Unintended Consequences of Increasing Electoral Districts? – Evidence From Germany

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Abstract

Germany's Bundestag election on 26 September 2021 once again produced the largest parliament since the beginning of the Federal Republic of Germany. Due to numerous overhang and compensatory seats, there are now 736 MPs in the new legislative period – the Federal Election Act originally sets the number of MPs at 598. In order to prevent the Bundestag from becoming too large and thus keep it workable, a major electoral law reform is currently being discussed. The most controversial measure to reduce the size of the Bundestag is to lower the number of electoral districts. Critics often argue that the resulting larger constituencies could have a negative impact on the personal relationship between directly elected MPs and their constituents. We study this relationship by linking individual-level data from six German elections with spatial district-level data from the Bundeswahlleiter. First, we explore how electoral district size affects citizens' political attitudes and behaviour with cross-sectional comparative data. Secondly, we use the 1998 electoral district reform to investigate whether citizens living in significantly disrupted districts changed political attitudes and behaviour. Results indicate that spatial district size does not generally affect citizens' perceptions of the democratic system and their influence on political outcomes. District size further does not affect citizens' political participation. Also, despite the reform of 2002 significantly changing many electoral districts' borders, we cannot confirm empirically any negative side-effects. We contend that if merging districts helps ensure the parliament's capability to work efficiently, then there are no observable reasons on the part of voters against this policy.

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1 Introduction

Germany's Bundestag election on 26 September 2021 once again produced the largest parliament since the beginning of the Federal Republic of Germany. Due to numerous overhang and compensatory seats, there are now 736 MPs in the new legislative period - last time, there were 709. However, the Federal Election Act originally sets the number of MPs at 598. In order to prevent the Bundestag from becoming too large and thus to keep it workable, a major electoral law reform is currently being discussed.

The most controversial measure to reduce the size of the Bundestag is to lower the number of electoral districts. Critics often argue that the resulting larger constituencies could have a negative impact on the personal relationship between directly elected MPs and their constituents. Often referred to as district continuity ("Wahlkreiskontinuität"), politicians and the Federal Constitutional Court advocate for districts to have a "certain continuity of spatial shape". However, as research has shown, many citizens do not even know their local MP, so the question arises: Do citizens care about their electoral district's spatial size and continuity?

We study this relationship by linking German GLES individual-level data from six German elections with spatial district-level data from the Bundeswahlleiter. Our analysis is two-fold: First, we explore how electoral district size affects citizens' political attitudes and behaviour with cross-sectional data. Second, we study the potential unintended consequences of disrupting district continuity using the 1998 electoral district reform as a quasi-natural experiment. After the 1998 election, the number of electoral districts has once before been reduced from 328 to 299. We investigate whether citizens living in significantly disrupted districts changed political attitudes and behaviour. This two-step approach allows us to differentiate static size effects from reactions to a disruption in district continuity.

Results indicate that spatial district size does not generally affect citizens' perceptions of the democratic system and their influence on political outcomes. District size further does not affect citizens' political participation. Also, despite the reform of 2002 significantly changing many electoral districts' borders, we cannot confirm empirically any negative side-effects. Therefore, our analyses revealed no supporting evidence for the widespread criticism of disrupting district continuity. Consequently, we contend that if merging districts helps ensure the parliament's capability to work efficiently, then there are no observable reasons on the part of voters against this policy.

2 Background

One, if not the main focus of the reform debate, is the size of parliament. The Bundestag has grown steadily, especially recently, due to overhang and compensatory mandates: to currently 736 seats instead of the regular 598. This is mostly unanimously seen as a problem. In addition to the additional costs for taxpayers and the impaired functioning of a bloated parliament, political scientists (e.g. Decker and Jesse (2020); Lembcke and Heber (2018)) see the sanction character of elections, which is important in terms of democratic theory, endangered if corresponding losses of votes by parties do not lead to losses of mandates simply because the size of the Bundestag increases due to compensatory mandates. Two aspects come into focus in the reform discussion.

The first is to reduce the size of the Bundestag by dividing the federal territory into fewer constituencies. This measure can limit the possibilities for overhang and compensatory mandates from the outset. However, this is also accompanied by a change in specific constituency characteristics, such as enlarged constituencies: on the one hand, the area of the constituency area increases, and, on the other hand, there are, on average, more eligible voters per constituency. This can have different and possibly unintended consequences on voters, which are often criticised in public discourse. In this context, concerns are often expressed that enlarged constituencies could lead not only practically but also politically to less proximity between MPs and citizens (Krings, 2019) and thus "only increase the distance of federal politics from citizens" (Frieser (2019), 8). In this article, we want to shed light for the first time on whether empirical analyses can empirically confirm this criticism.

Secondly, the reform discussion is not only about the number of MPs but also about the electoral mode by which MPs enter parliament. The decisive factor is the ratio of MPs directly elected in the constituency to those entering the Bundestag by default via a list mandate or an additional compensatory mandate. This aspect can potentially play a role when voters distinguish between MPs with a direct mandate and those with a list mandate. However, in this article, we deal exclusively with the first aspect of constituency size.

In October 2020, the then Bundestag agreed on an amendment to the Federal Electoral Act with the votes of the governing parties of the CDU/CSU and the SPD, according to which the number of constituencies would now be reduced from 299 to 280 with effect from 1 January 2024 (Deutscher Bundestag, 2020). This was preceded by a more far-reaching bill proposed by the then opposition parliamentary groups of the FDP, the Greens and the Left, which wanted to reduce the number of constituencies even to 250. The Bundestag constituencies vary in population size and area. In the 2021 Bundestag election, the average German constituency was 1,959 km^2 in size and had a population of approximately 278,147 citizens. In comparison,

the average constituency in France is 1,096 km^2 with about 125,000 citizens; in the United Kingdom, the average constituency is 373 km^2 with a population size of approximately 71,631. However, both countries show a large variance, especially in terms of geographical area. In the United Kingdom, the largest constituency covers almost 12,000 km^2, while the smallest constituency is only 7.35 km^2.

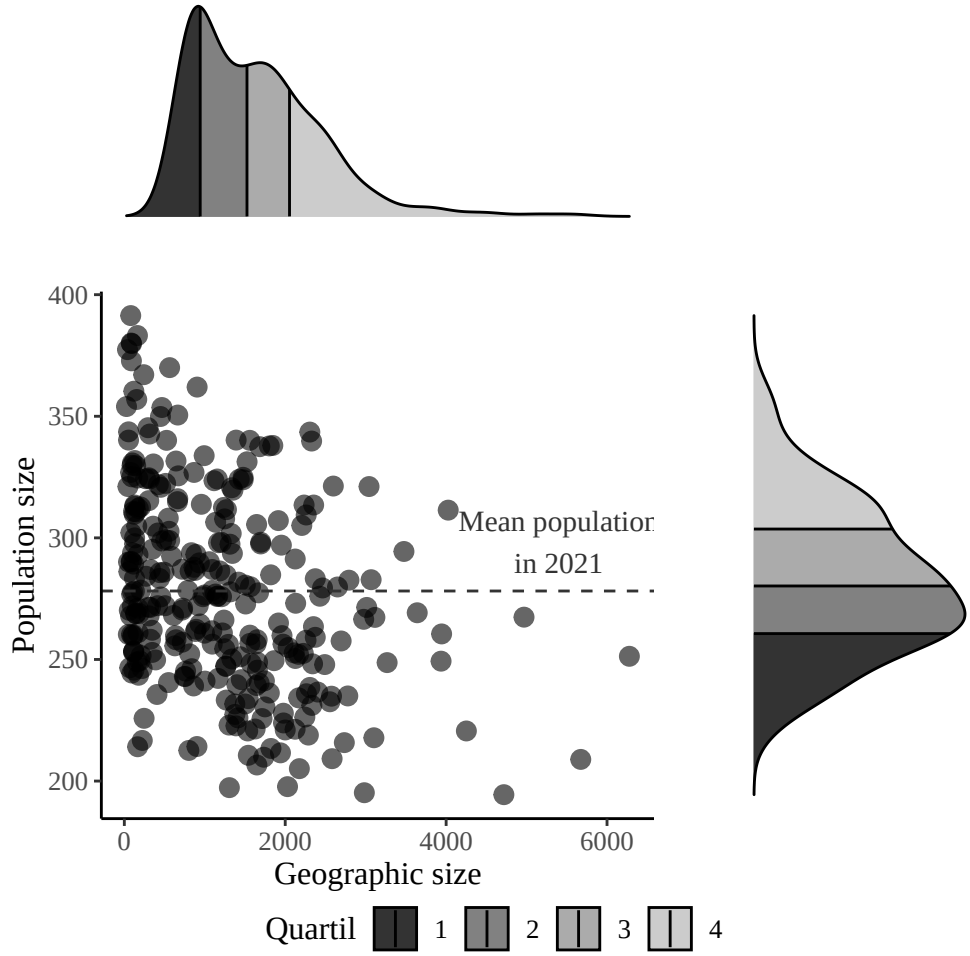


Figure 1: Distribution of the German Bundestag constituencies 2021 along geographic size (in km^2 and population size (in 1000)

Figure 1 shows that there is also some variation between the Bundestag constituencies in Germany, whose area is plotted on the horizontal axis and population size on the vertical axis. The corresponding frequency distributions of the constituencies, which are shown in terms of geographic area at the top and population on the right-hand side of the scatter diagram, illustrate this variation. We divide each distribution into quartiles to identify areas where constituencies are similar in size for better orientation. For example, we see that small-area constituencies in the first quartile (in dark grey) differed less in size from each other than the largest-area constituencies in the fourth quartile (in light grey). For example, Johannes Arlt's constituency (Mecklenburgische Seenplatte II - Landkreis Rostock III) in Mecklenburg-Vorpommern is the largest in Germany - with 6,278 km^2 and a population of only 251,300. At the other extreme of

the scale, there are also constituencies where it is easy to get from appointment to appointment by bike, such as in Berlin-Mitte, represented in the Bundestag by Hanna Steinmüller: In 2021, approximately 377,400 citizens will be living there on only 39 km^2.

Constituency variation in terms of area and population is evident in Germany. However, this is not a unique national phenomenon but inevitably arises when an electoral area is divided into several constituencies. In order to ensure the fairness of the individual influence of eligible voters on political decision-making processes through their voting weight, in many democracies, constituencies are divided according to population size or the number of mandates to be allocated in the constituency is adjusted in each case. In the Federal Republic of Germany, policymakers chose the first way. By counting approximately the same number of eligible voters in each constituency, it should be possible for voters in different constituencies to have the same influence on the outcome of elections. However, due to uneven population development, also known as demographic heterogeneity, this approach to constituency division translates in the long run into an unintended inequality of constituencies. While rapidly growing cities are becoming more densely populated and thus require smaller constituencies in terms of area, constituencies in rural areas develop in the opposite direction and grow steadily. In the current Federal Electoral Act (BWahlG) §3.3, there are explicit "shall" (15%) and "must" limits (25%) for the deviation of the population of a constituency (non-German population is excluded) from the respective average. If these limits are exceeded, a new delimitation needs to be carried out. Such a criterion regarding the geographical area of the constituency is not found in the Federal Electoral Act. In summary, even before the forthcoming reform of the constituency division, there are large deviations from the average in terms of area and population of a constituency, which are pronounced in both directions. Taking into account increasing differences in population development, it is therefore indispensable to understand whether and how the political process in small constituencies differs from that in large constituencies.

The literature provides a central argument for the potential contextual effects of constituencies: An enlargement of the constituency makes constituency work more difficult for candidates and MPs and impairs communication among voters and with candidates. On the one hand, an enlargement of constituencies makes constituency work more difficult because it limits the accessibility of candidates and MPs. Not only because of the increased geography, but also because with a larger population there is more interaction with the population and therefore more issues to be dealt with. This could prove detrimental to the formation of political will (for example, Behnke (2020a,b); Frieser (2019); Grzeszick (2020)), promote disenchantment with politics and aversion to politics, and ultimately damage the acceptance and legitimacy of parliamentary democracy (Krings, 2019). The presumed causal chain is usually not elaborated in more detail in these contributions. However, these arguments seem to be at least implicitly based

on the assumption that impeded political will formation leads to dissatisfaction and loss of trust with the acting actors, the political system and ultimately its legitimacy. This presumed negative effect is difficult to test systematically with the available data. However, if these arguments are correct, citizens in larger constituencies should consequently be less confident of being able to influence political processes themselves and, therefore, less satisfied with democracy. If this is indeed the case, we should be able to observe systematic differences between voters in small and large constituencies in terms of well-known characteristics of political participation research. Following the argument, we would expect to find, for example, lower political efficacy (civic competence) or lower satisfaction with democracy among respondents in larger constituencies. On the other hand, such items are asked in numerous survey instruments, which also allow these respondents to be assigned to their Bundestag constituencies[1].

3 Data and methods

To empirically test this theoretical argument, we use two sources of data in this paper. First, we analyse all waves of the German Longitudinal Election Study (GLES) post-election survey and other academic GLES predecessor studies since 2002. This time frame makes the last major constituency reform before the 2002 election the starting point of the data, which increases the comparability of the individual survey waves. Thus, the period of analysis we have chosen includes academic post-election studies for the 2002, 2005, 2009, 2013, 2017, and 2021 elections.

The sample size varies from year to year, from a minimum of 1,864 in 2013 to a maximum of 3,424 respondents in 2021. Since the participants in the study were selected using randomised sampling, we can ensure that the data includes people from a wide variety of constituencies. This variation in the distribution of respondents across constituencies is crucial for analysing constituency size effects. Beyond the advantage of respondent distribution, this data is also suitable for empirical investigation of the argument, as the survey contains relevant items on political efficacy and democratic satisfaction, but also specific information on the constituency affiliation of all voters surveyed.

[1]In principle, this argument could also be tested for state constituencies. However, we believe that if such different attitudes and representation deficits are mediated by the perceived size of constituencies, then we should be most likely to find differences - if any - in the most important elections. Conversely, a null result is even more convincing if no effect can be found even in federal elections.

The latter allows us to link the individual data of the by-election studies with our second data source: the spatial district-level data provided by the Federal Returning Officer (German: *Bundeswahlleiter*). As districts are subject to change across elections, this includes year-wise district-level data on all German electoral districts covering geographic and socio-demographic aggregate measures. With the help of this second data source at the constituency level, we can determine how large the area and population of the constituency of each respondent in the post-election studies are. Based on this, we then analyse whether constituency size impacts political attitudes and, if so, what that impact is.

But how do you test the size effects of constituency reform? We noted earlier that a reduction in the number of all constituencies leads (a) to an increase in the area of each remaining constituency and (b) to an increase in the German constituency population and thus also to an increase in the number of eligible voters per constituency. However, such a reform, which at first appears unambiguous, can have three different effects: First, the *enlargement of the geographical area* of the constituencies may have an impact. Secondly, an *increase in the population per constituency* could have negative consequences. And thirdly, the *interplay of both factors* discussed could also trigger a change in citizens' image of politics and their role in it. Accordingly, we analyse the data in a three-step procedure. We first test isolated effects of area and population size[2] while holding the other measure constant, then combine both analyses and test the joint relationship between the area of a constituency and the population size of the constituency.

After the comparative analysis, we then specify reform effects more directly by comparing districts whose electorate significantly changed as a consequence of the 2002 reform with those mostly unchanged by the reform.

In the analysis, the focus is on looking at the potential effects of area and population size on political attitudes. The dependent variables thus include political efficacy and satisfaction with democracy. We operationalise political efficacy by using two items. Both items measure ordinally scaled agreement with the statements "Who is in government can make a difference" and "What people vote for can make a difference" and range from 1 to 5, with lower scores indicating a lower level of political efficacy and higher scores indicating a higher level of perceived political efficacy. We measure satisfaction with democracy with the question, " All in all, are you very satisfied, fairly satisfied, not very satisfied or not at all satisfied with the way democracy functions in the Federal Republic of Germany? " which ranges from 1 to 5. Based

[2]We deliberately focus our analysis on population size (and not on the number of eligible voters) within the constituencies, since the Federal Electoral Act §3 stipulates the delimitation of constituencies on the basis of the total population and not the number of eligible voters.

on this data, we present our results in the next section.

4 Results

Table 1: Reform suggestions: Average district size

Number of constituencies	Average size in km^2	Average population
299	1195	274,000
280	1276	293,000
250	1429	329,000
200	1786	411,000
180	1985	457,000

To determine the potential effects of constituency reforms, we first look at average changes in the two characteristics affected by an increase in the size of individual constituencies: Geographical area and population size. Table 1 shows average values for both factors, given that one of the most discussed reform proposals presented here was to be implemented. While the number of 280 constituencies reflects the smallest but legally defined change (Deutscher Bundestag, 2020), reform proposals with even lower constituency numbers involve much larger changes: In the case of 180 constituencies instead of 299, for example, this could lead to an increase in geographical area as well as a population increase of over 66%. In the following sections, we will examine the potential effects of these reform proposals and the associated changes in constituency characteristics in more detail.

4.1 Comparative analysis

4.1.1 Step 1: Effect of population size in similar area constituencies

In this part of the study, we investigate whether voters from constituencies with larger populations tend to have lower political efficacy and democratic satisfaction scores. For this purpose, we compare voters from constituencies that differ in population size but have a similar geographical area. For this purpose, we divide all constituencies into one of four categories according to their area. The categorisation is done according to the area quartiles so that the first category contains the 25% of the smallest constituencies in terms of area. In comparison, the fourth category includes 25% of the largest constituencies in terms of geographical area (cf. figure 1, top frequency distribution). In the next step, we subdivide the survey data according to these categories and compare voters within their categories. In this way, we ensure that no voters from a large area constituency are compared with voters from a city in this part of the analysis.

We estimate a series of linear regression models within each area quartile and for each by-election study. The dependent variables are the responses to the three question items above. The independent variable is the population size of the constituency. We also include control variables for the constituency's state[3]. This analysis strategy results in 3x4x6 different regression models (number of dependent variables x number of quantiles of population size x number of elections). We adapt meta-analysis techniques to summarise the results of these individual regressions for each of the three dependent variables. We specify a multilevel model in which the effect coefficient of population size varies as a random effect between survey waves and within survey waves between categories of geographic size. Figure 2 shows 24 (= 4x6) estimated coefficients and their 95% confidence intervals of the individual regression models and the estimated coefficient of the summary random-effects meta-analysis for each of the three dependent variables. If not within a confidence interval, the dashed reference line indicates that the corresponding regression coefficient is systematically different from zero. Shaded in grey is the uncertainty range of the coefficient estimated with the random-effects meta-analysis. It is not surprising that this is estimated much more precisely than the individual coefficients since we calculate the random-effects meta-analysis based on the data of all 24 regressions. We show the individual regression coefficients to make the possible heterogeneity between the studies transparent on the one hand and, on the other hand, to show that there is no systematic pattern, which would call into question the estimated value of the summary meta-analysis.

Our meta-analysis shows that voters from constituencies with larger populations have neither lower political efficacy nor lower democratic satisfaction scores. Regarding attitudes on whether it makes a difference who governs in Berlin, we even find a statistically significant positive coefficient (0.15, with a standard error of 0.074). This result suggests that voters from constituencies with larger populations have higher approval ratings. For example, suppose the number of constituencies is reduced from 299 to 280. In that case, each remaining constituency increases in size by an average of about 20,000 inhabitants (which corresponds to 0.2 units of the population size variable). Accordingly, our statistically significant positive estimated coefficient means that a typical eligible voter has, on average, a (0.2x0.18 =) 0.03 scale point higher value concerning whether it makes a difference who governs in Berlin. Although the effect is statistically significant, we estimate it to be insignificant in terms of content due to its negligibly small size.

[3]We prefer this analysis strategy to regression models in which the area of the constituency is included as a control variable. Such models are theoretically also capable of estimating the effect of population size while keeping area constant, but only under the additional linearity assumption.

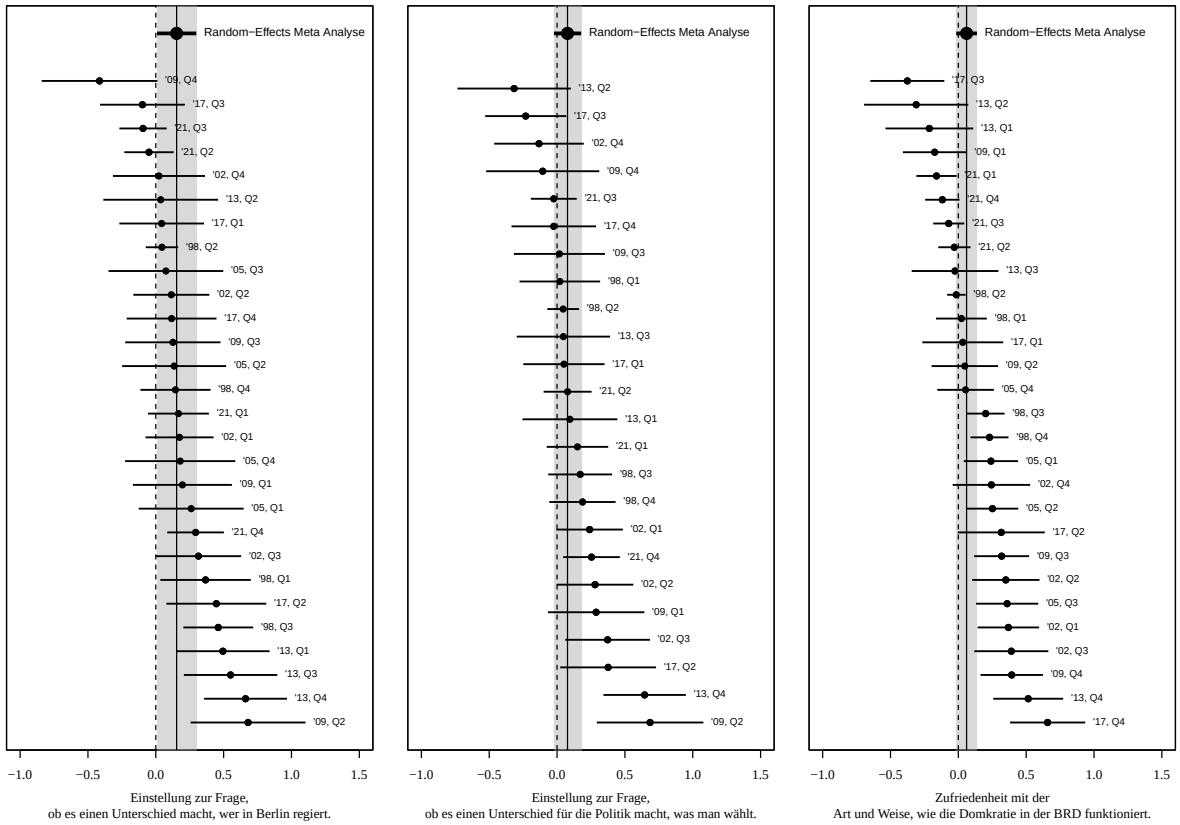


Figure 2: Results of random-effects meta-analysis of the effects of population size on political efficacy (left and centre panels) and satisfaction with democracy (right panel)

A similar result is found for attitudes towards whether one's vote makes a difference to politics, for which we find no statistically significant effect coefficient (0.08, with a standard error of 0.051); and for satisfaction with democracy, for which we also find no statistically significant effect coefficient (0.06, with a standard error of 0.039). In summary, voters from constituencies with different population sizes do not differ significantly in their attitudes towards political efficacy or satisfaction with democracy. The first part of the analysis thus does not provide empirical support for the argument that an increase in population within constituencies harms voters.

4.1.2 Step 2: Effect of a larger area of a constituency with similar population size

In a second step, we investigate whether voters from geographically larger constituencies have lower political efficacy and democratic satisfaction scores. For this purpose, we compare voters from constituencies that differ in the area but have a similar population size. The procedure is analogous to the first part of the analysis: We divide all constituencies into four quartiles according to their population size (cf. Figure 1, right frequency distribution). The first category now contains the 25% of constituencies with the smallest population size, while the fourth category comprises the 25% of constituencies with the highest population size. We

split the data according to these categories. In this part of the analysis, we ensure that voters from a constituency with a comparatively small population size are not compared with voters from constituencies with a large population size in order to estimate the effect of constituency area on political efficacy and democratic satisfaction. Analogous to the first analysis, we estimate 24 (= 4x6) different regression models with each quartile and election data for each of the three dependent variables. The dependent variables are the previously used measures of political efficacy and satisfaction with democracy. The independent variable is geographical constituency size, i.e. the area of the constituency. We also control for the state in which respondents live. Again, we summarise the estimation results of the individual regression models also using multilevel models in which the effect coefficients of constituency area vary as a random effect between survey waves and within survey waves between the empirical quartiles of constituency area.

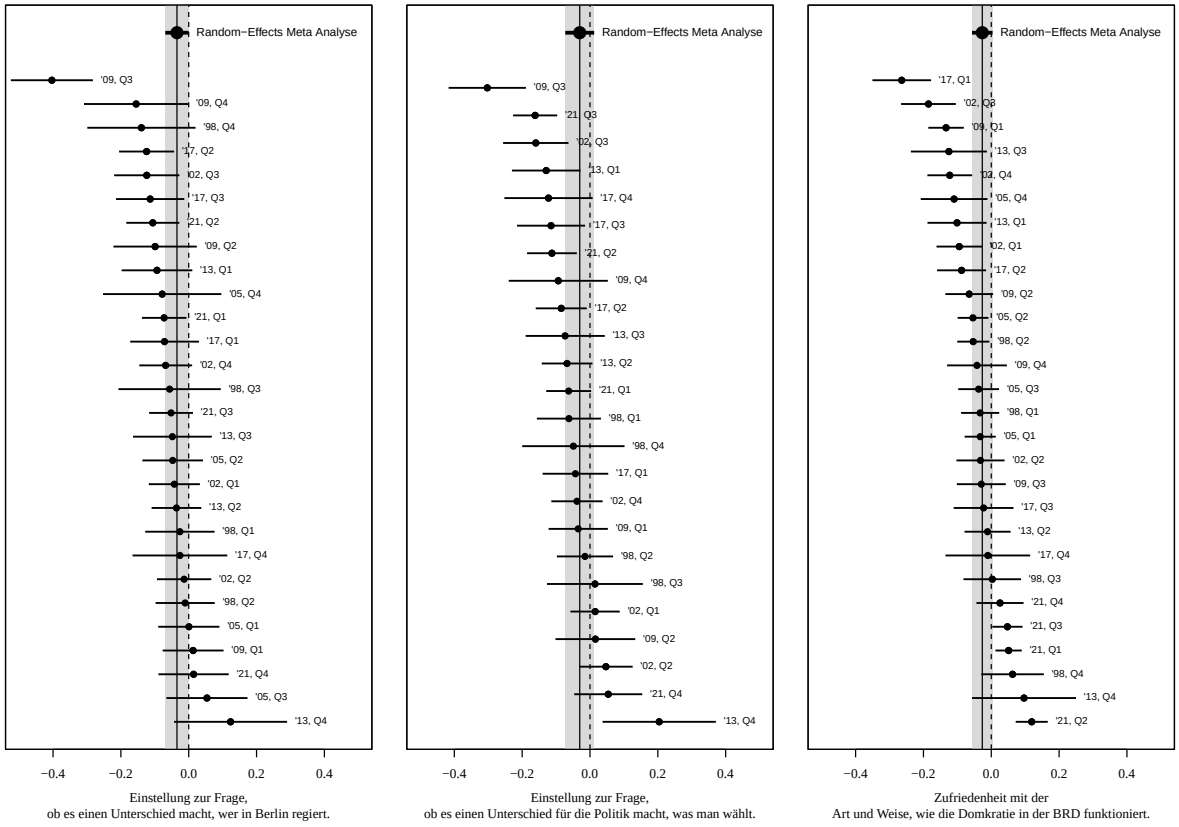


Figure 3: Results of random-effects meta-analysis of the effects of geographic size on political efficacy (left and centre panels) and satisfaction with democracy (right panel)

Figure 3 shows the results of the analysis analogous to our previous figure. Our meta-analysis shows that voters from larger constituencies do not differ significantly from voters from smaller constituencies regarding political efficacy and satisfaction with democracy. The coefficient relating to whether it makes a difference who reacts in Berlin is statistically significant (-0.035, with a standard error of 0.018) but trivial in content. If, for example, the number of

constituencies is reduced from 299 to 280, then each remaining constituency increases on average by about 80 km^2 (equivalent to 0.08 units of the variable constituency area). Our statistically significant positive negative estimated coefficient thus means that a typical eligible voter has, on average, a (0.08x0.09 =) 0.0028 scale points lower score on the question of whether one's vote makes a difference to politics. For an averagely satisfied voter who previously gave a value of 4 on the 5-point scale, this would result in a value of 4.0028 after the change, a change of 0.07%. The corresponding coefficient related to whether one's vote makes a difference to politics is also meaninglessly small and not statistically significant (-0.03, with a standard error of 0.022). The same applies to the estimated coefficient on the democratic satisfaction of eligible voters as a function of an increased area of a constituency. Although this is also negative, it is similarly small to the other coefficients and is not significantly different from zero (-0.026, with a standard error of 0.015).

4.1.3 Step 3: Simultaneous effect of population size and geographical constituency size

The third step of the analysis combines the two previous parts of the analysis. In the first part, we were interested in the effect of population size in constituencies of similar size in terms of area. The second part examines the effect of increased constituency areas in constituencies with similarly sized populations. However, a reduction in constituencies inevitably leads to an average increase in both the area and constituency population. In the third part of the analysis, we take this into account and examine the joint effect of increased constituency area and population size on political efficacy and democratic satisfaction. For this purpose, we specify linear regression models that include both population size and constituency area as independent variables, as well as a multiplicative interaction term between the two variables. As in the previous analyses, we estimate regression models for three dependent variables on political efficacy and democratic satisfaction, controlling for the state in which voters live. We calculate three regression models for each of the six elections. This results in (3x6=) 18 individual regressions. We then combine the results of the individual regression models in meta-analyses for each dependent variable. To do this, we estimate multilevel models in which the two constituency size variables and their interaction vary as survey-level random effects.

We present the regression results in tabular form in the appendix. We refrain from interpreting individual regression coefficients of the models with interaction effects (Brambor et al., 2006). Instead, we use simulation techniques (King et al., 2000) to interpret the estimation results and uncertainty using tangible scenarios. To do this, we calculate average increases in area and population under different hypothetical constituency reductions for each constituency. We then calculate the expected values and their uncertainty for our three dependent variables

based on the multilevel model. This gives us expected values from the model for all three dependent variables in each constituency based on their current size and after a hypothetical increase. We calculate the average values of political efficacy and democratic satisfaction across all constituencies and then determine the difference between the expected values before and after an increase in size, including the associated uncertainty. The results are shown in Figure 4.

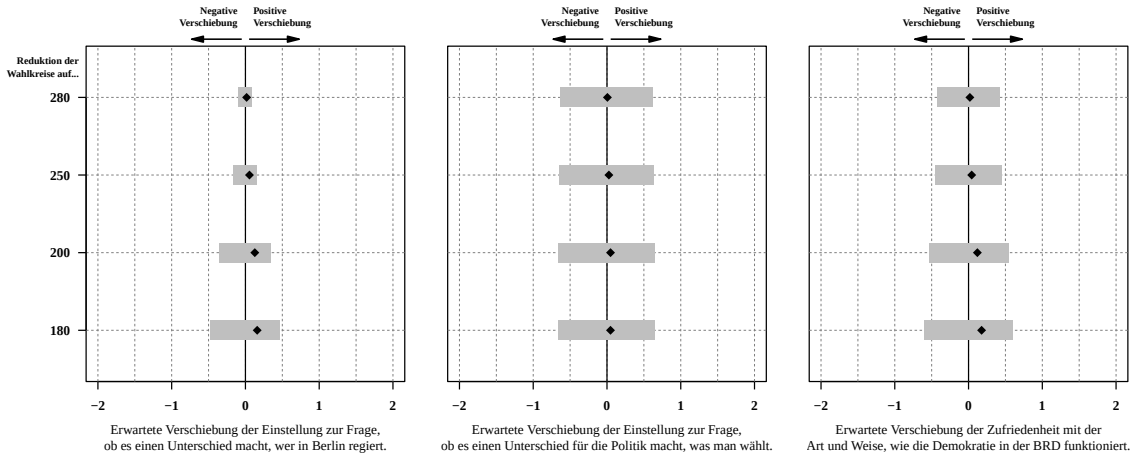


Figure 4: Simulation of expected changes in attitudes depending on hypothetical constituency number reductions. The figure shows point estimates (diamonds) and 95% equivalence confidence intervals (Hartman and Hidalgo, 2018).

The result of the third part of the analysis confirms the previous results. Figure 4 visualises changes in attitudes that we would expect, based on our statistical models, if constituencies were enlarged according to four different reforms, both geographically and in terms of population size, as a result of a reduction of constituencies from 299 to 280, 250, 200, and 180, respectively (see Table 1). All point estimates are close to zero, suggesting that, based on the model, we do not expect any changes in political efficacy or democratic satisfaction if there is a reduction in constituencies as a result of redistricting. This is true for all numbers of constituencies and all dependent variables considered here.

In addition to the point estimates, we show in Figure 4 the uncertainty associated with these estimates. The grey bars show equivalence intervals[4], which should be interpreted as follows: With a 95% confidence level, we can rule out that the true opinion shift lies outside the intervals.

[4]We choose equivalence intervals instead of confidence intervals because we do not want to examine whether changes are systematically different from zero (this is given), but because we want to assess whether we can also exclude small positive or negative effects on the basis of the empirical evidence. Null hypothesis tests based on confidence intervals are designed to make statements about whether a statistical estimate is systematically different from zero.

It should be emphasised here that the results are associated with not inconsiderable uncertainty. In principle, the larger the reduction of constituencies, the more uncertainty is associated with our results. This is a logical consequence since larger reductions are further removed from the actual reality, and their consequences are thus more difficult to assess.

To illustrate this, we pick out expected changes in attitudes on the question of whether it makes a difference in politics what one votes for. Here, with a reduction of constituencies from 299 to 180-the most extreme of all the interventions discussed-we can make the following statements based on our results: The point estimate of 0.05 is not significantly different from zero. Due to the size of this estimate, the results suggest that a reduction of constituencies to 180 does not lead to any substantively relevant change in attitudes among the population. Nevertheless, since our calculations are accompanied by uncertainty, it should be emphasised that small changes cannot be ruled out. Based on a 95% confidence level, however, we can state that these minimal effects do not exceed a positive or negative change of at most 0.65 scale points. With regard to the question of whether it makes a difference who governs in Berlin, this value is 0.47 scale points; with regard to satisfaction with democracy, 0.60 scale points of the underlying 4-point scale.

4.2 Germany's Political Landscape After 1998

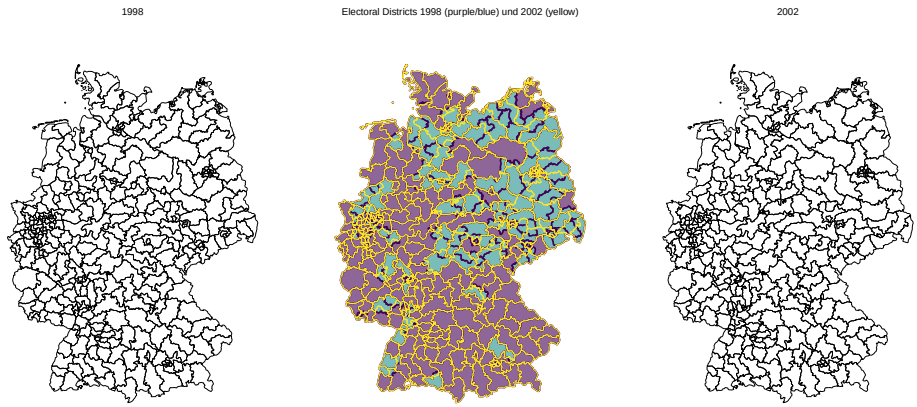
So far, we have analysed the effects of district size on individual political attitudes and behaviour through a comparative lens. Yet, it is plausible to assume that static size effects differ from effects caused by a reform to the districts and further accentuate size's possible effects. A district merger emphasises the political importance of a district's borders among citizens and disrupts local party politics and organisation. Following a merger, parties need to restructure on the local level, change campaign strategies towards a broader, physically more distant and possibly diverse target population, and might lose their district representative in the process. All these factors might further add to existing effects. To empirically test this argument, we now move on to a quasi-experimental investigation of spatial size effects using a major reform redistricting of almost all German districts in 1998 as a case study.

As previously discussed, German electoral guidelines regulate that a district's population size must be changed if it deviates more than 25% from the benchmark. Therefore, redrawing district borders and thereby changing geographic district size is a regular phenomenon affecting a few selected districts between elections. After the 1998 election, however, demographic

Equivalence intervals are designed to make statements about whether a statistical test statistic is systematically closer to zero than previously specified positive and negative values.

heterogeneity and residential mobility[5] had resulted in significant disparities in population size between electoral districts. This population inequality endangered the democratic principle of equality in vote and made a large-scale reform of districts inevitable.

Figure 5: District Boundaries in Germany Before (1998) and After (2002) the Reform



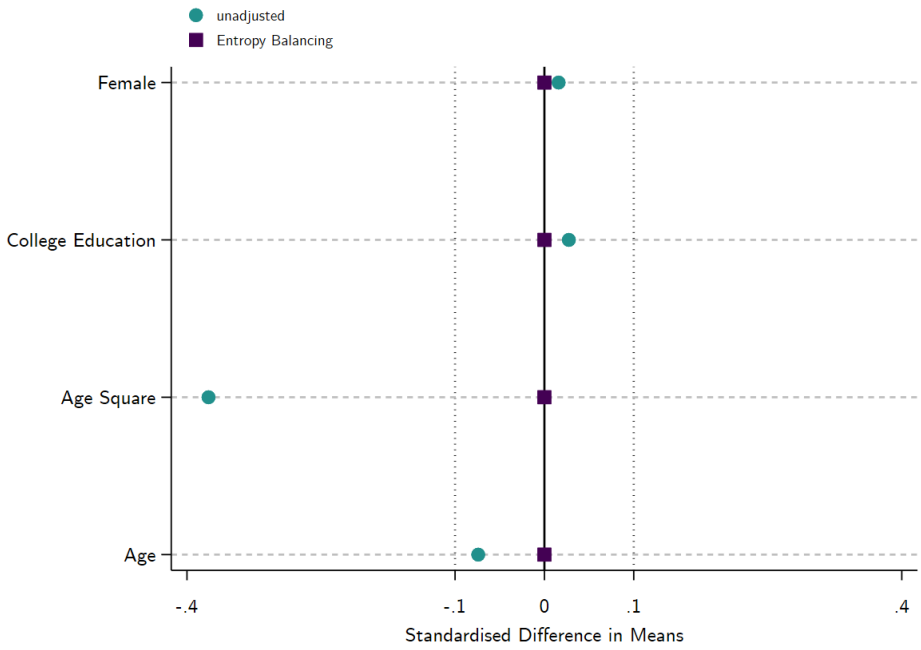
Right after the 1998 federal election, the German electoral district commission responded to this development and published the reform *"Law on the Re-division of Electoral Districts for the Election to the German Bundestag"*. The 1998 reform of electoral districts reshaped Germany's political landscape significantly by enlarging, merging, or even deleting districts on the map and re-assigning citizens to new constituencies. With 328 districts in 1998, the reform reduced that number to 299 for the 2002 election. Figure 5 illustrates the electoral borders before (left) and after the reform in 2002 (right). The centre map combines the two electoral landscapes, with yellow borders indicating electoral districts after the reform and purple/blue districts indicating district delimitation before the reform. With the purple shading illustrating changes below 10% of the area, it becomes apparent that districts from West Germany were less affected by major redistricting than constituencies in the East, where the majority of districts saw significant changes as indicated by the blue shading. Thus, the policy resolved inequality in the population. Yet, it did not make districts geographically equal.

To investigate the causal effect of district size after mergers, we focus on the survey covering the subsequent election of the reform in 2002. We use this design to refine our comparative analyses further and define the expected treatment of a district reform more precisely. Based on a report published by the Konrad Adenauer Foundation (KAS), we identify constituencies that significantly changed in the electorate composition due to the reform and construct a binary

[5]The latter was mainly a long-term effect of German re-unification and primarily concerned citizens moving from East to West.

treatment indicator (Eisel and Graf, 2002)[6].

Figure 6: Covariate Balance in 2002 Before and After Re-Weighting via Entropy Balancing Weights.



Before analysing the data, we account for socio-demographic variation and unobserved confounders between treatment and control group by applying entropy balancing. This method, as developed by Hainmueller, constructs a set of matching weights for individuals in both the group of voters in districts with high levels of change and and the group of voters in districts with low levels of change to balance them along with a pre-defined set of characteristics (2011). We estimate entropy weights based on age, gender, and education, thereby removing measured confounding between the groups. As Figure 6 demonstrates, we can successfully minimise the standardised difference in means on the specified demographics with the procedure. We then move on to estimating OLS regressions for all dependent variables, with the treatment indicator as the main explanatory variable. As before, we account for heterogeneity in treatment assignments by using state-fixed effects. As the analysis employs entropy weights, the models further do not need to include the covariates used for the weighting.

As table 2 displays, the effect of changing the electoral districts by at least 50% is non-significant for all variables of interest. That is, respondents residing in districts that have been subject to significant change in the electorate by the reform perceive the political system as equally as responsive as those of unchanged districts. Also, their levels of democratic satisfaction

[6]This indicator takes on 1 if a respondent's electoral district was changed by more than or equal to 50% in its electorate composition, and 0 if the change was below that threshold.

are not significantly different. Thus, we conclude that the reform did not significantly affect citizens in 2002.

Table 2: Quasi-experimental analysis: 2002

	It makes a difference...		
	...who is in power	...who people vote for	Satisfaction with democracy
Treatment: Electorate change >=50%	-0.01	0.01	-0.04
	(0.07)	(0.07)	(0.06)
Constant	3.47***	3.65***	3.35***
	(0.14)	(0.13)	(0.11)
Observations	2960	2975	2990
R^2	0.04	0.04	0.04

Standard errors in parentheses
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

5 Conclusion

So far, very little is known about whether and what effects changes in the electoral system have on the attitudes and behaviour of the electorate. The results of our analyses suggest that voters living in Germany's larger electoral districts in terms of area and population do not differ from voters from smaller electoral districts in terms of political efficacy and satisfaction with democracy. This contradicts fears and arguments against a reform of the number of constituencies. A reduced number of constituencies necessarily leads to larger constituencies on average. In larger constituencies, the argument goes that the constituency work of candidates and MPs, especially communication between them and the constituency population, becomes more difficult.

Like any empirical study, our study has weaknesses that we want to address at this point. Our analysis is comparative in nature: we compare voters from constituencies of different sizes in order to infer possible changes in attitudes. We aim to find out whether voters from larger constituencies are more satisfied or dissatisfied concerning political efficacy and the functioning of democracy in Germany. We do this to inform a debate in Germany that regularly claims that increasing the size of constituencies leads to higher dissatisfaction. We do not have ideal measurement tools to test this argument in each of its facets. Still, We could at least identify information on three relevant attitudes that should also be affected if the argument were to hold. However, our analysis clearly shows that voters in comparatively large constituencies are no more dissatisfied or satisfied than voters in comparatively small constituencies. It is important to emphasise that we can nevertheless make no firm statements about what would happen if the

sizes of existing constituencies were actually changed, for example, in the course of a reduction of constituencies.

If we interpret these results causally, despite their comparative nature, and use them to estimate possible shifts in attitudes that we might expect as a result of increases in the size of constituencies as a consequence of various constituency reductions, then we come to a clear conclusion. At any rate, based on the available data - and here, we have systematically been able to identify only three attitudes in several studies at the same time - we do not expect any relevant shifts in these attitudes. However, we can neither rule out very small positive nor very small negative changes in attitudes with certainty due to estimation uncertainty. However, despite this estimation uncertainty, we do not see relevant differences in behaviour or attitudes. The message of our analysis for the German reform debate is thus clear: arguments suggesting that voters are less satisfied if they live and vote in larger constituencies are not empirically supported by our analysis.

Future research should explore the role political changes play in district changes. That is, maybe a district's size does not matter, however, if changing a district's composition by reforming its' borders results in a shift of political majorities, constituents might perceive such a change as unfair. Further, due to few cases on the district level, the study might also be moved from the individual to the aggregate level. Using small-area-estimation might prove useful in estimating district-level attitudes and open the opportunity to create a quasi-panel study from the available data. Lastly, while Germany is an interesting case for studying district size effects due to recent reforms and considerable size variation, it is unclear whether the null effects are context-dependent. Therefore, future research should move from a within-country comparative lens to a cross-country analysis.

Yet, with regard to the results presented in this article, one can initially conclude that if merging electoral districts helps ensure a parliament's capability to work efficiently, then there are no consistently observable reasons on the part of voters against this policy. Nonetheless, as such reforms might have unintended consequences yet to unravel, policymakers should carefully weigh the costs and benefits of such a measure.

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A Extended presentation of the results of the meta-analysis

	It makes a difference...		
	...who is in power	...who people vote for	Satisfaction with democracy
Constant	3.00	3.36	3.17
	(0.19)	(0.28)	(0.21)
Population size	0.18	0.14	−0.00
	(0.05)	(0.09)	(0.05)
Geographic size	0.07	0.11	−0.16
	(0.13)	(0.18)	(0.08)
Population size × Geographic size	−0.04	−0.05	0.05
	(0.05)	(0.07)	(0.03)
AIC	47589.39	39681.68	38620.75
BIC	48391.62	40349.13	39422.65
Log Likelihood	−23688.70	−19750.84	−19204.37
N	14302	12286	14258
N(Studies)	6	5	6
Variance Residuals	1.59	1.44	0.85

Table 3: Tabulation of the results of the multilevel regression analysis