Geographic representation

Orit Kedar
The Hebrew University of Jerusalem
orit.kedar@mail.huji.ac.il

Yair Amitai
The Hebrew University of Jerusalem
yair.amitai@mail.huji.ac.il

Gilad Hurvitz
The Hebrew University of Jerusalem
gilad.hurvitz@mail.huji.ac.il

Abstract

We point at an overlooked aspect of misrepresentation in electoral systems: The degree to which within parties, voters residing in some districts are overrepresented at the expense of their co-partisans residing elsewhere. We theoretically develop the concept and study it empirically. Drawing on district-level data of 113 parties from 12 districted democracies, we find a substantial degree of geographic representational discrepancies within parties. Importantly, we show that the discrepancy is often accompanied by a difference in policy positions, rendering it particularly significant politically. We further propose a general measure for the discrepancy between the votes a party gains in different districts and the seats it holds in them, namely, geographic disproportionality (GeoDisp), and hypothesize about its behavior in different contexts. Unlike malapportionment, GeoDisp is party specific, and draws on actual votes. Utilizing geocoded data, we find a substantial degree of geographic disproportionality, which, per our expectations, varies by party.

Word count: 9999

1. Introduction

While characterized by stronger accountability and linkage between voters and representatives, electoral systems employing districts are also known to produce representational distortions of voters' voices: a party's seat-share often does not reflect its vote-share, and thus, supporters of some parties are overrepresented in parliament at the expense of their counterparts supporting other parties (e.g. Gallagher 1991; Carey and Hix 2011; Riera 2015). Correction mechanisms notwithstanding, this partisan distortion of representation in the conversion of votes to seats is a key characteristic of almost all districted systems.[1]

We illuminate, theorize, and empirically study a dimension of representational distortion in the conversion of votes to seats almost entirely overlooked by the vast electoral literature: the discrepancy between the origin of a party's votes (the districts they come from) and the districts in which a party occupies its seats, or put differently, the degree to which parties overrepresent some of their constituencies at the expense of others. Unlike partisan distortion which captures the discrepancy in representation of voters supporting different parties, this dimension of distortion is geographic, and captures discrepancy in representation *within* parties: parties overrepresent their supporters residing in different parts of the country at the expense of other supporters residing in other parts. Importantly, we show that although related, this concept is theoretically different and empirically distinct from malapportionment: we focus on party-specific geographic representation, and draw on actual party votes and seats.

A simple example might be in order. In the 2017 Norwegian parliamentary elections

[1] An exception is MMP, whereby seats are assigned according to the proportional vote.

9 parties secured seats in the 169-seat Storting. On one end of the size distribution are the Conservative, Labour, and Progress parties (with 49, 45, and 27 seats, respectively). On the opposite end of the distribution are the small Green (Miljøpartiet Dei Grøne, MDG) and the Left party (Rødt) with a single seat each. Figure 1 takes a close look at two of the four parties in the middle: The Christian Democratic Party (KrF) and the Liberal party (Venstre), securing 8 seats each. The figure presents the shares of KrF's and Ventsre's votes originating in each of Norway's 19 districts (in gray) and the respective shares of the parties' seats obtained in each district (in black).

The left panel (KrF) demonstrates how in some districts the gap between the two is substantial, reaching a factor greater than 5. As the figure shows, the KrF overrepresents its constituents in 5 districts: Møre og Romsdal, Sogn og Fjordane, Telemark, Aust-Agder, and Vest-Agder with a ratio of the party's seats to its votes in these districts varying between 1.7 to 5.7. Correspondingly, KrF supporters residing in the remaining 14 districts are underrepresented by the party's seat distribution. The right panel presents analogous quantities for Venstre. Supporters of the Venstre residing in Oppland, for example, cast 2 percent of the party's votes, those residing in Vestfold cast 4 percent of its votes, and those from Sør-Trøndelag cast 6 percent of its votes, while each of these districts received 12.5 percent of its seats. Overall, 32% of the districts (6/19) enjoy more Venstre seats compared to Venstre votes cast in them at the expense of the remaining 68% of the districts.

Importantly, the source of the discrepancy in the case of these two parties is idiosyncratic (though we test for it below, along with other explanations). Almost all seats beyond the fraction of votes a district contributed to the Venstre or the KrF are leveling seats designed to minimize *partisan* distortion and get the parties' share of seats in parliament to reflect more closely their respective share of votes. This highlights the fact

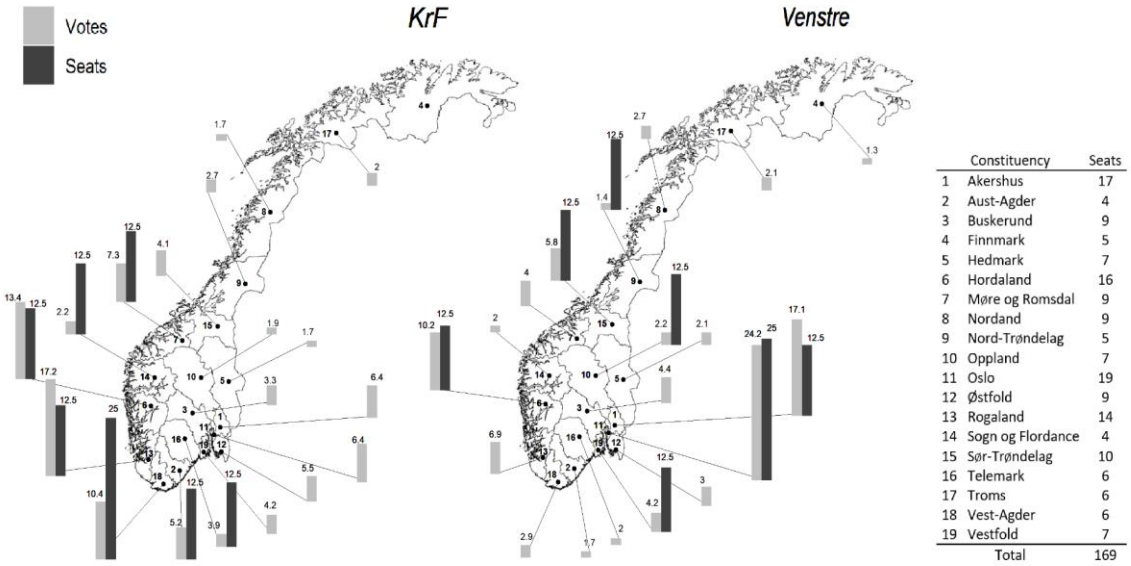
that even when partisan distortion is minimized, geographic distortion may still be substantial, and in some cases the very mechanism that reduces the former increases the latter. Lastly, it is worth mentioning that the discrepancy in the case of these two parties is not due to the malapportionment embedded in the Norwegian electoral systems. In fact, among the six districts overrepresented by the Venstre, four are downward represented by malapportionment, and there is no systematic correlation between the districts positively malapportioned and those overrepresented within either party. [2]

In this study, we ask: (i) Are the districts from which a party receives its votes also the ones in which it has seats? (ii) What is the political significance of such within-party geographic discrepancy in representation? And, (iii) how can one systematically evaluate geographic discrepancy of representation? Surrogate representation (Mansbridge 2003) notwithstanding, a geographic discrepancy between a party's origin of votes and the districts in which it occupies its seats is politically significant in several aspects. Co-partisans residing in different districts often differ in their local needs served by their respective representatives (Heitshusen et al. 2005), such that within-party representational gaps imply

[2] We follow Beramendi et al. (2022) in calculating district-level malapportionment as 1+log(RRI), where RRI = (District seats / District population) / (Total seats / Total population). Districts with a value greater (smaller) than 1 are over (under) represented. Of the 19 Norwegian districts, seven are underrepresented and 12 overrepresented, with values ranging between 0.85 (Vestfold) and 1.72 (Finnmark). The over/underrepresentation of districts by both KrF and Venstre (calculated as the difference between party district seats/party national seats and party district votes/party national votes) does not correlate with district malapportionment (Venstre: -0.06, p-value = 0.79; KrF: 0.18, p-value = 0.45).

that voters in the within-party underrepresented districts are potentially disadvantaged in terms of attendance to their local needs. Furthermore, representatives tend to focus their parliamentary efforts on committees that can serve the interests of the districts in which they are elected (Stratmann and Baur 2002). Lastly, the geographic discrepancy in representation of co-partisans is particularly significant if, as we show below, the amplified and the diminished voices differ ideologically.

Figure 1. Votes and seats for the Liberal and Christian Democratic parties in Norway's 2017 election



	Constituency	Seats
1	Akershus	17
2	Aust-Agder	4
3	Buskerund	9
4	Finnmark	5
5	Hedmark	7
6	Hordaland	16
7	Møre og Romsdal	9
8	Nordand	9
9	Nord-Trøndelag	5
10	Oppland	7
11	Oslo	19
12	Østfold	9
13	Rogaland	14
14	Sogn og Flordance	4
15	Sør-Trøndelag	10
16	Telemark	6
17	Troms	6
18	Vest-Agder	6
19	Vestfold	7
	Total	169

Note: Each bar represents the district's share of votes or seats of the party's total. Data source: Constituency-Level Election Archive.

Utilizing geocoded data (Kollman et al. 2019) from 12 Western democracies employing electoral districts, we first employ simple analyses to demonstrate geographic distortion in the representation of rural and urban co-partisans (110 parties), as well as differences in their positions on issues. We find that both rural and urban voters are often

overrepresented at the expense of their co-partisan counterparts to a substantial degree: 33% of the parties overrepresent one group in at least 10 percentage points at the expense of the other. We then utilize public opinion data (European Social Survey, 2018-2020) on four different policy domains – gay rights, immigration, European integration, and redistribution – and show that urbanites and country persons supporting the same party often differ systematically in their positions, especially on redistribution and European integration. Overall, there are different voices among supporters of a party residing in different districts, some are heard loudly at the expense of their co-partisans residing elsewhere, who are diminished. Lastly, drawing on a counterfactual analysis, we show that on average 8 percent of parliamentary seats (or 2.5 seats per party) would have been assigned to different districts in the absence of geographic distortion.

Having demonstrated the political significance of geographic (mis)representation, we propose a general framework for analyzing geographic representation and develop a measure of geographic disproportionality, GeoDisp. Drawing on malapportionment and departing from it, GeoDisp can be calculated both at the country and the party level, and indicates the degree to which the geographic distribution of a party's seats deviates from that of its votes. Utilizing electoral data from the same set of parties in the twelve countries, we find substantial levels of within-party geographic disproportionality, holding regardless of country-level malapportionment. Consistent with our expectations, these values decrease with party size and the magnitude of districts in which parties get their electoral support.

The paper continues as follows. The next section lays out the concept of within-party geographic representation and explains why it matters. The following section presents the data we make use of. The next section demonstrates how parties over/underrepresent some of their constituents at the expense of others, and shows ideological differences

between co-partisans. The following section develops GeoDisp, empirically implements it, and tests our hypotheses related to it. The final section concludes.

2. Geographic representational distortion

The rawest manifestation of public voice is that which is reflected at the voting booth. And whether perceived as a preliminary step toward substantive representation or an aspect of formal representation, the potential discrepancy between votes cast by voters and seats obtained by parties is perhaps the most straightforward operationalization of (mis)representation. Under this framework, the greater the discrepancies between parties' vote- and seat-shares, the greater the distortion score. We refer to this familiar dimension as *partisan* misrepresentation.

Political scientists have proposed several measures for partisan misrepresentation between votes cast for and seats obtained by parties. Grofman (1983) systematically examines alternative measures of bias and partisan proportionality, Rose's (1984) Index of Proportionality uses absolute gaps between respective vote- and seat-shares, and Shugart and Taagepera (1989, p.105) propose a measure of deviation from PR. The most commonly applied measure is Gallagher's Least Square Index of Disproportionality (1991, see also Taagepera and Grofman 2003), which adds up squared gaps between vote- and seat-shares (see Equation 1 below). At the national level, countries employing PR with larger districts on average are characterized by smaller partisan disproportionality (e.g., Benoit 2000; Carey and Hix 2011; Powell and Vanberg 2000). Yet we can also calculate partisan disproportionality within a district rather than at the national level, and get a sense of partisan misrepresentation in every district separately (Grofman and Selb 2010). Lastly, a more recent set of analyses examines district-related factors pertaining to partisan

misrepresentation. Such analyses call attention to the fact that under districted systems, votes are converted to seats differently in different parts of the country (Kedar et al. 2016; Monroe and Rose 2002; Rodden 2019).

2.1 Geographic (mis)representation

We propose a transposition of the partisan framework. While partisan representation identifies votes by the party cast for and seats by the party which occupies them and hence examines the discrepancy between parties' vote- and seat-shares, our approach, embedded in geographic representation, identifies votes and seats by district. Specifically, we propose to identify each vote by the district it originates from and each seat by the district in which it is occupied. Thus, for each party, we compare the district slices of its pie of votes to the district slices of its pie of seats and examine the gaps between them. Parties that occupy their seats in the same districts where their votes originate have their two pies aligned with each other and are geographically representative. The greater the discrepancy between the origin of a party's votes and the location of its seats, the lesser the party's geographic representativeness of its supporters.

Geographic representativeness can be considered not only from the party's perspective but also from that of the voter. Cases in which a party has limited geographic representation are ones where the share of votes some districts contribute to the party differs from their share of seats. This implies that supporters of the party residing in some districts get more (fewer) representatives of their party in their respective districts compared to votes contributed to the party by these districts. Put differently, some of the party's supporters have their voice amplified, and their co-partisans have it diminished.

Malapportionment. Before we turn to discuss the political significance of this discrepancy, we wish to dwell on the distinction between our analysis of party-level geographic

representation and the most prominent concept drawn upon to analyze geographic representation: Malapportionment. Malapportionment taps at the 'discrepancy between the shares of legislative seats and the shares of population held by geographical units' (Samuels and Snyder 2001, 652). As such, it has served as an underpinning concept for the analysis of geographic distortions of formal representation. Indeed, malapportionment has been used as an important compass for comparativists to identify countries whose electoral system – overtly or covertly – deviate from equal vote-seat ratio across its districts (Lust-Okar 2006; Riera and Lago 2023). Our analysis of geographic representation is distinct from malapportionment in two important aspects. First, it allows us to capture misrepresentation (and later disproportionality) not only of the country as a whole but also by party. As we empirically demonstrate below, different parties are characterized by different levels of misrepresentation of their voters residing in different districts. Second, our measure taps the discrepancy between *actual* votes and seats. As such, it is sensitive to specific characteristics of the particular election under study, namely, support rate for different parties and voter turnout.

In addition to this conceptual distinction, we cross paths with malapportionment twice in this study. The first is anecdotal in the Norwegian case presented above. As this example suggests, geographic misrepresentation within parties holds separately of malapportionment of districts. The second is systematic. The empirical analysis of our proposed measure (Table 3 below) includes malapportionment as a control variable, demonstrating that our measure captures party-level geographic distortion beyond malapportionment.

2.2 Why study geographic representation within parties

The study of discrepancies between parties' vote- and seat-shares relies on a key

assumption. In the words of Powell (2004): 'The aggregate comparison of citizen vote distributions and… representative distributions assumes that the same party means the same thing to voters in different districts within a country.' However, Powell contends:

> If the same party label means something different in the two districts, then the results of "canceling" across districts will be misleading at best... If the party representatives fail to coordinate in their legislative activity, the problem is compounded. The paradigmatic vote-seat studies, and even their variants, provide few clues as to how one might address this problem… (281)

The challenging of the assumption that any party representative indeed serves as a surrogate representative for any voter of the party regardless of their residence, is at the core of our motivation for studying geographic representation. Indeed, surrogate representation (Mansbridge 2003) holds that a representative represents voters of her party (e.g., on ideological grounds) regardless of the district in which their ballots were cast, delivering representation to voters with whom the representative has no electoral relationship. This important notion has also been helpful in explaining a variety of other representational connections in different contexts (Baker 2020; Schildkraut 2016). For the issue at hand, however, there are reasons to suspect that voters are not equally represented by a representative from elsewhere in the country as they are by a representative from their own district. This can be seen in at least three components of representation – service responsiveness, allocation responsiveness, and policy responsiveness (Eulau and Karps 1977).

Service responsiveness, which includes the non-legislative services that a representative provides for individuals or groups (e.g., casework), is almost always considered constituency work directed at individuals or groups within one's district. And although in theory provided regardless of recipients' partisan affiliation, reelection

considerations may lead representatives to perform "party service in the constituency rather than constituency service" (Arter and Raunio 2018, 1). Thus, voters underrepresented by their party have their service needs fall through the cracks: neither their district representatives from other parties nor their party representatives elsewhere fully represent their needs.

Regarding allocation responsiveness or pork-barrel exchanges, it is reasonable that even if supporting the same party, voters in different regions of a country might differ in their preferences for the allocation of resources across geographical lines. Voters in the south, for example, might prefer investment in resources that promote the south, while those residing in the north might prefer resources traveling northward. These differences project onto representatives' efforts in parliament (Stratmann and Baur 2002). Here, too, partisan differences are nevertheless crucial, as voters of different parties from the same district plausibly prioritize different kinds of investments and resources in their region. Hence again, voters' within-party districted representation is significant for allocation of resources compatible with voters' interests.

Lastly, co-partisans residing in different districts may share some beliefs across district boundaries, but diverge on others. There is little reason to suspect that supporters of a party, and particularly a party that is a coalition of interests, share the same issue positions on *all* dimensions. Co-partisans might share the same positions on the economy, for example, but differ on second-dimension politics. Or they might agree on foreign policy, but differ in their positions on the center-periphery cleavage. We hold that at least in some constellations, differences on such positions among supporters of the same party will align with district boundaries or region.

Political scientists have incorporated districts to the analysis of representation in

various ways. Districts have been shown to be a crucial factor for candidate position-taking (Achen 1978), parliamentary speech (Fiva et al. 2023), targeted spending (Catalinac and Motolinia 2021), and votes in the legislature (Gerber and Lewis 2004). In light of the considerations laid out here, we incorporate districts to party-level analysis of vote-seat discrepancy. We first do so by examining the discrepancy and its political significance. We then develop a general framework for the analysis of geographic disproportionality.

3. Data

Our empirical analysis is two-pronged. In the first part, we analyze the political significance of geographic representation. To this aim, we draw on a broad cross-section of cases and examine the extent of geographic (mis)representation among co-partisans, as well as the ideological differences between them. We also conduct a counterfactual analysis that evaluates the magnitude of geographic misrepresentation in terms of parliamentary seats. In the second part we theoretically and empirically develop GeoDisp, a measure of geographic disproportionality, and utilize it to assess geographic disproportionality across parties and countries.

Our data include the latest election in each of 12 established democracies that employ a districted electoral system,[3] and for which we were able to gather full data on districting and election results at the district level, as well as public opinion data. This amounts to 113 parties that won seats in their national elections: Belgium 2019, Denmark 2019, Finland 2019, Iceland 2017, Ireland 2011, Italy 2013, Norway 2017, Portugal 2019, Spain 2019, Sweden 2018, Switzerland 2015, UK 2019 (for a list, see Table A1 in the

[3] We omit mixed and multi-tiered systems.

appendix, p.1).[4] To conduct the analysis outlined above, we draw on different sources of data. We list the key sources here in brief, and elaborate below on how we utilize them.

Electoral data. We utilize district-level election results from the Constituency-Level Elections Archive (CLEA) Lower Chamber Elections Archive (Kollman et. al 2019a). We also utilize CLEA's GeoReferenced Electoral Districts Dataset (Kollman et al 2019b).

Public opinion. To gauge differences in voters' ideological preferences, we utilize data from the European Social Survey (ESS) waves 9 and 10 (2018 and 2020, respectively). These data include 12,350 respondents in our 12 countries.[5]

4. How geographic representation matters

The analysis presented in Figure 1 above indicates that at least some parties overrepresent their supporters residing in some districts at the expense of those residing in others. In this section, we assess how broad this particular finding is and analyze its political significance. We do so in two different ways. First, we draw on a particularly salient cleavage in modern democracies in recent years: urban vs. rural districts. Obviously, different cleavages correlate with geography depending on the country (e.g., ethnic, linguistic, economic, and even occupational). Our analysis of the rural-urban cleavage within parties serves as a demonstration of the political relevance of geographic representation. We examine whether

[4] We omit from this analysis 12 parties and 14 independent candidates that ran in a single district, as they, arithmetically, perfectly represent the districts they ran in.

[5] Belgium (N=1080), Denmark (N = 1214), Finland (N=1084), Iceland (N=623), Ireland (N = 1160), Italy (N=1226), Norway (N=1083), Portugal (N=559), Spain (N = 903), Sweden (N=1287), Switzerland (N=600), and the UK (N = 1491).

these two sets of districts are over/underrepresented compared to one another *within* parties. We then demonstrate within-party ideological differences between the two types of constituencies. We find that geographic misrepresentation is broad and is politically relevant.

Second, we return to the approach taken in Figure 1 whereby we ungroup districts and examine each one separately. Conducting a counterfactual analysis, we show that geographic over/underrepresentation within parties has implications for seat allocation in parliament, and that parliamentary seats would have been allocated differently in the absence of party-level geographic misrepresentation.

4.1 Rural and urban co-partisans: gaps in representation

To identify rural and urban districts, we calculate district density drawing on the number of eligible voters per district and divide it by the size of the district in squared kilometers (obtained from CLEA and CLEA's GeoReferenced Electoral Districts Dataset, respectively (Kollman et. al 2019a and 2019b)). We identify districts below their country's median density as rural, and those equal to and above the respective median as urban.[6] We employ a straightforward analysis to examine over/underrepresentation of urban and rural voters within parties: For each party, we calculate the difference between the share of its seats

[6] For three of these countries (Belgium, Iceland, and Switzerland), due to missing data, district density was calculated using figures from official state records. Also, in Finland we merged districts per the redistricting act of 2015, and in Ireland and Italy where district boundaries following the redistricting was incompatible with our voter data, we drew on the elections that took place prior to it. We omit districts of voters living abroad in Italy and Portugal.

obtained in rural districts and the share of its votes cast in them, such that a positive (negative) score on the figure implies within-party over(under)representation of rural districts over urban ones.

Figure 2 presents these gaps for each of the parties (N=110), grouped by country.[7] The figure demonstrates several things. First, many parties are far apart from the zero line, implying over/underrepresentation of rural votes compared to urban ones. In fact, in 33 percent of the cases (37 parties) there is a gap of at least 10 percentage points between the origins of the party's votes and the home of its seats. This gap is not in one direction: Among this set of parties, 60% overrepresent their urban voters at the expense of their rural ones and the rest underrepresent them. And although in some countries parties are clustered somewhat closer to the zero line (e.g., Ireland, Sweden), in most the range is large, implying a substantial geographic misallocation of seats.

Second, it is evident that this variation in the direction of misrepresentation exists not only overall but also within each country: Some parties overrepresent their rural voters at the expense of their urbanite supporters while others amplify the representation of their urban supporters. This result is key. Recall that under malapportionment, some districts – often rural ones – are overrepresented compared to others (Snyder and Samuels 2004, 150). This might lead to more seats for some parties than their share of votes and fewer for others. The heterogeneity presented here suggests that even under malapportionment that may amplify overall support for some parties compared to others, geographic

[7] We omitted three additional parties that received votes exclusively in urban or rural districts (as they, arithmetically, perfectly represent the group of districts they ran in). This left us with 110 rather than 113 parties.

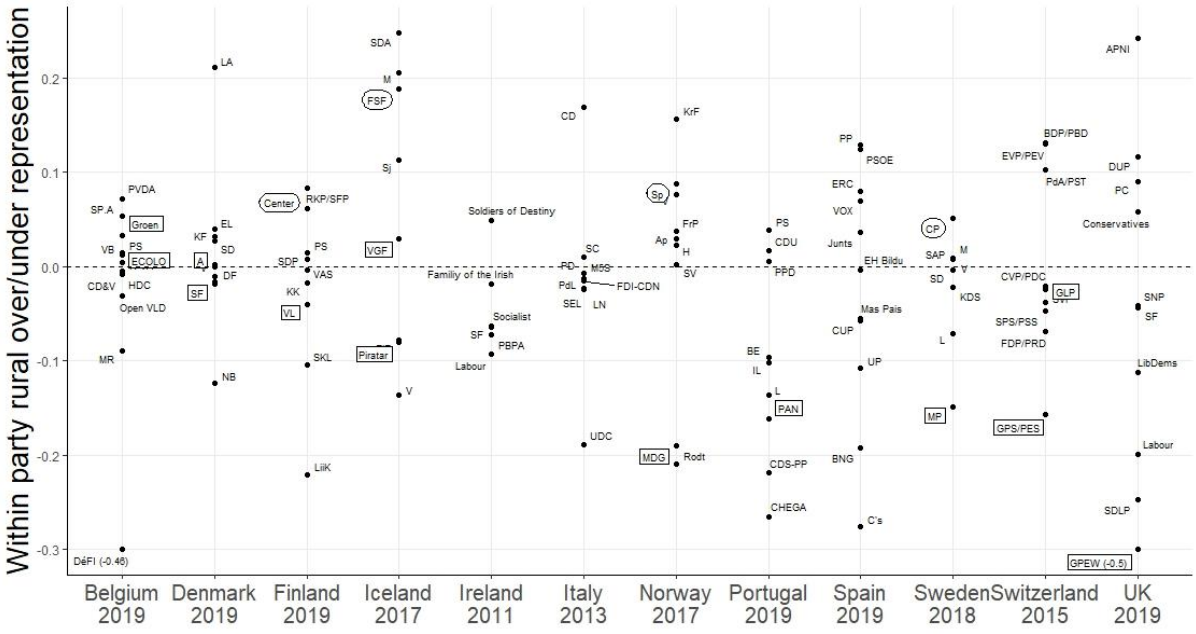
disproportionality *within* parties in both directions is substantial. Moreover, an auxiliary analysis shows that although large parties are characterized by smaller misrepresentation on average compared to smaller ones (correlation of -0.32 between absolute gap and party vote-share), this relationship is quite noisy, with some medium and even large parties characterized by high misrepresentation between the two sets of districts. One such example is the British Labour party with 0.33 of the votes, which underrepresents rural voters (-0.2). Another is the Icelandic Social Democratic Alliance with 0.12 of the votes, which overrepresents its rural votes (0.25).

Third, the results reveal heterogeneity within party family (see Figure A2 in the appendix, p.2, and further analysis of the results reported in Figure 2).[8] Most party families overrepresent their rural supporters in some countries and underrepresent them in others (e.g., Liberal and Social Democratic party families). Two exceptions are Green and Agrarian/Center parties (marked in rectangles and circles, respectively). Green parties are less popular in small-magnitude rural districts and their support in these areas is hence diminished when converted to seats (Kedar et al. 2016). Due to the district-mediated conversion of votes to seats, this is, in turn, reflected *within* the party: its urban supporters receive more seats than their contribution to the party's total votes. The geographic distribution of support for Agrarian/Center parties, however, is more mixed, yet they overrepresent their rural supporters. Again, this geographic bias is not the product of some decision of the party to undercount some of its constituencies or prioritize one segment of

[8] Party family classification is based on the Chapel Hill Expert Survey (Jolly et al. 2022), with missing classifications supplemented by the Comparative Manifesto Project (Lehmann et al. 2023) and ParlGov (Döring et al. 2022) classifications.

its supporters over another. Rather, it is a product of a district-mediated conversion of votes to seats.

Figure 2. Rural over/underrepresentation within parties in 12 Western democracies



Note: Parties plotted above the zero line overrepresent their rural voters. Agrarian/Center parties are marked in circles and Green parties in rectangles. For two parties with extreme values (Belgium's DeFI and the UK GPEW), actual values appear in parentheses.

In sum, a substantial set of parties, small and large, across countries, over/under represent their rural or urban voters at the expense of one another. The direction of the representational bias is not constant across parties, nor does it correlate with parties' political stances. On both the left and the right, some parties have the voice of their rural voters amplified while others have it diminished. This result highlights the contingency of geographic disproportionality on the particular circumstances of the election, such as turnout and vote margin.

4.2 Rural and urban co-partisans: Political differences

Geographic misrepresentation in conjunction with ideological differences might have implications for the volume in which different voices within the party are heard. To assess the political implications of the geographic discrepancy we find above, we examine whether and how constituencies over(under)represented by their parties differ from their under(over)represented co-partisans in their policy preferences. We thus analyze jointly the degree – and direction – of ideological differences and misrepresentation within parties.

To examine ideological differences, we employed public-opinion data (ESS 2018, 2020) on four key issue areas: gay rights, immigration, European integration, and redistribution (see Table A3 in the appendix, p.3, for question-wording). All four policy questions were transformed to a 0-1 scale, where higher values represent more conservative positions (on European integration, high values imply greater support for the statement that 'integration has gone too far'). Utilizing the place of residence question item, we assigned respondents into two groups – rural or urban, where the former includes a country village, farm or home in the countryside, and the latter includes a big city, suburbs or outskirts of a big city. This leaves us with the positions of rural and urban supporters of 91 parties on each of the four issue areas, 364 ideological comparisons altogether.

Figure 3 presents the results of this analysis. The figure is divided into four panels, one per policy domain. The horizontal axis of each panel marks the ideological difference between the mean position of party supporters residing in rural and urban areas, such that where the former hold positions more conservative than the latter the gap is positive. The vertical axis is identical to that in Figure 4 and marks over(under)representation of rural constituencies at the expense of urban ones in positive (negative) value. Thus, for example, in the top left quadrant are cases where rural voters are overrepresented within their

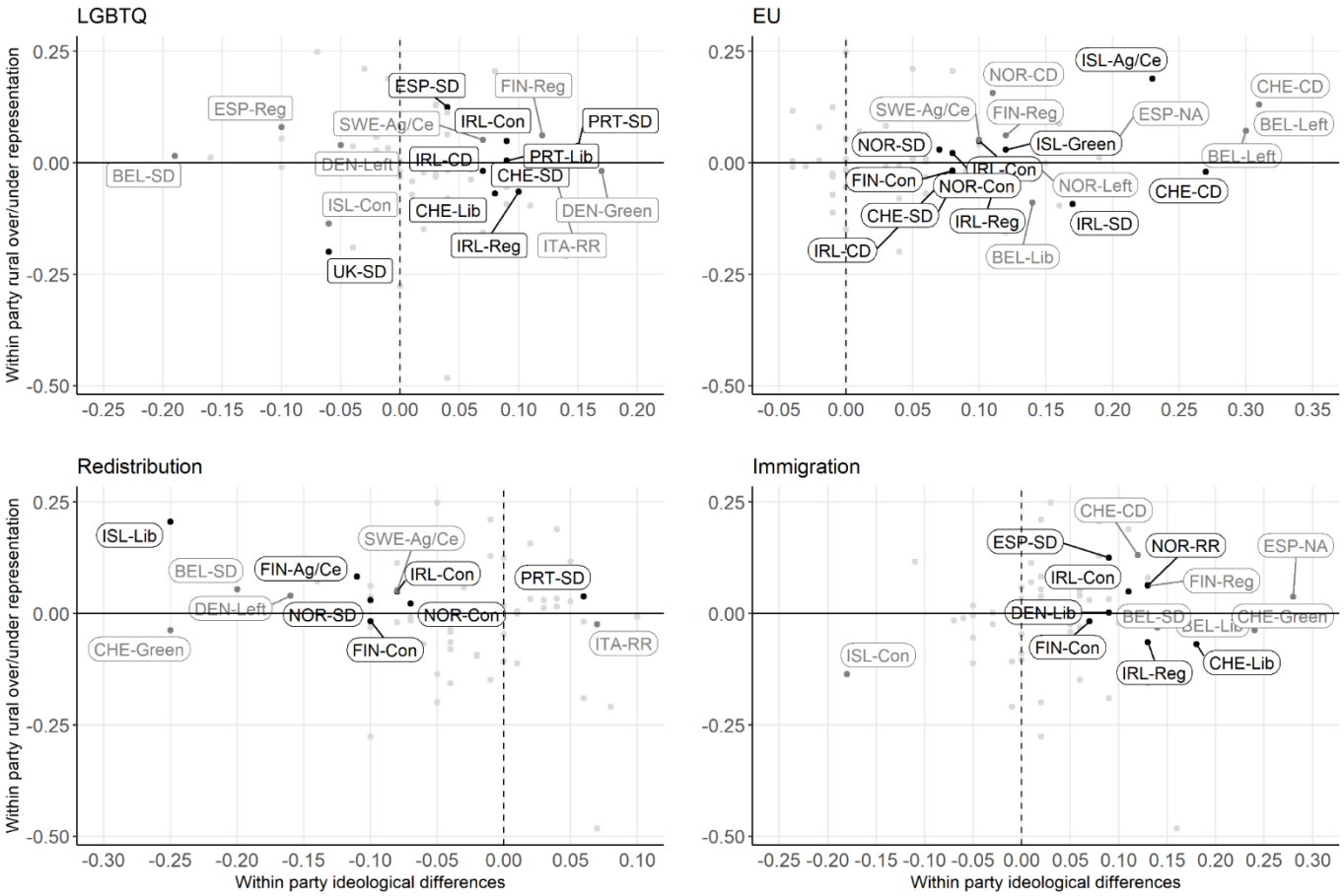
parties and their positions are more progressive than those of their urban counterparts.

All 364 ideological comparisons in our analysis are marked in the four panels (91 within-party gaps per panel), yet we highlight those that are substantively and statistically significant. Parties whose parliamentary seat-share exceeds 10% *and* the ideological differences between urban and rural voters reach standard levels of statistical significance (0.05) are titled in black. Parties that have similarly significant diverging opinions among the two sets of constituencies yet occupy no more than 10% of parliamentary seats are titled in gray. Finally, gray markers with no title mark those cases in which urbanites and their co-partisans residing in rural areas do not systematically differ in their issue positions regardless of party size.

The figure is rich in details and findings, yet it tells a clear story. Overall, in 65 (18%) of the comparisons we find systematic within-party ideological differences that reach standard levels of statistical significance. These cases are spread across parties, such that 56% of the parties have at least one policy domain on which their rural and urban supporters differ ideologically. Any two supporters of the same party who reside in two different districts, therefore, may differ on some policy areas and not on others. This fraction varies somewhat across the four issue areas: Co-partisans tend to be in disagreement most often on European integration and least often on redistribution. Take the Partido Socialista (PS), the social democratic party in Portugal, which gained 108 seats, almost 47% of the seats in the lower chamber in the election under study, as an example. Its rural supporters were on average 0.15 more conservative than their underrepresented urban co-partisans on gay rights (top left panel), and sought less redistribution than the latter (bottom left, gap of 0.06). On European integration and immigration, however, rural and urban supporters of the PS did not systematically differ.

Importantly, these ideological differences are systematic in their direction: depending on the issue, the data are clustered on either the left or the right side of each panel, indicating that rural and urban co-partisans not only differ, but differ in a consistent direction: the former are either more conservative or more progressive, depending on the issue. Compared to their urban co-partisans, rural voters hold conservative positions on gay rights, think that the process of European integration should be slowed down, and hold conservative positions on immigration, yet support greater levels of redistribution.

Figure 3. Ideological differences and over/underrepresentation of co-partisans



Note: Above the zero line are cases in which rural districts are overrepresented. To the right of the zero line are cases where rural voters hold more conservative positions. Labels mark parties in which ideological differences between co-partisans are statistically significant. Among them, parties with a seat share of 10% or more are colored in black.

These general patterns are not a product of differences in a small subset of countries, nor are they the result of ideological heterogeneity within a few parties, although the divergence is more pronounced in some party families along some issues compared to others. More often than among supporters of other party families, rural and urban supporters of Christian Democratic parties diverge in their position on European integration, supporters of Social Democratic parties diverge on immigration, and interestingly, supporters of Conservative parties diverge on redistribution.

Overall, the analyses in Figures 2 and 3 reveal within-party differences of opinion combined with gaps of representation. In the concluding section of the study, we reflect on potential implications of this finding.

4.3 Geographic misallocation of seats

Lastly, we take a step back from the rural-urban application and ask: how many seats would have been assigned differently in the absence of geographic distortion? After all, some portion of the gap between vote- and seat-share is inevitable because seats cannot be broken down to fractions. To answer this question, we conduct a counterfactual analysis in which we analyze, given the number of seats each party obtained – that is, keeping the standard partisan disproportionality constant – how many party seats would have been reassigned to different districts in the absence of geographic distortion.

Our procedure of calculating this quantity is straightforward. Dividing a party's total votes by total seats, we get a hypothetical average number of votes per seat for each party (obviously, in reality, this number might differ by seat and depend on the electoral formula). Using that number as a quota, we then examine how many seats the party "should" have obtained in each district (we do so by dividing the number of votes the party obtained in the district by the quota). Finally, we examine the vote remainders for the party in the different

districts and assign the seats remaining to the remainders in descending order. Thus, the number of seats per party and partisan disproportionality remain constant, only we reexamine the party's allocation of seats across districts.

Table 1 presents the results of this analysis. The first column presents the number of parliamentary seats that would have been assigned to supporters of the same parties residing in a different district were the parties to equally represent their supporters residing in different districts. The absolute numbers range between 7 (Denmark) and 79 (the UK), and is 18 on average. Obviously these numbers depend on the size of the respective parliament. Shifting to proportions, our analysis suggests that on average 8% of the seats in each parliament should have been reassigned to supporters of the same parties residing in other districts, ranging between 3% in Sweden to 14% in Iceland. Examining the same results at the party level, on average, 2.53 seats per party (with a nominal number of 9 parties on average) are misaligned with the origins of the party's votes.

Overall, our analysis in this section indicates a significant degree of within-party geographic misalignment between votes and seats pertaining to rural vs. urban districts, accompanied by differences between these same groups in positions on key political issues. Lastly, we find a substantial geographic misallocation of party seats in parliament across districts due to within-party vote-seat discrepancies.

Table 1. Counterfactual analysis: Geographically misallocated seats

Country	Misallocated seats	Seats in parliament	Share of misallocated seats	Number of parties	Misallocated seats per party
Belgium (2019)	8	150	0.05	12	0.67
Denmark (2019)	7	176	0.04	10	0.70
Finland (2019)	10	199	0.05	9	1.11
Iceland (2017)	9	63	0.14	8	1.12
Ireland (2011)	16	151	0.11	7	2.29
Italy (2013)	40	612	0.07	9	4.44
Norway (2017)	15	169	0.09	9	1.67
Portugal (2019)	20	226	0.09	9	2.22
Spain (2019)	46	346	0.13	13	3.54
Sweden (2018)	11	349	0.03	8	1.38
Switzerland (2015)	13	196	0.07	9	1.44
UK (2019)	79	649	0.12	10	7.9

Note: Parties' total seats are unchanged, only reassigned to districts in accordance with the party's share of votes cast in the different districts.

5. A measure of geographic disproportionality

What is the extent of the geographic discrepancy between where a party's votes come from and where its seats are obtained, and how does it differ across parties? In this section, we theoretically and empirically develop a measure of geographic disproportionality (GeoDisp) that allows us to answer these questions in a broader way, beyond specific demonstrations. Our measure compares the share of a party's votes originating from a particular district to the share of its seats obtained in that district, thus examining the gap between districts' shares contributed to the party's electoral fortunes (votes) and their respective shares of the party's parliamentary fortunes (seats).

A stylized example might be helpful. Imagine a party A running in two districts: D1, a four-seat district in the southern part of the country, and D2, a twenty-seat district in the center. For simplicity, assume that the country is perfectly apportioned with 1,000 votes per

parliamentary seat. Assume further full turnout, and that the party received 35 percent of the votes cast in D1, and 42 percent of the votes cast in D2, amounting to 1,400 (0.35*4,000) and 8,400 (0.42*20,000), respectively, and 9,800 in total. Now, assume that given vote-shares of other parties in each of these districts and the electoral formula, these votes translate into seats such that the party received 2 seats in D1 and 6 seats in D2, 8 seats altogether. Thus, in the example above, district D1 contributed 0.14 (1400/9800) of the party's votes and obtained 0.25 (2/8) of the party's seats. Similarly, D2 contributed 0.86 (8400/9800) of the party's votes and obtained 0.75 (6/8) of its seats. Within the party, therefore, supporters residing in D1 are overrepresented at the expense of their co-partisans residing in D2. In the formalization below, we present a general measure, following which we apply it to evaluate the gap presented in this illustration.

Figure 4 presents the logic behind our proposed measure. Imagine a country divided to N districts (i=1…N) in which K parties (j=1…K) compete in the elections for an S-seat parliament. v_{ij} are the votes cast in district i for party j and similarly, s_{ij} are the seats obtained in district i by party j. Thus, voters in district 1 cast a total of $v_{1.}$ votes (v_{11}, v_{12}… v_{1K}), and the district gets a total of $s_{1.}$ seats (s_{11}, s_{12},…s_{1K}), both for Parties 1 through K. Similarly, Party 1 gets a total of $v_{.1}$ votes (v_{11}, v_{21},...v_{N1}) and obtains $s_{.1}$ seats (s_{11}, s_{21},...s_{N1}), both from districts 1 through N. Panel A presents this stylized setup.

The standard disproportionality measures gauge partisan disproportionality. They identify votes by the party they are cast for and seats by the party obtaining them. They then calculate the gap between the two for each party and, depending on the measure, apply some arithmetic formula to these gaps. This is highlighted in Panel B. Typically, each party's vote-share and seat-share are calculated at the national level (see final row of the table). The gap between the two shares for each party then serves as the basis for the

calculation of partisan disproportionality. Greater gaps between party vote- and seat-shares lead to greater scores. Similarly, at the district level (rarely done), the gap for each party between its vote-share and seat-share in the district is used to calculate disproportionality at the district level. Thus, Gallagher's Index of Disproportionality (Gallagher 1991) at the district level (district *i*) is calculated as:

Eq. 1 $$Partisan\ disproportionality_i = \sqrt{\frac{1}{2}\sum_j (\frac{v_{ij}}{v_{i.}} - \frac{s_{ij}}{s_{i.}})^2}$$

And at the national level:

Eq. 2 $$Partisan\ disproportionality = \sqrt{\frac{1}{2}\sum_j (PVS_j - PSS_j)^2}$$

Where $PVS_j = \frac{v_{.j}}{V}$ is the vote-share of party *j*, and $PSS_j = \frac{s_{.j}}{S}$ is the seat-share of party *j.* These two calculations are based on the quantities in Figure 4b. The district-level measure (equation 1) draws on any inner row of the table, and the national-level one (equation 2) on the bottom (total) row.

We transpose this analysis. We identify votes and seats by their district rather than their party, and calculate the gaps between the shares of a party's votes originating from different districts and its shares of seats obtained in different districts. This is presented in Figure 4c. Under this framework, each party has a vector of votes it received from various districts and a vector of seats it occupies in various districts. At the party level, we compare the share of votes the party received in each district out of the overall votes it received with the analogous seat quantity. Thus, at the party level, geographic disproportionality of party *j*:

Eq. 3 $$GeoDisp_j = \sqrt{\frac{1}{2}\sum_i (\frac{v_{ij}}{v_{.j}} - \frac{s_{ij}}{s_{.j}})^2}$$

Figure 4. Partisan and geographic disproportionality

4a. Votes and seats: setup

	p_1	p_2	. . .	p_K	Total
d_1	v_{11}, s_{11}	v_{12}, s_{12}		v_{1K}, s_{1K}	$v_{1.}, s_{1.}$
.					
.					
.					
d_N	v_{N1}, s_{N1}	v_{N2}, s_{N2}		v_{NK}, s_{NK}	$v_{N.}, s_{N.}$
Total	$v_{.1}, s_{.1}$	$v_{.2}, s_{.2}$		$v_{.K}, s_{.K}$	V,S

4b. Partisan disproportionality

	p_1	p_2	. . .	p_K	
d_1	v_{11}, s_{11}	v_{12}, s_{12}		v_{1K}, s_{1K}	→ partisan disproportionality in d_1
.					
.					
.					
d_N	v_{N1}, s_{N1}	v_{N2}, s_{N2}		v_{NK}, s_{NK}	→ partisan disproportionality in d_N
Total	$v_{.1}, s_{.1}$	$v_{.2}, s_{.2}$		$v_{.K}, s_{.K}$	→ partisan disproportionality

4c. Geographic disproportionality

	p_1	p_2	. . .	p_K	Total
d_1	v_{11}, s_{11}	v_{12}, s_{12}		v_{1K}, s_{1K}	$1., s_{1.}$
.					
.					
.					
d_N	v_{N1}, s_{N1}	v_{N2}, s_{N2}		v_{NK}, s_{NK}	$v_{N.}, s_{N.}$
	↓	↓		↓	↓
	geographic dispropor-tionnality of p_1	geographic dispropor-tionaliy of p_2		geographic dispopor-tionality of p_K	Geographic disproportional ity

At the national level, we calculate the vote- and seat-shares as part of the overall votes and seats cast in and assigned to a district:

Eq. 4 $$GeoDisp = \sqrt{\frac{1}{2}\sum_i (DVS_i - DSS_i)^2}$$

Where $DVS_i = \frac{v_i}{V}$ is the vote-share of district *i*, and $DSS_i = \frac{s_i}{S}$ is the seat-share of district *i.* This indicates the degree to which there is a discrepancy in the country as a whole between where votes come from and where seats go.[9] The party-level measure (equation 3) draws on any inner column of the table, and the national-level measure (equation 4) on the total column.

Applying Equation 3 to our illustration of party A above, we get:

$$GeoDisp_A = \sqrt{\frac{1}{2}[(0.14 - 0.25)^2 + (0.86 - 0.75)^2]} = 0.11$$

Our analyses below shed light on qualities of the measure and this score in particular.

5.1 Geographic disproportionality: Theoretical exploration

Our measure ranges between zero and one. Following a similar logic (yet on transposed political quantities) to Gallagher's Least Square partisan disproportionality index however (Gallagher 1991), it is not interpreted as a percentage. Rather, comparing its scores theoretically across constellations and empirically to related measures sheds light on the magnitude of geographic representativeness in different contexts. We begin with the

[9] At the national level, our GeoDisp is a cousin of malapportionment. The two differ, however, in two key aspects: GeoDisp draws on real votes in the election under study rather than population (or eligible voters), and the functional form is squared rather than absolute value.

former. Table 2 demonstrates the properties of the measure for a single party by presenting stylized scenarios and their corresponding GeoDisp scores. Each section of the table compares two or more scenarios, each consisting of a set of districts, the shares of votes each district contributes to the party's total votes and the share of seats it receives of the party's total set of obtained seats. The right column of the table presents the GeoDisp score of the respective scenario. Section (i) presents scenarios of two or three districts each, and conveys the boundaries of our measure. In the first scenario there are three districts in which the share of the party's seats is identical to the share of the party's votes, and a perfect geographic proportionality is attained (a score of 0). Conversely, in the second scenario, all votes contributed originate from one district and all seats are assigned to another. This is obviously not consistent with electoral law and results in absolute disproportionality (a score of 1).

Section (ii) presents six scenarios of two districts each. In the first scenario, one district contributes 0.501 of the party's votes and receives all its seats, while the other contributes 0.499 of its votes and receives none of the party's seats. This scenario results in a GeoDisp score of 0.499, which, in the case of two districts, is effectively the upper bound of our measure. As we move from the first to the last scenario, the discrepancies decline, and the GeoDisp score declines accordingly, reaching a score of 0.05 in the last one. Plainly put, the smaller the discrepancy, the smaller the score.

Section (iii) provides two examples whereby the vote-seat discrepancies in four districts amount to a score of 0.14, similar to the average in our empirical analysis below. In the first scenario, a fifth district is accurately represented. In the second, that district is replaced with four accurately represented districts. The score stays unchanged. This example demonstrates the general property whereby as long as the total share of votes cast

and seats distributed in them is constant, a change in the number of districts accurately represented does not affect the disproportionality score.

Table 2. Configurations of geographic disproportionality

	(Votes, Seats)	Score
(i)	(0.3, 0.3) (0.28, 0.28) (0.42, 0.42)	0
	(1.0, 0.0) (0.0, 1.0)	1
(ii)	(0.501, 1) (0.499, 0)	0.49
	(0.6, 1) (0.4, 0)	0.40
	(0.7, 1) (0.3, 0)	0.30
	(0.8, 1) (0.2, 0)	0.20
	(0.9, 1) (0.1, 0)	0.10
	(0.95, 1) (0.05, 0)	0.05
(iii)	(0.3, 0.2) (0.25, 0.15) (0.15, 0.25) (0.1, 0.2) (0.2, 0.2)	0.14
	(0.3, 0.2) (0.25, 0.15) (0.15, 0.25) (0.1, 0.2) (0.05, 0.05) (0.05, 0.05) (0.05, 0.05) (0.05, 0.05)	0.14
(iv)	(0.3, 0.2) (0.25, 0.15) (0.15 0.25) (0.3 0.4)	0.14
	(0.3 0.25) (0.25 0.1) (0.15 0.2) (0.3 0.45)	0.16

Section (iv) proceeds with a variation on the four districts of representational discrepancy listed in Section (iii). In the first scenario, two districts receive 0.1 percentage points more seats than their respective party vote-share, and two receive 0.1 less. In the second scenario, the overall discrepancy across the four districts is the same (0.4), yet the degree of misrepresentation of each of the four districts separately is different: two districts have 0.05 and 0.015 percentage points fewer seats than votes, and two have 0.05 and 0.15 more seats than votes. As is shown in the table, the GeoDisp score is slightly greater in the latter scenario (0.16 compared with 0.14 in the former). This reflects the property of a Least Square principle: it registers a few large discrepancies more strongly than many small ones. This property corresponds with a political rationale whereby, unlike small discrepancies, larger ones are less likely to be a result of inevitable rounding, and are more likely to lead to

substantial representational gaps.

Geographic discrepancy between votes and seats need not be identical across parties. In fact, we expect it to vary across them. Recall that at the party level, geographic disproportionality captures the gap between where its votes originate and where its seats are occupied. The figures this gap is made of, and hence the gap itself, depend on idiosyncratic factors, such as turnout and vote shares of different parties in the district. This implies that a party characterized by high level of geographic disproportionality in one election will not necessarily be characterized by it in all elections. Yet because the gaps are calculated of the party's total votes and seats, other things equal, party's size matters. A given set of votes from a particular district that were not translated into a comparable fraction of seats for that district can be impactful for the ability of a small party to represent the district, but less so for a large party. Thus, our first hypotheses is:

H1. Small parties will be characterized by larger geographic disproportionality compared to large ones.

While overall party size is relevant for geographic disproportionality, the origin of its vote is relevant as well. Given that votes are more accurately converted to seats in large-magnitude districts compared to small ones, the magnitude of districts from which a party's votes originate may affect the party's geographic disproportionality.[10] Our second hypothesis is, then:

H2. Parties whose votes originate from small-magnitude districts will be characterized by greater geographic disproportionality compared with parties whose votes originate from

[10] This expectation holds regardless of whether the party strategically directs its effort to large-magnitude districts or whether it is simply more appealing to voters residing in them.

large ones.

In the analysis below we turn to empirically measure geographic disproportionality, and evaluate the factors affecting it.

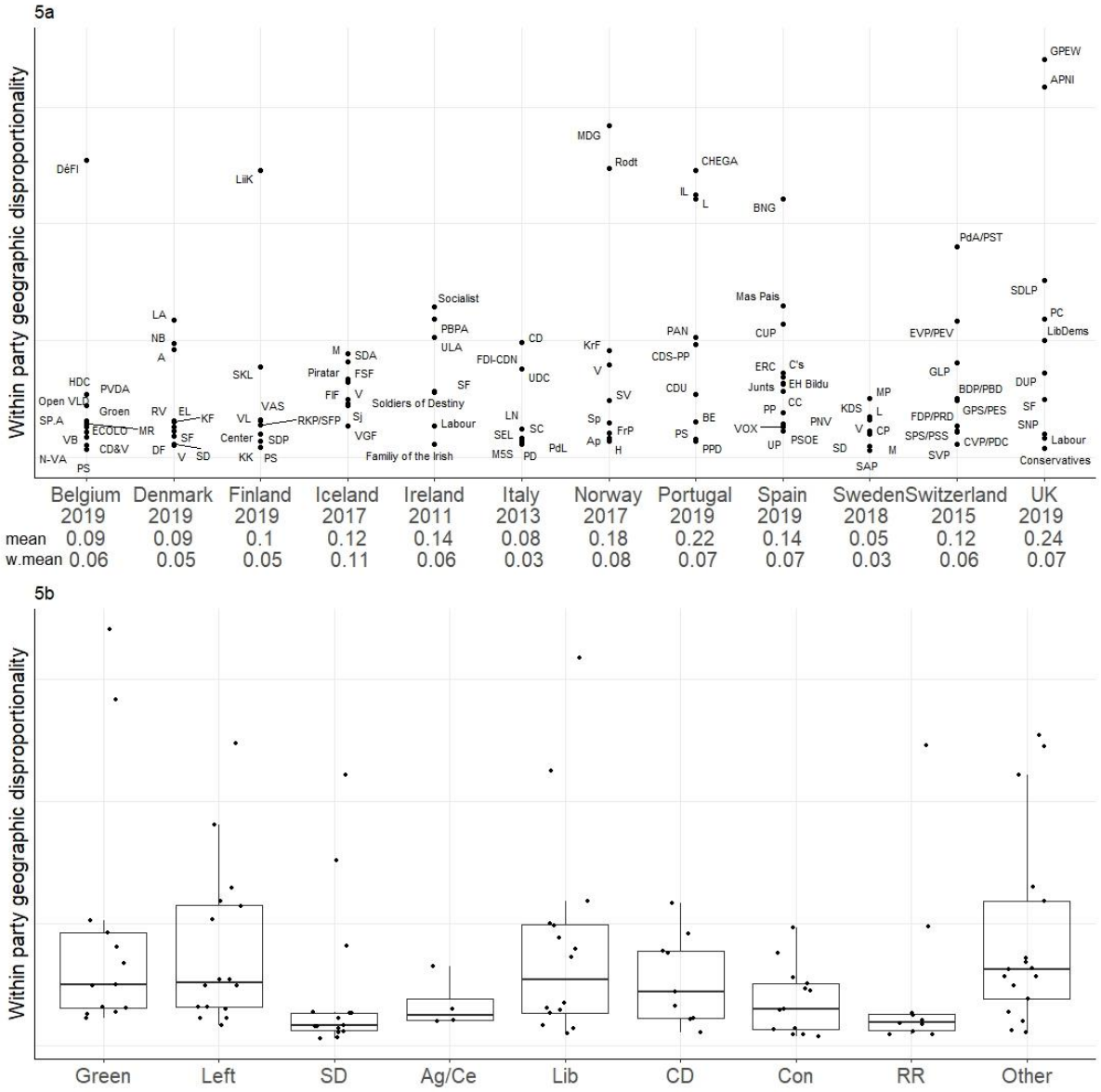
5.2 Disproportionality across parties and countries

Our analysis utilizes the same raw data of district-level votes and seats reported in CLEA (Kollman et. al 2019a) drawn on in Figure 2 above, from which we calculate geographic disproportionality per Equation 3 above. Given our theoretical focus, most of our analysis is at the party level. Figure 5a presents 113 party-level GeoDisp indices in our 12 countries, grouped by country. The average score is 0.13 (SD=0.14), and the median one is 0.07. The average score for each country separately is noted below the figure. The figure demonstrates how geographic distortion varies both between and within countries. First, countries vary in their average party score, with Swedish parties scoring the lowest disproportionality on average (0.05) and parties in the UK the highest on average (0.24). Second, they differ in how much variation there is within them, with countries such as Iceland and Italy exhibiting little differences in their parties' disproportionality scores, and others such as Norway and Portugal having a wide range of geographic distortion, from parties that accurately reflect the origin of their votes to ones which substantially distort it.

Although small parties are less representative than their larger counterparts (more on this below), geographic disproportionality is not a property reserved for small parties only. Moderate-size parliamentary parties with relatively high disproportionality score include, among others, the Icelandic Center Party and Independence Party (with 11% and 25% of the seats in parliament and scores of 0.17 and 0.09, respectively) and the Fianna Fail in Ireland (with 12% of the seats in parliament and a score of 0.11). Moderate-size electoral ones include, among others, the Liberal Democrats in the UK (12% of the votes and a score

of 0.2).

Figure 5. Geographic disproportionality across 12 Western democracies



Note: Geographic disproportionality within parties by country (panel a) and party family (panel b). Mean and weighted mean (by party size) are noted underneath panel a. Geographic disproportionality is calculated based on equation 3.

One might wonder if some party families are characterized by greater disproportionality compared to others. Panel b presents the same party-level scores

grouped by party family. The boxplots mark the median disproportionality score for each party family (the horizontal line in the box), the interquartile range (IQR, the box), parties within 1.5 times above or below the IQR (whiskers), and parties beyond that range (dots).[11] The figure demonstrates the substantial variation both across and within party families (for presentation of each party separately, see Figure A4 in the appendix, p.4). While some party families are characterized by low levels of geographic disproportionality (e.g., the radical right), others exhibit significant discrepancy between where their votes originate and where their seats are assigned (e.g., left). It also shows that some party families are characterized by similar levels of proportionality across countries (e.g., the Social Democrats), yet others are characterized by substantial variation (e.g., the Liberals).

GeoDisp scores presented here map onto the illustration of rural-urban within-party misrepresentation presented above. In fact, they correlate at 0.85 with the absolute value of the signed representational gaps presented in Figure 2 above (the correlation is positive in all 12 countries, with a median score of 0.75). This obviously does not imply that the rural-urban intra-party cleavage we examine is the only manifestation of geographic disproportionality. Although it is reassuring that GeoDisp tightly captures this prominent cleavage, other political cleavages correlate with geography and may be captured by GeoDisp.

5.3 Putting geographic disproportionality in context

Putting GeoDisp scores in context can shed light on the relative quality of party-level geographic representation. To this aim, we conduct two comparisons and revisit the Norwegian case presented at the outset.

[11] The scores are horizontally jittered for presentational purposes.

Geographic disproportionality at the party and national levels. First, we compare our party-level geographic disproportionality index reported above (avg. GeoDisp=0.13) to the national-level one. These are the empirical versions of Figure 4c, computed through equations 3 and 4, respectively. Compared to the party-level indices, national-level disproportionality scores are negligible, showing high – in fact, near perfect – geographic congruence between votes and seats. This is not surprising, given that at the national-level each district's votes and seats are pooled across parties. Scores of national-level geographic disproportionality hover around an average of 0.023 (SD=0.02), and range between 0.005 (UK 2019) and 0.070 (Iceland 2017) (see Table A5 in the appendix, p.5, for all 12 scores). The stark gap between geographic disproportionality at the party and the national levels is an indication that the pooling of votes and of seats across parties at the national-level masks substantial geographic distortion within parties.

Partisan vs. geographic disproportionality. Drawing on the same data, we switch to comparing the two dimensions: our party-level geographic disproportionality score and the familiar partisan disproportionality (Gallagher 1991). This is akin to comparing the empirical versions of Figures 4c and 4b, respectively, in our cross section of cases.[12] We calculate the partisan disproportionality at the national level, as is commonly done in the representational literature (e.g., Gallego et al. 2012; Riera 2015).

[12] Unlike the analysis above, this calculation includes parties that won no seats and those running in a single district. Omitting those would have resulted in an artificially lower partisan disproportionality score, and thus by comparison reflect more favorably on our own measure. While this allows us to account for all parties reported in CLEA, it includes an "other'' category in Sweden, consisting of 1% of the votes.

The average national-level partisan disproportionality score is 0.06, ranging from 0.01 (Sweden) and 0.02 (Iceland and Denmark) on the low end to 0.17 (Italy) with the UK second (0.12) on the high end. Nine of our countries score 0.08 or lower. A comparison of the partisan disproportionality with our geographic disproportionality at both the national and the party levels reported above is revealing. Partisan disproportionality is, on average, less than half the magnitude of our party-level geographic disproportionality (0.13) and more than twice as large as the average national-level geographic disproportionality score (0.023). Lastly, it is worth mentioning that the two dimensions, partisan and geographic disproportionalities, are not positively correlated (r=0.11, p value=0.26), and, as seen at the outset, in some cases are even in tension with one another.

Norway 2017 revisited. Having calculated GeoDisp for each case, we return to the Norwegian case highlighted at the outset. Recall that The Liberal party (Venstre) and the Christian Democratic Party (KrF) whose geographic (mis)representation is presented in Figure 1 are two of the four middle parties in size, with three substantially larger parties and two smaller ones. The nine parties in Norway have an average GeoDisp score of 0.18, albeit with substantial variation across parties. Venstre and the KrF score 0.16 and 0.18, respectively. The three largest parties -- the Conservative, Labour, and Progress -- show particularly high levels of geographic congruence between where their votes originate and where their seats are assigned not only on the rural-urban dimension but also district by district, and thus have particularly low GeoDisp scores (0.03, 0.03, and 0.04, respectively). On the opposite end of the distribution, the small Green and the Left party are particularly unrepresentative geographically, with scores of 0.57 and 0.49, respectively. This has to do with the fact that a single-seat party is almost inevitably geographically incongruent with the party's origins of vote.

The two comparisons above, along with the wide-ranging geographic disproportionalities in Norway, underscore the value added of analyzing geographic representation at the party level. The study of partisan representation highlights discrepancies in representation of supporters of different parties, overlooking ideological and interest-based differences between co-partisans residing in different districts. The study of geographic representation at the national level (through either geographic disproportionality or malapportionment) highlights discrepancies in representation of voters residing in different districts, overlooking differences between neighbors supporting different parties. Our analysis of party-level geographic representation complements the two. It focuses in representational discrepancy across districts, yet also considers within-party differences.

5.4 Variation in disproportionality

What accounts for the variation in geographic disproportionality across parties? Recall that our hypotheses point to two factors: the size of the party, and its share of votes originating from small districts. We expect the former to be negatively correlated with geographic disproportionality, and the latter to be positively correlated with it. To examine these hypotheses, we regress party-level GeoDisp score against the party's vote-share, as well as the fraction of the party's votes originating from districts with small magnitude (equal to or smaller than 3, 4, 5, 6, or 7 seats). Importantly, our different specifications control for key suspects. Given the analysis of the Norwegian Venstre and the KrF above, we incorporate malapportionment (Model 3), as well as the fraction of the party's attained seats that are leveling seats (Model 4). We also incorporate the fraction of parliamentary seats that are leveling seats (Model 5), as well as the combination of malapportionment and each of the two calculations of leveling seats (Models 6 and 7).

Table 3 presents the results of this analysis. In the interest of space, the table presents a cutoff of districts with a magnitude smaller than 5 (more on the other cutoffs below). In all specifications, standard errors are clustered by country. As can be seen in the table, consistent with our first hypothesis, as a party's vote-share increases, its geographic disproportionality declines. The effect is remarkably stable across specifications and is substantial in its magnitude. Both vote-share and GeoDisp range between 0-1. Thus, a coefficient of 0.76 implies that an increase of 20 percentage points in a party's vote-share is associated with a decline of 0.15 in GeoDisp – a decline just slightly greater than the range between the mean party GeoDisp score (0.13) and a party that is geographically perfectly proportionate. It is also akin in magnitude to the gap in disproportionality between Labour and the Conservatives – the large parties in Norway 2017 which we reviewed above, and Venstre.

Additionally, consistent with our second hypothesis, an increase in the share of a party's votes originating from small districts results in greater geographic disproportionality at the party level. Here, too, the result is stable across specifications. Both these results resonate with the mechanical conversion of votes to seats: any geographic discrepancy between a party's votes and seats has greater weight when the party is smaller overall. Related to this last point, the share of the party's seats originating from small districts is strongly correlated with the magnitude of the districts in the country as a whole (correlating with the magnitude of the median and average legislator at -0.66 and -0.74, respectively). This country-specific summary figure is captured in Model 1 by a country fixed effect. The coefficients on our control variables tell a similar story across models: They suggest that these factors are not the source of geographic disproportionality. The Norwegian KrF and Venstre notwithstanding, malapportionment, levelling seats in the parliament as a whole,

and levelling seats which the party won are not correlated with geographic disproportionality.

Table 3. Geographic disproportionality, party size, and small-M districts

	M1	M2	M3	M4	M5	M6	M7
Party size (share of votes)	**-0.758 (0.00)**	**-0.763 (0.00)**	**-0.768 (0.00)**	**-0.768 (0.00)**	**-0.757 (0.00)**	**0.767 (0.00)**	**-0.756 (0.00)**
Vote share in M <=5	**0.102 (0.00)**	0.153 (0.13)	**0.102 (0.00)**	**0.099 (0.00)**	**0.101 (0.00)**	**0.098 (0.00)**	**0.01 (0.00)**
Malapportionment			0.049 (0.89)			0.046 (0.90)	0.057 (0.86)
Party leveling seats				-0.029 (0.51)		-0.029 (0.52)	
Country leveling seats					0.022 (0.89)		-0.025 (0.87)
Constant	0.192 (0.00)		0.19 (0.00)	0.196 (0.00)	0.193 (0.00)	0.194 (0.00)	0.191 (0.00)
Country FE		✓					
N	113	113	113	113	113	113	113
R^2	0.34	0.44	0.34	0.34	0.34	0.34	0.34

Note: Dependent variable: geographic disproportionality. Standard errors clustered by country. P-values in parentheses.

Robustness. We conduct two sets of analyses beyond the seven models included in the table. Tables A6 in the appendix (p.6) present the first set, which includes all other cutoffs of

district magnitude between 3-7. The results reported in Table 3 are stable: both the parties' vote-share and the share of the parties' votes originating in small districts are consistently correlated with the respective parties' geographic disproportionality. Furthermore, we rerun the main set of models (M<=5) with a subset of the cases. We eliminate from the analysis cases that exhibit no variation in magnitudes with respect to the cutoff of M=5: the UK (M=1) – the only SMD case in our data, Finland (7-36), Iceland (8-13), and Ireland (3-5). We run our set of seven models five times, whereby we first omit one country at a time and then all of them (leaving the analysis with 79 parties). The latter set of models is reported in Table A7 (p.10). In it, as well as in each of the other four sets, our results hold.

6. Conclusion and implications

In this paper, we offer a new prism through which the ubiquitous translation of votes to seats can be evaluated: the unequal representation of voters supporting *the same* party and residing in different districts. Like malapportionment, our concept is geographic in nature, yet unlike it, it is party- and election- specific. We demonstrate that parties themselves often overrepresent voters residing in some districts at the expense of others, and that this discrepancy varies by party. Furthermore, evaluating the political significance of this discrepancy along the rural-urban cleavage, we find that parties indeed overrepresent one set of districts at the expense of another, and that this discrepancy has political significance: Voters residing in districts underrepresented by parties often differ in their positions from those residing in overrepresented ones. Who are the winners and losers of this geographic misrepresentation? There is no one thread of over/underrepresentation. We observe multiple discrepancies. The answer depends on the party, the district, and the issue at hand.

That some voices among party supporters are amplified and others diminished raises

questions about the implications of discrepancies in geographic representation for party elites and policy outcomes. Ideological differences between amplified and diminished co-partisans might be reflected in the positions of the party elite. In some cases, the constituency amplified holds positions away from the median voter compared to those of the diminished constituency. In such cases, the elected party elite will likely hold positions more extreme than those of their supporters. If this is the case for several parties, it might lead to a polarized party elite compared to the public. An additional potential implication arises in cases where diminished constituencies differ from their amplified co-partisan constituencies along *several* policy dimensions. If so, the party elite might hold positions different from those of the underrepresented constituency along several policy dimensions. At the extreme, such multidimensional ideological incongruence might lead to an abandonment of the party by that constituency and to its alignment with another party instead.

In this paper, we analyzed the political implications of geographic (mis)representation along one key dimension: urban vs. rural districts. Analysis along additional dimensions presents an exciting opportunity for future studies. One might imagine, for example, that co-partisans residing in geographically distant regions of a country might have different priorities regarding allocation of resources, such as investments in geographically based infrastructure (railways, roads, and even airports). Depending on the type of residential community they live in and their occupation, co-partisans might also differ in their position on environmental preservation vs. economic development. Yet another possibility is that those residing in industrial regions differ from their co-partisans living in agricultural regions in their macroeconomic positions on topics such as tariff policy or sectors of the economy that should enjoy subsidies. Any such

ideological or interest-based dimension on which co-partisans might differ and within-party geographic representation is distorted may have implications for ideological discrepancy between political elites and their supporters.

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On-line Appendix

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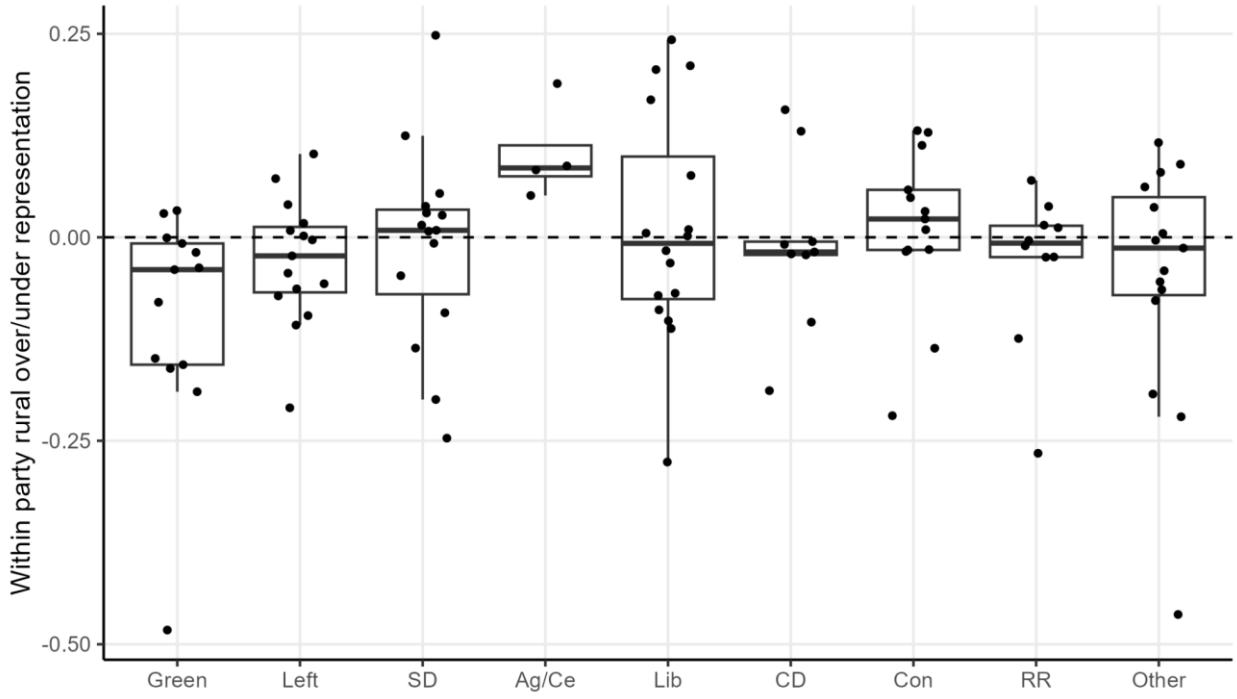
A1. Countries, parties included, and districts

Country (year)	Parties	Number of districts
Belgium 2019	CVP/CD&V; FDF; ECOLO; VB; PS; AGALEV; PSC; N-VA; PVV; PA-PTB; MR; SP	11
Denmark 2019	KF; DF; RV; NY; V; EL; SD; SF; A; NB	11
Finland 2019	SKL; Maal; SSDP; VL; VAS; LN; KK; RKP/SFP; SPP	12
Iceland 2017	FIF; Sj; VGF; M; D; F; S; V	6
Ireland 2011	Family of the Irish; Labour; PBPA; SF; Socialist Party; Soldiers of Destiny; ULA	43
Italy 2013	FDI-CDN; CD; SC; PD; M5S; LN; Left Ecology Freedom; PdL; UDC	26
Norway 2017	Sp; KrF; H; MDG; DnA; V; ALP; RV; SV	19
Portugal 2019	CDU; CH; IL; BE; L; PAN; CDS; PPD; PS	22
Spain 2019	BNG; CUP; C's; ERC; EH Bildu; PNV/EAJ; Junts per Catalunya; PP; PSOE; United We Can; Vox	52
Sweden 2018	CP; KDS; MP; SKP; FP; MSP; SAP; SD	29
Switzerland 2015	CVP/PDC; BDP/PBD; FDP/PRD; GLP; GPS/PES; PdA/PST; EVP/PEV; SPS/PSS; BGB/PAB	26
UK 2019	Alliance; Conservatives; DUP; GPEW; Labour; LibDems; Plaid Cymru; SNP; SDLP; SF	650

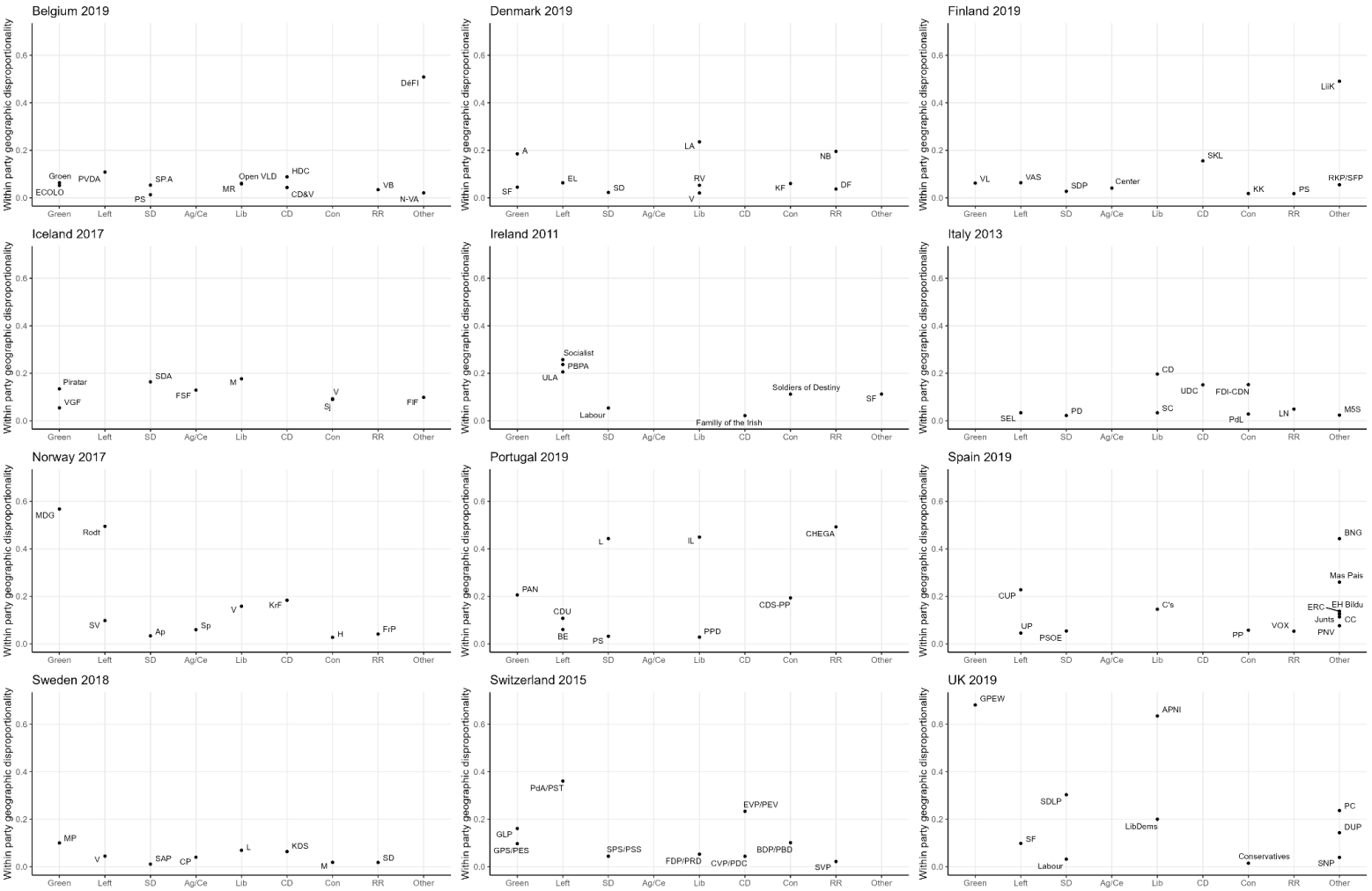
A2. Rural over/underrepresentation by party family



A3. questions wording

Issue	Question wording
Gays' rights	"Gays and lesbians free to live life as they wish?" (1) Agree strongly (5) Disagree strongly
Immigration	"Would you say it is generally bad or good for [country]'s economy that people come to live here from other countries?" (0) Agree strongly (10) Disagree strongly
European integration	"Some say European unification should go further. Others say it has already gone too far. Using this card, what number on the scale best describes your position?" (0) Gone too far (10) Go further
Redistribution	"Government should reduce differences in income levels?" (1) Agree strongly (5) Disagree strongly
Residence	"Which phrase on this card best describes the area where you live?" (1) A big city (5) Farm or home in countryside

A4. Party level geographic disproportionality by country and party family



A5. Partisan and Geographic disproportionality at the country level in 12 Western democracies

Country	Year	Country seats	Number of parties	Number of districts	Partisan disproportionality	Geographic disproportionality
Belgium	2019	150	12	11	0.036	0.031
Denmark	2019	176	10	11	0.004	0.019
Finland	2019	199	9	12	0.030	0.013
Iceland	2017	63	8	6	0.016	0.067
Ireland	2011	151	7	43	0.082	0.018
Italy	2013	612	9	27	0.170	0.013
Norway	2017	169	9	19	0.026	0.021
Portugal	2019	226	9	20	0.063	0.011
Spain	2019	346	13	52	0.063	0.041
Sweden	2018	349	8	29	0.002	0.008
Switzerland	2015	196	9	26	0.029	0.024
UK	2019	649	10	650	0.111	0.005

A6. Spatial disproportionality, party size, and share of votes from different cut-offs of small-magnitude districts

M <= 3

IDV	M1	M2	M3	M4	M5	M6	M7
Party size (share of votes)	**-0.746**	**-0.76**	**-0.744**	**-0.76**	**-0.744**	**-0.758**	**-0.742**
	(0.000)	**(0.000)**	**(0.000)**	**(0.000)**	**(0.00)**	**(0.000)**	**(0.000)**
Vote share in M <=3	**0.113**	**-0.058**	**0.112**	**0.109**	**0.108**	**0.108**	**0.107**
	(0.000)	**(0.001)**	**(0.000)**	**(0.000)**	**(0.000)**	**(0.000)**	**(0.000)**
Malapportionment			0.125			0.116	0.143
			(0.713)			(0.737)	(0.67)
Party levelling seats				-0.039		-0.038	
				(0.335)		(0.358)	
Country levelling seats					-0.07		-0.075
					(0.641)		(0.601)
Constant	0.198		0.193	0.203	0.202	0.198	0.196
	(0.000)		(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Country FE		✓					
N	113	113	113	113	113	113	113
R^2	0.33	0.432	0.33	0.333	0.331	0.333	0.332

Note: Results from 7 OLS regression models for party-level spatial disproportionality, with SEs clustered by country. P-values in parentheses.

M <= 4

IDV	M1	M2	M3	M4	M5	M6	M7
Party size (share of votes)	**-0.744**	**-0.748**	**-0.743**	**-0.754**	**-0.744**	**-0.753**	**-0.742**
	(0.000)	**(0.000)**	**(0.000)**	**(0.000)**	**(0.000)**	**(0.000)**	**(0.000)**
Vote share in M <=4	**0.116**	0.149	**0.115**	**0.112**	**0.113**	**0.111**	**0.113**
	(0.000)	(0.23)	**(0.000)**	**(0.000)**	**(0.000)**	**(0.000)**	**(0.000)**
Malapportionment			0.063			0.059	0.072
			(0.852)			(0.865)	(0.825)
Party levelling seats				-0.029		-0.029	
				(0.494)		(0.506)	
Country levelling seats					-0.028		-0.031
					(0.859)		(0.837)
Constant	0.192		0.189	0.196	0.194	0.193	0.191
	(0.000)		(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Country FE		✓					
N	113	113	113	113	113	113	113
R^2	0.342	0.436	0.342	0.343	0.342	0.343	0.342

Note: Results from 7 OLS regression models for party-level spatial disproportionality, with SEs clustered by country. P-values in parentheses.

M <= 6

IDV	M1	M2	M3	M4	M5	M6	M7
Party size (share of votes)	**-0.749**	**-0.76**	**-0.75**	**-0.759**	**-0.749**	**-0.759**	**-0.749**
	(0.000)	**(0.000)**	**(0.000)**	**(0.000)**	**(0.000)**	**(0.000)**	**(0.000)**
Vote share in M <=6	**0.097**	-0.019	**0.097**	**0.093**	**0.096**	**0.094**	**0.096**
	(0.001)	(0.884)	**(0.000)**	**(0.000)**	**(0.005)**	**(0.002)**	**(0.002)**
Malapportionment			-0.023			-0.022	-0.017
			(0.949)			(0.951)	(0.96)
Party levelling seats				-0.028		-0.027	
				(0.555)		(0.556)	
Country levelling seats					-0.015		-0.014
					(0.923)		(0.925)
Constant	0.188		0.189	0.192	0.189	0.193	0.19
	(0.000)		(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Country FE		✓					
N	113	113	113	113	113	113	113
R^2	0.329	0.431	0.329	0.331	0.329	0.331	0.329

Note: Results from 7 OLS regression models for party-level spatial disproportionality, with SEs clustered by country. P-values in parentheses.

M <= 7

IDV	M1	M2	M3	M4	M5	M6	M7
Party size (share of votes)	**-0.747**	**-0.76**	**-0.749**	**-0.755**	**-0.747**	**-0.757**	**-0.749**
	(0.000)	**(0.000)**	**(0.000)**	**(0.000)**	**(0.000)**	**(0.000)**	**(0.000)**
Vote share in M <=7	**0.1**	-0.014	**0.102**	**0.096**	**0.1**	**0.098**	**0.103**
	(0.001)	(0.916)	**(0.000)**	**(0.003)**	**(0.005)**	**(0.002)**	**(0.002)**
Malapportionment			-0.116			-0.112	-0.119
			(0.77)			(0.78)	(0.746)
Party levelling seats				-0.024		-0.024	
				(0.628)		(0.628)	
Country levelling seats					-0.002		0.007
					(0.992)		(0.964)
Constant	0.184		0.188	0.188	0.185	0.192	0.188
	(0.000)		(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Country FE		✓					
N	113	113	113	113	113	113	113
R^2	0.332	0.431	0.333	0.333	0.332	0.334	0.333

Note: Results from 7 OLS regression models for party-level spatial disproportionality, with SEs clustered by country. P-values in parentheses.

A7. Geographic disproportionality, party size, and share of votes from small districts – A subset of cases

IDV	M1	M2	M3	M4	M5	M6	M7
Party size (share of votes)	**-0.778**	**-0.801**	**-0.787**	**-0.791**	**-0.777**	**-0.801**	**-0.786**
	(0.000)	**(0.000)**	**(0.000)**	**(0.000)**	**(0.000)**	**(0.000)**	**(0.000)**
Vote share in M <=5	**0.230**	0.155	**0.247**	**0.215**	**0.226**	**0.233**	**0.243**
	(0.000)	(0.106)	**(0.000)**	**(0.004)**	**(0.000)**	**(0.002)**	**(0.000)**
Malapportionment			-0.246			-0.263	-0.250
			(0.571)			(0.560)	(0.587)
Party levelling seats				-0.026		-0.028	
				(0.654)		(0.640)	
Country levelling seats					-0.012		-0.017
					(0.943)		(0.922)
Constant	0.183		0.191	0.188	0.184	0.197	0.193
	(0.000)		(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Country FE		✓					
N	79	79	79	79	79	79	79
R^2	0.328	0.469	0.331	0.330	0.328	0.333	0.331

Note: Results from 7 OLS regression models for party-level spatial disproportionality, with SEs clustered by country. P-values in parentheses. The analysis excludes Finland, Iceland, Ireland, and

the UK, as these countries do not exhibit variation in magnitude that spans on both sides of the cutoff.