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# David and Goliath in the Poll Booth: Group Size, Political Power and Voter Turnout\*

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## Abstract

This article analyses how the presence of a dominant group of voters within the electorate affects voter turnout. Theoretically, we argue that its absolute size affects turnout via increased free-riding incentives and reduced social pressure to vote *within* a larger dominant group. Its relative size compared to other groups within the electorate influences turnout through instrumental and expressive responses – in both the dominant and dominated groups – to the degree of electoral competition *between* groups. Empirical evidence from a large cross-section of German municipalities is in line with these theoretical predictions. The observed effects should be taken into account when redesigning electoral jurisdictions through, for instance, municipal mergers or gerrymandering.

**Keywords:** *Voter turnout, Power, Group size, Merger, Gerrymandering.*

**JEL-Classification:** *D70, D72, H11, H40*

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# 1. Introduction

Electoral jurisdictions typically consist of several groups of voters (e.g., neighbourhoods within a city, or distinct population centres merged into one municipality), but generally hold only one election to determine the local political majority. This political majority subsequently decides upon public good provision financed from a common pool of resources within its boundaries. Some of these public goods will have a highly localized character and mainly benefit one specific group ('local' public goods). For instance, a park or swimming pool in one neighbourhood predominantly benefits the inhabitants of that neighbourhood. With a common pool of resources, such local public goods are desirable for each population group within the jurisdiction since the cost of their provision will be spread over the jurisdiction's total population (Weingast et al. 1981; Baron and Ferejohn 1989; Saarimaa and Tukiainen 2015).

However, in order to gain representation and achieve one's preferred distribution of public expenditures, at least some group members have to bear the cost of political participation: for instance, by turning out to vote and casting a ballot in favor of the group's most-preferred candidate. This turnout decision of individuals within a group-based social setting has received substantial theoretical and empirical attention (Uhlaner 1989; Coate and Conlin 2004; Feddersen and Sandroni 2006; Fowler 2006; Gerber et al. 2008; Ben-Bassat and Dahan 2012; for a review, see Geys 2006a). Yet, most of these contributions are predominantly concerned with how individually optimal free-riding upon the efforts of other group members can be overcome (Schram 1991; Bufacchi 2001; Grossman and Helpman 2001). Empirical work thereby illustrates that turnout increases with group identity and altruistic feelings (Schram and Sonnemans 1996; Fowler 2006), the extent of social interaction (Grossman and Helpman 2001) and when one observes 'allies' voting (Großer and Schram 2006). Less attention has been given to turnout decisions in the presence of multiple social groups of differing sizes. In this article, we contribute to the literature by analyzing voter turnout in a common-pool setting where *multiple* groups within a jurisdiction aim for the same prize (i.e. political representation). We

specifically focus on how the presence of a dominant group affects the overall level of voter turnout.

Theoretically, we argue that two effects will be at play. First, each group within the jurisdiction wants to win the election, because political representation matters for the distribution of public spending (Weingast et al. 1981; Baron and Ferejohn 1989). This induces competition *between* groups within the electorate. Second, each group faces free-riding incentives *within* its members, which must be overcome to gain representation. The presence of a dominant group within the electorate impacts both these dimensions – and thereby affects the overall level of turnout. In particular, we maintain that the *absolute* size of a dominant group increases free-riding incentives and reduces social pressure *within* that group, which depresses voter turnout. However, this effect is mitigated by the group’s *relative* dominance over other groups (i.e. its political power) because a dominant group’s ability to win the *between*-group competition declines with internal abstention.<sup>1</sup> Furthermore, the *relative* size of a dominant group limits the extent of competition *between* groups. This reduces voter turnout for instrumental reasons (Downs 1957), unless the dominant group’s *absolute* size triggers a large expressive benefit from voting for and identifying with the winning group (Hinich 1981; Ashworth *et al.* 2006). The empirical evaluation of these theoretical propositions using data on local elections in 577 German municipalities across seven Länder shows substantial supportive evidence.

From a policy perspective, these arguments and findings have important implications for the design or demarcation policy of government jurisdictions – whether via municipal merger processes or gerrymandering. While previous research studies whether local democracy considerations are involved in shaping the post-merger municipal structure (Hyytinen et al.,

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<sup>1</sup> The absolute size of a group does not necessarily equal its power in the political process. Rather, it is the distribution of group sizes – i.e. each group’s size *relative to* all other groups – which determines each group’s power (Shapley and Shubik 1954; Banzhaf 1965; Laruelle and Valenciano 2001). As such, we will often use the terms ‘relative size’ and ‘(political) power’ interchangeably in the remainder of this article.

2014; Saarimaa and Tukiainen 2014), highlights important effects of municipal mergers in terms of fiscal policies (Hinnerich 2009; Reingewertz 2012; Blom-Hansen et al. 2016) and discusses the effect of gerrymandering on vote choice and parties' electoral (dis)advantage (Erikson 1972; Shotts 2002; Engstrom 2006), it pays little attention to the potential effect of such redistricting measures on residents' turnout decisions. Our results illustrate that this is an over-simplification. This effect derives from changes generated in the electorate's *composition* (i.e. the absolute and relative sizes of competing groups), and is independent of the fact that mergers and gerrymandering affect the size of the electorate.

## 2. Theoretical background

To guide our theoretical discussion, figure 1 depicts two electoral jurisdictions with five distinct subsets of voters – which we refer to as ‘groups’. Without loss of generality, one might think of the electoral jurisdictions as municipalities and of the groups in terms of geographical characteristics: e.g. communities, neighbourhoods, or districts.<sup>2</sup> Both jurisdictions A and B in figure 1 have an identical set of voters. The sole difference between the two jurisdictions is that one group of voters is larger than all others in jurisdiction A (which we refer to as a ‘dominant’ group), while all groups are approximately equal-sized in jurisdiction B. To analyse how this composition of the electorates in both jurisdictions affects voter turnout in the general election (i.e. at the jurisdiction level), figure 1 clarifies that two elements should be taken into account:

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<sup>2</sup> Voters naturally may also feel part of non-geographic groups, such as those based on socio-economic characteristics. The exact nature of the groups is irrelevant for our theoretical argument, but we discuss a geographic criterion for groups here as this will be central to our empirical analysis. Anecdotal evidence suggests that such geographical ‘community’ considerations can be very strong, and often are connected to distinctive policy preferences (Wille and Deschouwer, 2012; see also note 4 below). For our empirical analysis, it is sufficient that geographical group considerations have *some* relevance for individuals – even if they play a minor role compared to socio-economic ones.

a) the absolute size of the dominant group and b) its relative size or power compared to the other groups in the jurisdiction.

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Figure 1 here

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## 2.1. Assumptions

Based on insights from the foregoing literature, we first set out and justify key assumptions concerning the roles of the absolute and relative size of any given group for turnout within that group. We thereby rely on arguments embedded in both instrumental and expressive rationality. Although the former has been dominant in the existing literature, ignoring expressive rationality in our view may lead to an incomplete analysis and biased inferences.

From an instrumental rationality perspective, turnout is a function of the voter's estimate of the difference in expected utilities from the election candidates' policies ( $B$ ) – weighted by the probability that one's vote determines the election outcome ( $p$ ) – and the costs of voting ( $C$ ) (Downs, 1957; Riker and Ordeshook, 1968; Geys, 2006a). Within this framework, each individual voter's probability of being pivotal ( $p$ ) is reduced when the voting population is larger and the election is not close. Consequently, turnout is expected to decline under these circumstances (Cancela and Geys, 2016). This line of argument directly implies that the absolute size of any group within the population works to depress turnout for instrumental reasons, while a group's relative size reduces (increases) turnout when it is dominant (dominated).<sup>3</sup>

From an expressive perspective, voters have been found to obtain utility from supporting the winning group (Hinich, 1981; Ashworth *et al.*, 2006). This implies that turnout in a dominant

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<sup>3</sup> Note that an increased relative size of a dominated group benefits the closeness of the election.

group may increase with relative group size due to such expressive benefits (while it should have no immediate effect on members of a dominated group). Absolute group size, however, can have two opposing effects within an expressive context. On the one hand, it may undermine the extent of social pressure to vote within any given group (Schram and van Winden, 1991; Grossman and Helpman, 2001). On the other hand, group identification is a positive function of group size because the distinctiveness of a social category is determined at least in part by the number of people qualifying for inclusion in that category (Brewer *et al.*, 1993; Ellemers *et al.*, 1999). Depending on the relative importance of both elements, turnout within any group may thus either increase or decrease with its absolute size from an expressive perspective.

These assumptions can now be combined to study turnout within any given group and derive hypotheses on the overall turnout effect of having one dominant group in the electorate.

## **2.2. Relative size effect of dominant group**

In a two-group setting, a dominant group representing 80% of the population is more likely to win the electoral competition between groups than a dominant group representing only 55% of the overall population, all else equal. More generally, the *relative* size or political power of a dominant group directly affects its probability of winning the electoral competition *between* groups (Downs 1957; Riker and Ordeshook, 1968). Based on the assumptions outlined above, this has different implications for individuals' turnout decisions in the dominant and dominated groups (as indicated in Figure 2).

In the dominated group, turnout is likely to decline because individuals in this group realise that their probability to win the election falls (Downs 1957; Riker and Ordeshook, 1968). The effect on individuals in the dominant group, however, is a priori unclear. From an instrumental perspective, turnout may fall because its members understand that their vote becomes increasingly less necessary to clinch electoral victory. From an expressive perspective, however, turnout may increase to the extent that voters obtain utility from supporting the

winning group (Hinich 1981; Ashworth *et al.* 2006). Moreover, the latter effect is likely to be increasing in the *absolute* size of the dominant group because group identification rises with group size (Brewer *et al.* 1993; Ellemers *et al.* 1999), and the expressive utility from voting for a winner thus may be “positively related to the number of other voters for the same candidate/party” (Ashworth *et al.* 2006, 387; Schuessler 2000). Hence, at any given level of the *relative* size of a dominant group, a larger *absolute* size of the dominant group strengthens the positive effect of expressive utility on turnout.

Taking the diverse effects within the dominant and dominated groups together, the *relative* size of a dominant group can be expected to depress voter turnout whenever the positive ‘expressive’ or identification effect is limited and outweighed by the negative instrumental effect. However, an increasing absolute size of the dominant group (keeping relative dominance constant) induces a larger expressive benefit for voters within the dominant group. This implies that any negative effect on overall turnout due to instrumental calculations becomes weaker when the absolute size of the dominant group increases. This leads to our first hypothesis.

Hypothesis 1: The *relative* size or power of a dominant group in the electorate initially depresses voter turnout, but this negative effect becomes weaker when the absolute size of the dominant group increases.

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Figure 2 here

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### **2.3. Absolute size effect of dominant group**

A larger dominant group reduces its members’ incentive to vote for both instrumental reasons (as the probability for each individual within that group to be pivotal declines; Downs 1957; Riker and Ordeshook, 1968) and expressive reasons (due to reduced social pressure to vote

within larger groups; Schram and van Winden, 1991; Grossman and Helpman, 2001). Clearly, however, any such turnout-reduction within the dominant group increases the probability that a dominated group gains the upper hand in the contest *between* groups (i.e. the electoral contest becomes closer). Since winning the competition *between* groups is desirable for both instrumental (i.e., setting public policy) and expressive (i.e., identifying with the winner) reasons, this may work to stimulate turnout in the dominated group (see section 2.1.). In other words, declining turnout in the dominant group may stimulate turnout in the dominated group (column 1 in figure 3).

Importantly, since this effect can be anticipated by members of the dominant group, it is likely to provide a counter-weight to the tendency towards abstention in larger dominant groups discussed above. Maintaining a dominant position in the competition between groups indeed requires that turnout in the dominant group should not decline too much when its absolute size increases (for a given size of, and turnout in, the dominated groups). A simple numerical example might clarify this line of argument. Consider three groups with 12000, 4000 and 2000 voters, respectively. Turnout rates are a decreasing function of absolute group size (see above) and stand initially at 20%, 30% and 40%, respectively. Consequently, the 2400 voters in the dominant group win against 1200 and 800 voters, respectively, in the dominated groups. Now imagine that the dominant group gains 2500 additional individuals, and turnout declines to, say, 14%. This would imply that only 2030 voters will turn out in the dominant group, barely 30 more than in the dominated groups (at unchanged turnout rates). This closer contest, we argue, would work to raise turnout in the dominated groups *and* limit the decline in turnout in the dominant group.

Clearly, both elements would play out more strongly when the initial relative size of the dominant group is smaller – as this would make it more likely that a turnout decline among its members triggers a loss in the competition between groups. Hence, the relative size of the dominant group can be expected to mediate any decline in turnout within a larger dominant

group (column 2 in figure 3), if only because its relative size determines how ‘risky’ an internal turnout decline is to win the election. These varying forces lead to our second hypothesis.

Hypothesis 2: The *absolute* size of a dominant group in the electorate may increase or depress voter turnout depending on the level of its *relative* size.

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Figure 3 here

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### **3. Empirical implementation**

Germany provides an interesting empirical laboratory for our analysis. Local public good provision is to a large extent delegated to the municipal level, and Germany has witnessed several waves of municipal mergers (more details below). Importantly, although administrative tasks generally become concentrated during municipal mergers, the old population centres most often remain physically and psychologically distinct. They can also retain their distinct sense of local community – with distinctive policy preferences and strong demands for ‘local’ representation in the municipal council – even many years after the amalgamation process (Wille and Deschouwer, 2012).<sup>4</sup> This setting allows assessing the effects on voter turnout of the composition of the electorate by including measures for the *relative* and *absolute* size of the dominant sub-electorate within a (merged) municipal population.<sup>5</sup>

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<sup>4</sup> One recent example in Belgium is a 2015 petition against the planned introduction of one single postal code for the municipality of Beringen – almost 40 years after Beringen merged with three other communities in 1976. The main reason for the opposition was that the unified postal code represents “an assault on the individuality of our communities” (Royackers, 2015; own translation).

<sup>5</sup> If municipal amalgamations are in some way connected to factors related to voter turnout in elections, this may induce endogeneity concerns in our analysis. From this perspective, it is important to note that we have no knowledge of any studies in the vast literature on voter turnout nor that on municipal amalgamations suggesting – or empirically verifying – turnout-related drivers of amalgamation processes.

### **3.1. Institutional framework and sample**

Legislative responsibilities in Germany are federally organized and divided between the national and the regional level (called ‘Länder’). From a legal perspective, local authorities are self-regulatory bodies within the regions’ administration, which can act autonomously as guaranteed by the second paragraph of Article 28 of Germany’s Constitution.<sup>6</sup> The institutional setting and scope of the provision of public goods and services at the local level are further determined by the regions’ legal framework. Typically, however, local governments are responsible for welfare services (such as child care provision and education), cultural events, sports and recreational facilities (such as parks), and local infrastructure investments (including roads). Local government revenues mainly derive from three sources: allocated grants, taxes and fees.

It should be noted that we have consistently referred to local governments – rather than municipalities. The reason is that local government in Germany consists of counties (‘Kreise’), municipalities (‘Gemeinden’), and independent towns (‘kreisfreie Staedte’). Independent towns cover functions of counties and municipalities at the same time. Hence, to ensure comparability in the amount of public good provision among the local jurisdictions included in our analysis, we exclude independent towns and focus purely on municipalities.

The electoral rules at the local level differ slightly by federal state. Still, in all cases citizens vote for parties and lists of independent candidates to be elected as members of the local council using a proportional election rule. Parties holding a majority in the council then form a government (possibly by forming a coalition). In smaller municipalities, the mayor is elected by the members of the majority in the municipal council. In larger municipalities, the mayor is

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<sup>6</sup> For a more detailed description of Germany’s federal system, see, for example, Biehl (1994).

directly elected by citizens using majority rule and runoff elections (note that in these mayoral election campaigns, parties typically form coalitions by recommending their supporters to vote for their favourite candidate). However, the mayor lacks strong political power to decide on public good provision. As this power resides with the council, we concentrate on the municipal council elections in our analysis.

Our central analysis also concentrates on one particular type of municipalities. Many current German municipalities comprise formerly independent communities, and they tend to institutionally deal with this historical legacy in different ways. While some municipal governments directly account for possible variation in local preferences within a municipality by having two bodies of government, others concentrate all decisions in one centralized parliament. Since the former type of municipalities explicitly allows for political representation of local communities within the municipality (Michelsen et al. 2014), they provide an institutional solution for any power struggles between geographically distinct groups of voters within a municipality. In the second group, however, local interests are instead debated in one jointly elected municipal council. Given this institutional design, we focus on these municipalities in our analysis. This indeed represents the only setting where the absolute and relative size of local communities can affect municipal-level turnout rates.<sup>7</sup>

Our final sample of 577 German municipalities (across seven Länder) is determined by imposing two further restrictions. First, to ensure sufficiently comparable political conditions, we only include municipalities that held elections in the 2002-2005 period. Second, we drop geographically homogenous municipalities since our theoretical argument relies on (potential)

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<sup>7</sup> In some states, so-called ‘Ortschaftsverfassungen’ allow for some degree of local autonomy. This setting hands back some competences in administering and decision-making on local public good provision to communities. In practice, this opportunity is only rarely applied and limited to a small number of municipal tasks (Rosenfeld et al. 2007).

conflict between different groups within a municipality. As discussed in more detail in the next section, we operationalise such political conflicts using information about the presence of geographically distinct disentangled residential areas within a municipality (which usually reflect communities merged into one new municipality in the past). All data derive from the German Federal Statistical Office.

Local amalgamation processes have taken place at different points in time in each of the federal states considered in the analysis. While a first wave of municipal amalgamations took place in the 1970s in the area of the Federal Republic of Germany, a second wave of municipal amalgamations took place in the mid-1990s in the area of the former German Democratic Republic (GDR). According to Wollmann (2004, p. 641), both waves of local government reforms and amalgamations in Germany predominantly followed a traditional approach “meant to strengthen the political and administrative institutions”. Such reforms attempt to preserve the influence of citizens rather than reduce it – unlike reforms guided by the idea of New Public Management (NPM) introducing privatization and outsourcing of administrative tasks. Moreover, the mergers in most of the amalgamation processes in Germany are best viewed as semi-voluntary since political encouragement for merging was very strong even though municipalities were – in a first step – allowed to choose their merging partners (in a second step state-level governments often enforced further mergers) (see also Egger et al. 2017).

### **3.2. Empirical strategy**

Although our theoretical argument implies a number of auxiliary predictions on turnout rates at the group level, we unfortunately lack information on voter turnout at this level in our dataset. Hence, we are unable to differentiate turnout rates of the different groups within a municipality. However, our analysis provides insights on the average effects of municipal amalgamations, and in particular on the role of asymmetric political power across groups for voter turnout.

Clearly, the empirical verification of group-level implications of our theoretical argument should be seen as an important avenue for further research.

To empirically estimate the effects described in the previous section, we follow the approach described in equation 1:

$$turnout_i = \alpha + \varphi_{power} \cdot power_i + \varphi_{interaction} \cdot size_i \times power_i + \varphi_{size} \cdot size_i + \beta \cdot X_i + \nu_i \quad (1)$$

where  $turnout_i$  is defined as the number of votes cast divided by the eligible population in municipality  $i$ ,  $X_i$  is a vector of control variables,  $\alpha$ ,  $\varphi_{power}$ ,  $\varphi_{interaction}$ ,  $\varphi_{size}$  and  $\beta$  are a set of parameters to be estimated, and  $\nu_i$  denotes an i.i.d. error component.

The coefficients of central interest are those measuring the absolute ( $\varphi_{size}$ ) and the relative size ( $\varphi_{power}$ ) of the dominating group in the electorate. By introducing an interaction between absolute and relative size ( $\varphi_{interaction}$ ), we aim at estimating the effects described in hypotheses 1 and 2:  $\varphi_{power} < 0$ ,  $\varphi_{size} < 0$ , while  $\varphi_{interaction} > 0$ .

To most closely capture the idea that “voters’ preferences are likely to be heterogeneous with respect to the geographic location of [public] services” (Saarimaa and Tukiainen 2016: 31; see also Alesina and Spolaore 1997), we define subsets of voters within the municipal population geographically. An example is provided in Figure 4, which illustrates that our division rests upon the identification of disentangled residential areas within the municipal boundaries using geo-referencing methods. Based on geographical information available in the election year, we identify all disentangled residential areas within the administrative boundaries of each municipality. As there exists no structured information about the amalgamation processes of the past, we focus on those settlements that have their own place name. The place name is a good indicator for previously independent localities that merged into one new (larger) municipality, as, typically, new residential construction lots are assigned to an existing locality. In a second step, we use the generated spatial information to determine the residential space of each locality. As the information on the total number of eligible voters is only available on the

municipality level, the residential space is used as weight to approximate the number of eligible voters for each locality in a third step. Based on this information, power indices are calculated.

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Figure 4 here

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Our measure for the dominant group's *absolute* size is the number of eligible voters in the largest disentangled residential area within the municipality. Its *relative* size is measured via the Shapley-Shubik and normalized Banzhaf power indices, which quantify the implicit a priori political power of different groups within the municipality (Shapley and Shubik, 1954; Banzhaf, 1965). The underlying idea is that each groups' power in the decision process over local public good provision in the municipality is determined by both its own size *and* that of the other sub-electoralates. Putting this information in one measure, the Shapley-Shubik and normalized Banzhaf power indices allow us to quantify how 'power'-ful the largest group is (on a 0-1 scale) in terms of dominating the municipal political process under simple majority rule (for a comparison of both indices, see Laruelle and Valenciano 2001). Specifically, the Shapley-Shubik index reflects the share of all voting sequences in which a group casts the deciding vote, while the Banzhaf index represents the probability with which a group can change the outcome of a majority vote.

Taking advantage of the existing literature (Geys 2006b; Cancela and Geys 2016),  $X_i$  includes variables for the overall size of the municipality (population)<sup>8</sup>, the closeness of the election,<sup>9</sup>

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<sup>8</sup> The overall population and the number of eligible voters in the largest residential area are correlated by nature. Including both variables—as suggested by theoretical considerations—comes at the costs of larger standard errors, which implies that the inferences drawn from our estimation will be less precise. Even so, we find significant coefficients for both variables in all specifications (see below).

<sup>9</sup> Unfortunately, ex-ante data on election closeness from, for instance, pre-election polls are not available. Also, significant changes in the municipal structure prevent us from using historical election outcomes as a proxy

share of non-partisan votes, share of high- and low-educated inhabitants<sup>10</sup>, share of long- and short-term unemployed, population density, population mobility, municipal age structure and concurrent (EU or state-level) elections. Remaining unobserved level effects across the German territory are accounted for by an East Germany dummy (which captures all municipalities located in the area of the former GDR) as well as three additional region dummies (other regional indicator variables are dropped to avoid linear dependency). Detailed variable definitions and descriptive statistics for all variables are provided in Table 1.

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Table 1 here

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### 3.3. Econometric issues

The dependent variable (i.e., turnout) is a fractional response variable, and by definition bounded on the 0-1 interval. Hence, we estimate equation (1) using the quasi-maximum likelihood method (QMLE) based on a Bernoulli log-likelihood function proposed by Papke and Wooldridge (1996).

$$E(\textit{turnout}_i | z_i) = G(z_i\pi) \tag{2}$$

where  $z_i$  stands for a matrix of all explanatory variables in equation (1) and  $\pi$  subsumes the corresponding parameter vector. We choose the non-linear function  $G(\cdot)$  to be the logistic function satisfying  $0 \leq G(\cdot) \leq 1$ . This estimator is preferable to OLS or Tobit-based estimators since it is consistent and asymptotically normal regardless of the true distribution of  $\textit{turnout}_i$  on the set of explanatory variables  $z_i$ , given that  $E(\textit{Turnout}_i | z_i)$  is correctly specified (for detailed

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(note that this would in itself be an imperfect proxy given the long time period between consecutive local elections). The ex-post measure of closeness we rely on is, however, potentially endogenous as it may be affected by turnout levels. Still, excluding it from the analysis leaves our key results unaffected.

<sup>10</sup> As no data exists for the education level of the entire population, we use data from employment statistics.

discussion, see Papke and Wooldridge, 1996). All results are robust, however, to using OLS, logit and a fully parametric (ML) beta regression approach (details upon request).

Our analysis exploits a cross-section of municipalities, which may lead to biased inferences whenever group size or power in municipalities are correlated with unobserved municipal attributes that also affect voter turnout. We cannot formally rule out the existence of such factors, and the nature of the data available does not enable us to address this issue in detail (e.g., using instrumental variable techniques). Furthermore, mergers commonly occur between smaller municipalities or bring together one large municipality with several smaller ones, whereas large municipalities are unlikely to merge with other large municipalities. This might introduce selection issues for our analysis, and may cause biased estimates since voter turnout is negatively correlated with population size (Cancela and Geys, 2016).<sup>11</sup> As our cross-sectional data again make it nearly impossible to address this in a fully credible fashion, this should be kept in mind when interpreting our findings. Future research should ideally exploit panel datasets or sources of exogenous variation to deal with these concerns.

#### **4. Results and Robustness**

Our main findings are summarized in Tables 2 and 3. Model I relies on the Shapley-Shubik index to proxy the largest group's relative dominance while Model II employs the Banzhaf index. To evaluate the robustness of our results to the use of such power indices, we also replicate the analysis using an indicator variable equal to one if the largest residential area

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<sup>11</sup> Consider, for instance, a merger between two municipalities. If both are small, relative group size will be small and voter turnout high (since small pre-merger size would be associated with higher turnout). However, if one municipality is very large and one very small, relative group size will be high and turnout low (since large pre-merger size would be associated with lower turnout). Based on this example, relative group size would be negatively associated with voter turnout due to such selection issues. This implies that our estimates reported below might be biased downwards.

exceeded 50% of the population (Model III) or the population share of the largest residential area (Model IV). Overall, our results are robust to these operationalization choices.

To begin with a brief discussion of the control variables, we find that these are largely in line with findings in the turnout literature (Geys 2006b; Cancela and Geys 2016). For instance, lower education levels are linked to lower turnout rates, while concurrent state-level elections are associated with higher voter turnout. Interestingly, concurrent EU elections are linked to *lower* turnout in municipal elections, which may reflect that their continued second-order nature fails to generate sufficient interest – and turnout. The role of unemployment appears to depend on its exact nature: i.e. short-run unemployment is correlated with higher turnout while the reverse is true for the long-term unemployment rate. The share of non-partisan votes is linked to significantly higher turnout, which most likely reflects the fact that higher political interest in the municipal population enhances both the number of non-partisan lists presented to the population and voter turnout. Finally, we find that population size, density and mobility have no significant independent effects on voter turnout in our sample, and that the closeness of the election (measured *ex post*) *decreases* turnout. While the latter finding contradicts Downs' (1957) predictions and is unexpected, it is not entirely uncommon in the literature (Geys 2006b; Cancela and Geys 2016).<sup>12</sup>

#### **4.1. The empirical effects of absolute and relative size**

Turning to our key explanatory variables, we first of all find a negative direct effect on voter turnout of the *absolute* number of voters in the largest disentangled residential area within the municipality. Although this weakens when the political power of this largest group increases

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<sup>12</sup> In our setting, this unexpected closeness effect may simply reflect that the (*ex post*) difference between winner and runner-up is a highly imperfect measure of the competitiveness of an election in a multi-party setting. Moreover, the (*ex ante*) expected closeness of an election may be better captured by the 'power' variable in our model (which measures the relative size of different residential areas within the municipality).

(as indicated by the positive interaction term; see also below), the *overall* effect of the dominant group's absolute size never turns positive since both power indices lie between 0 and 1. Large groups thus are associated with lower voter turnout across all levels of relative group size (although the coefficient estimate becomes statistically indistinguishable from 0 when relative group size approaches its maximum value of 1). In terms of effect size, our findings indicate that adding 1000 individuals to the dominant group (remember that mean group size is just over 6600 individuals) is associated with a turnout decline of 3.8% when the group's relative size is at the minimum value (i.e. 0). This reduces to a turnout decline of 0.8% when the dominant group's relative size is at the maximum observed value (i.e. 1). This result is in line with hypothesis 2, and suggests that an increasing absolute size of a dominant group in the electorate tends to depress overall voter turnout.

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Tables 2 and 3 here

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Secondly, we find that the sign of the coefficient estimate for *relative* group size varies with the absolute size of a group. It is negative and statistically significant for very small groups, but turns positive for larger groups (i.e., over 4354 individuals, or roughly 51 percent of our observations). More specifically, a one standard deviation change in the dominant group's relative size (equal to about 0.3) is associated with a turnout decline of 4% when this group's absolute size is at the minimum observed value (i.e. 200 individuals). When the dominant group's absolute size is at the maximum observed value (i.e. roughly 59000 individuals), a one standard deviation change in its relative size is linked to an increase in turnout of 1.5%. This pattern is in line with hypothesis 1, and supports the idea that "the number of other voters for the same candidate/party" positively affects individuals' expressive utility from turning out on Election Day (Ashworth *et al.* 2006, 387; Schuessler 2000). At a certain point, this effect fully

compensates the negative direct effect of relative size or power of the dominant group (graphical illustrations available upon request).<sup>13</sup>

## 4.2. Validity check

A key implicit assumption in our empirical analysis based on municipal-level data is that disentangled residential areas constitute voting blocks within the municipality. As we lack information on the results of an election on the level of these residential areas, we unfortunately cannot directly verify this crucial assumption by comparing the vote shares for the respective parties within a municipality. However, as a validity check, we *can* use the information from elections held in other municipality types, where information on elections for each decentralized municipal council is available. Such municipalities are similar in size and composition compared to the municipalities in our main sample, despite the fact that localities within them are legally independent. Specifically, to check the validity of our voting block assumption, we test whether the distribution functions of the disaggregated and aggregated results of the elections are equal for each party running in the local elections (i.e. CDU, SPD, Green Party, FDP, PDS and “others”). Significant differences between the distribution functions of the aggregated and disaggregated vote shares would support our assumption. Non-parametric Kolmogorov-Smirnov tests consistently reject the null of equality of the distribution functions at any level of confidence. This provides support for our assumption that disentangled residential areas indeed constitute separate voting blocks (detailed results available upon request).

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<sup>13</sup> Excluding our interaction term or running models with *either* absolute *or* relative group size (but not the other) indicate that both aspects have an overall negative relation to voter turnout. When adding non-linear terms to the model, we lose statistical significance for the coefficient estimates of relative group size, but overall the key results remain qualitatively unaffected.

## 5. Concluding discussion

This article argued that *both* the absolute *and* the relative size of a dominant group of voters within the electorate can have an important impact on voter turnout. Using data from a large cross-section of German municipalities and operationalizing groups of voters based on disentangled residential areas within the municipality, our empirical analysis confirms that both characteristics interactively influence voters' decision-making process. However, further research is required regarding the complex mechanics underlying democratic decision-making in such settings and on the exact nature of politically relevant cleavages between voter groups. Although our analysis concentrated on a geographical characterisation of voter groups, one might indeed imagine similar effects with respect to, for instance, partisan affiliation or based on socio-demographic characteristics (including age, gender or income).

Overall, our analysis provides support for the idea that the design or demarcation policy of electoral districts directly affects voter turnout. Admittedly, this is not a novel finding. Earlier work has shown that political involvement and (feelings of) political efficacy of inhabitants are affected by municipal mergers. Yet, as mergers by construction lead to larger political entities, the channel of influence this literature has concentrated on is a simple size effect (e.g. Lassen and Serritzlew 2011). In reality, mergers also redefine the relative size and geographical dispersion of groups within a merged jurisdiction. Our findings illustrate that these are additional sources of influence over individual's turnout decisions. Moreover, looking beyond mergers, re-districting efforts could have no impact on the overall size of an electoral jurisdiction, while affecting its composition. We highlight that such re-apportionment of the local political power distribution can have substantial effects on voter turnout.

Our findings also add to the ongoing debate on the potential role of competitiveness (and hence the size of dominant groups) for voter turnout. As pointed out by Geys (2006b), existing scholarship has reached no consensus – neither empirically nor theoretically. Abrahamson et al. (2007), for instance, found that the expectation of a more decisive electoral victory reduces

the likelihood that people participate in the election (in a majoritarian setting), while Ashworth et al. (2006) find that clear winners may stimulate turnout (in a PR setting). This confirms Grönlund's (2004) finding that electoral system typology plays a critical mediating role: i.e. the dominance of one group depresses turnout in a plurality system but increases political participation in a proportional setting. Our analysis adds to this debate by indicating that not only the relative size of different groups matters (i.e. their dominance), but also the largest group's absolute size – and that these effects interact with one another.

Finally, from a practical perspective our results imply that politicians and planners of jurisdictional reforms should take the composition of amalgamated entities into account. The reason lies in the fact that such reforms often aim at increasing the efficiency in local public good provision by increasing the size of local governments (Geys et al. 2008). However, since political participation can have a beneficial influence on public sector efficiency (Borge et al. 2007; Geys et al. 2010), our results imply that the influence of a re-composition of the population on voters' incentives to turn out on Election Day may either fortify or abate any efficiency gains from mergers that arise from, for instance, economies of scale.

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Table 1: Variable definition and descriptive statistics (N=577)

<b>Variable</b>	<b>Description</b>	<b>Mean</b>	<b>SD</b>	<b>Min; Max</b>
<b>Endogenous variable</b>				
<i>Turnout</i>	Votes cast / eligible voters	0.5086	0.0794	0.28; 0.72
<b>Explanatory variables</b>				
<i>Power</i>	Shapley-Shubik or	0.7834	0.3010	0.01; 1
	normalized Banzhaf index	0.8010	0.2964	0.01; 1
<i>Size</i>	Number eligible voters in dominating group (in 1000)	6.6269	7.3604	0.20; 59.23
<i>Total population</i>	Total inhabitants (in 1000)	12.854	12.141	0.37; 112.23
<i>Closeness</i>	Difference between winner and runner-up (in %)	0.1905	0.1891	0; 1
<i>Non-partisan votes</i>	Dummy=1 if average share of non-partisan votes exceeds 33.3%	0.3812	0.4861	0; 1
<i>Population density</i>	Number inhabitants/km <sup>2</sup> (in 1000)	0.3278	0.3443	0.01; 2.02
<i>Population mobility</i>	In- and out-migrants / total population	0.1062	0.0301	0.02; 0.22
<i>HHI age</i>	Herfindahl index of age-structure	0.0704	0.0038	0.06; 0.11
<i>Long-term unemployment</i>	Number unemployed over 12 months / total population	0.0152	0.0227	0; 0.29
<i>Short-term unemployment</i>	Number unemployed under 12 months / total population	0.0441	0.0615	0.0002; 0.79
<i>Education high</i>	Employees with university degree / total population	0.0187	0.0191	0; 0.17
<i>Education low</i>	Employees without vocational training and without secondary school education / total population	0.0366	0.0267	0; 0.25
<i>Dummy EU election</i>	Dummy=1 if concurrent EU election	0.6655	0.4722	0; 1
<i>Dummy state election</i>	Dummy=1 if concurrent state election	0.1906	0.3931	0; 1
<i>Dummy east</i>	Dummy=1 if former GDR	0.5303	0.4995	0; 1
<i>Dummy RP</i>	Dummy=1 if municipality is located in Rhineland-Palatinate	0.0555	0.2291	0;1
<i>Dummy BW</i>	Dummy=1 if municipality is located in Baden-Wuerttemberg	0.2790	0.4489	0;1
<i>Dummy MV</i>	Dummy=1 if municipality is located in Mecklenburg-Western Pomerania.	0.0849	0.2790	0;1

Table 2: Quasi-maximum likelihood (QMLE) estimation results

	<b>Model I</b>		<b>Model II</b>	
	<b>(Shapley-Shubik index)</b>		<b>(normalized Banzhaf index)</b>	
	Coef.	Standard error	Coef.	Standard error
<i>Size</i>	-0.038 *	0.016	-0.037 *	0.016
<i>Power x Size</i>	0.030 *	0.013	0.029 *	0.013
<i>Power</i>	-0.130 **	0.044	-0.126 **	0.044
<i>Total Population</i>	-0.003	0.003	-0.003	0.003
<i>Closeness</i>	0.209 **	0.057	0.210 **	0.057
<i>Non-partisan votes</i>	0.067 **	0.022	0.068 **	0.022
<i>Population density</i>	-0.017	0.046	-0.019	0.046
<i>Population mobility</i>	0.049	0.398	0.039	0.398
<i>HHI age</i>	6.699 **	2.504	6.672 **	2.507
<i>Short-term unemployment</i>	1.293 *	0.578	1.316 *	0.587
<i>Long-term unemployment</i>	-3.985 *	1.902	-4.043 *	1.914
<i>Education high</i>	0.250	0.536	0.237	0.536
<i>Education low</i>	-1.613 **	0.469	-1.616 **	0.471
<i>Dummy EU election</i>	-0.243 **	0.050	-0.244 **	0.050
<i>Dummy state election</i>	0.412 **	0.044	0.413 **	0.044
<i>Dummy east</i>	-0.266 **	0.047	-0.265 **	0.047
<i>Dummy RP</i>	0.330 **	0.064	0.331 **	0.064
<i>Dummy BW</i>	0.314 **	0.059	0.316 **	0.059
<i>Dummy MV</i>	0.059	0.047	0.060	0.047
<i>Constant</i>	-0.129	0.192	-0.128	0.193
<i>R<sup>2</sup></i>		0.58		0.58

Note: N=577; \*\*, \* indicate significance at the 1%, 5% level of confidence.

Table 3: Robustness checks

<b>Variable</b>	<b>Model III</b>		<b>Model IV</b>	
	<b>(Dummy = 1 if largest residential area &gt; 50%)</b>		<b>(Population share largest residential area)</b>	
<b>Turnout</b>	<b>Coef.</b>	<b>Std. Err.</b>	<b>Coef.</b>	<b>Std. Err.</b>
<i>Size</i>	-0.027	0.095	-0.071*	0.018
<i>Power x Size</i>	0.018	0.069	0.054*	0.013
<i>Power</i>	-0.085	0.277	-0.064	0.062
<i>R</i> <sup>2</sup>	0.58		0.58	

Note: N=577; \* indicate significance at the 1% level of confidence.

Figure 1: Representation of possible group-size distributions

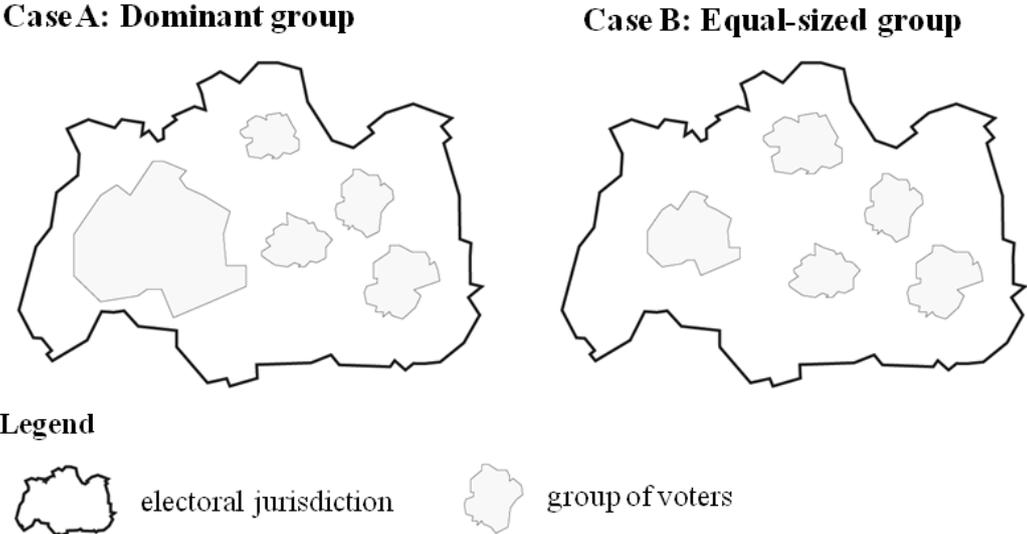


Figure 2: Instrumental and expressive effects of the *relative* size of the dominant group

	<b>Dominated group</b>	<b>Dominant group</b>	<b>Overall turnout</b>
Instrumental effect	↓	↓	↓
Expressive effect	-	Increasing with absolute size of the dominant group	Increasing with absolute size of the dominant group
Net effect	↓	↓/↑ (depends on absolute size of the dominant group)	↓/↑ (depends on absolute size of the dominant group)

Figure 3: Instrumental and expressive effects of *absolute* size of the dominant group

	<b>Dominated group</b>	<b>Dominant group</b>	<b>Overall turnout</b>
Instrumental effect	↑ (if turnout declines in dominant group)	↓ (depending on relative size of dominant group)	↓/↑ (depending on relative size of dominant group)
Expressive effect	↑ (if turnout declines in dominant group)	↓ (depending on relative size of dominant group)	↓/↑ (depending on relative size of dominant group)
Net effect	↑ (if turnout declines in dominant group)	↓ (depending on relative size of dominant group)	↓/↑ (depending on relative size of dominant group)

Figure 4: Identification of sub-groups in municipalities

