

District magnitude and representation of the majority's preferences: a comment and reinterpretation

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Abstract Drawing on new data that combine recorded votes from the Swiss National Assembly with canton-level referendum results on identical legislative proposals, Portmann et al. (Public Choice 151:585–610, 2012) develop an innovative strategy to identify the effect of district magnitude on the relationship between representatives and their constituents. We replicate PSE's central result and also estimate a related model that allows for the possibility of non-monotonicity in the relationship between district magnitude and representatives' deviance from referendum median voters. Our results indicate that representatives elected in low-magnitude multi-member districts deviate from canton-level majorities less than either MPs from single-member districts or those from high-magnitude multi-member districts.

Keywords Representation · Electoral systems · District magnitude · Switzerland

1 Portmann, Stadelmann, and Eichenberger's study and expectations about voter-legislator congruence

In “District magnitude and representation of the majority's preferences: Evidence from popular and parliamentary votes,” Portmann et al. (2012) (henceforth PSE) apply an ingenious research design to a novel set of data to estimate the effect of district magnitude (the number of legislators elected from a given district) on Swiss legislators' congruence with positions embraced by majorities of voters. The main empirical finding in the paper—that the more seats elected in a district, the greater the likelihood that a given MP will deviate in a legislative vote from the preferences of his or her district majority—raises important normative

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Table 1 District magnitudes in elections to the Swiss National Council after 2003

District magnitude	No. of districts	% of cantons	Cumulative %	No. of MPs	% of MPs	Cumulative %
1	6	23	23	6	3	3
2	2	8	31	4	2	5
3	1	4	35	3	2	7
4	1	4	38	4	2	9
5	3	12	50	15	8	16
6	1	4	54	6	3	19
7	4	15	69	28	14	33
8	1	4	73	8	4	37
10	1	4	77	10	5	42
11	1	4	81	11	6	48
12	1	4	85	12	6	54
15	1	4	88	15	8	61
18	1	4	92	18	9	70
26	1	4	96	26	13	83
34	1	4	100	34	17	100
Total	26	100		200	100	

questions about the relationship between district size and the quality of democratic representation.

Switzerland is an ideal case for investigating how district magnitude shapes the relationship between voters and elected politicians for several reasons. First, in the Swiss National Assembly district magnitude ranges from one, in the least populated cantons, to 34 in Zurich, with canton-level district magnitude spread across that range, as Table 1 shows. Second, the Swiss practice of submitting measures identical to those voted in parliament to subsequent popular referendums provides a unique opportunity for comparing the behavior of voters and legislators on exactly the same issues. Hence, PSE constructed a dataset that combines the voting records of members of the Swiss parliament (MPs) with canton-level outcomes on 100 referendums taken on a wide range of policy and constitutional issues. By matching MP votes with referendum outcomes, PSE can identify instances in which MPs voted contrary to the revealed preferences of citizen majorities at the cantonal level. We applaud PSE's innovative identification strategy, and the analytical leverage they get by comparing parliamentary votes with referendum results on identical proposals. We also applaud their transparency and generosity in making their data available for reanalysis.

Nevertheless, there are reasons to think the relationship between district magnitude and representation responsive to median preferences might be more nuanced than PSE suggest and, specifically, that it may be non-monotonic. Why expect non-monotonicity? There are two distinct reasons, which operate at opposite ends of the range of district magnitudes we have identified in other work as the "electoral sweet spot" of low-magnitude (4 to 8 seats per district) proportional representation (Carey and Hix 2011). Below the sweet spot, in single-member districts (SMDs), we expect coordination failures among politicians and voters to yield frequent non-median electoral outcomes. Above the sweet spot, in high-magnitude districts, we expect cognitive overload to undermine voters' abilities to identify good agents and to monitor bad behavior. We address these phenomena in turn, first outlining the theoretical rationale, then noting empirical results from other research that support our expectations.

First, we would argue that there is scant reason to expect electoral competition in Swiss SMDs consistently to produce winners whose policy preferences are congruent with their districts' median voters. The expectation of median convergence in plurality elections (which is, effectively, what Swiss Assembly elections amount to in the single-member cantons) depends on the assumption of competition between two alternatives. With more than two alternatives, spatial models of elections predict divergence of candidate platforms away from the median (Denzau et al. 1985; Cox 1987). Pure two-candidate competition is rare even where all seats in a parliament are contested by SMD, but of course Swiss electoral competition more generally is multi-party and multi-candidate. Thus, the expectation of divergent options strikes us as far more apt than an expectation of convergent ones. Even when candidates fail to converge, one might expect strategic voting to produce SMD winners from among those alternatives closest to district median voters. Yet the conditions necessary for effective strategic voting are demanding and, if centrist votes split between proximate alternatives, SMD competition can produce spatially extreme outcomes (Cox 1997).

Recent scholarship demonstrates that, outside environments where the number of candidacies is constrained and expectations about their relative strengths are firm, SMD elections are no more likely than multi-member district elections to constrain vote fragmentation or yield centrist outcomes (Moser and Scheiner 2012). Indeed, the scholarship on voter congruence with political parties suggests that even in established democracies, SMD elections yield governments further from median voter preferences than do proportional representation (PR) elections (Huber and Powell 1994; Powell and Vanberg 2000). In short, coordination failures in SMDs can easily produce non-median outcomes, and we expect such failures to be plentiful in the Swiss SMDs. By contrast, in the low-to-moderate range of district magnitude that we identify as the sweet spot, the number of vote-share thresholds for winning representation is higher, reducing the likelihood and the stakes of coordination failures.

Second, in high-magnitude districts above the sweet spot range, we anticipate a different set of factors to contribute to deviations from median voter preferences. Here we expect the sheer number of representatives—and, in elections, the number of alternatives—to undermine the ability of voters to identify responsive candidates and to monitor their behavior once in office. Long-established results from cognitive psychology demonstrate that humans are capable of distinguishing clearly among a limited set of choices arrayed on a single dimension, but that the ability to discern differences and establish consistent rank orderings falls off precipitously when the number of alternatives rises above the seven to nine range (Miller 1956; Baddeley 1994). Monitoring and evaluating the performance of individual MPs is clearly simpler for citizens in lower-magnitude than in higher-magnitude cantons—as there are fewer MPs to keep track of—but this suggests that the drop-off in the ability to monitor and evaluate should be modest up through the low-to-moderate range of Swiss district magnitude, then accelerate at higher magnitudes.

Electoral studies scholarship has paid relatively little attention to the effects of the number of alternatives on voters' abilities to make meaningful distinctions.¹ Yet recent research on political corruption suggests that monitoring of representatives and holding them to account may be subject to a sweet spot dynamic with respect to district magnitude. In a study of over 40 countries that use PR to elect their legislatures, Chang and Golden (2007) show that in lower district magnitudes, allowing voters to cast preference votes for individual candidates, as the Swiss system of open lists and *panachage* does, is associated with less budget corruption. In contrast, in higher district magnitudes, the relationship is reversed,

¹An exception, focused on the effects of ballot technologies on voters' abilities to make choices among a crowded field, is Shocket et al. (1992).

with preference vote systems associated with more legislative abuse of budgetary appropriations. Depending on the model, the monitoring advantage for candidate preference systems over closed-list systems disappears in the district magnitude range of around 10–15.

Our own previous research found empirical evidence that low-magnitude PR outperforms both single-member districts and higher-magnitude PR on other representational outcomes, such as disproportionality, party system fragmentation, and proximity of governments to median voter preferences (Carey and Hix 2011). Along similar lines, the combination of coordination failures in SMDs and monitoring challenges in higher-magnitude districts prompts us to expect a non-monotonic relationship between magnitude and deviations from the preferences of district-level median voters. The unique Swiss practice of pairing referendums and legislative votes, combined with PSE's data, allowed us to test the proposition that MP deviations from voters' positions might be non-monotonic in district magnitude. To sum up, we asked whether PSE's overall result—that the higher is district magnitude, the more frequently MPs deviate from their voters—might be covering a more subtle relationship between magnitude and responsiveness. Our hypothesis is:

- Swiss MPs elected in low-magnitude multi-member districts should be more congruent with their constituents than MPs elected in either SMDs or high-magnitude districts.

2 Replication and re-estimation of PSE's main results

PSE's analysis is based on logistic regressions of MP deviations from cantonal majorities on the district magnitude of the canton from which the MP was elected, and vectors of other explanatory variables reflecting characteristics of the MP (partisanship, parliamentary experience, narrowness of electoral victory) as well as characteristics of the referendum (voter turnout and whether constitutionally required or discretionary). PSE look at deviations between MPs and national majorities as well as MPs and their cantonal majorities. We focus on deviations between MPs and cantonal majorities because this analysis is directly related to our prior work on the effect of district magnitude on representation. Elections in Switzerland are cantonal. Cantons, moreover, are diverse demographically and politically. Accountability to one's electorate might well demand deviation from national majorities. But from our previous research, we expect the behavior of MPs elected in low-magnitude multi-member districts to be no less attuned to the majorities in their *districts* as MPs elected in single-member districts. In contrast, we do not have any clear expectations about whether the relationship between district magnitude and MP deviations from *national* majorities should be monotonic or non-monotonic.

Following PSE, all legislative votes by MPs on issues on which there were referendums are pooled, and the dependent variable is a dummy that takes the value 1 if an MP voted differently from the majority in his or her district on an issue, and 0 otherwise (PSE label this variable $MP \neq \text{District}$).

The main independent variables are as follows (see PSE 2012: 591–593 for a full description and motivation for the control variables). *Seats* is the district magnitude of the canton in which an MP was elected (the number of legislators elected from the district). *Canton = Nation* controls for the national majority in a referendum, and takes the value 1 if the majority in the district voted the same way as the national majority.² Two variables

²PSE label this variable *Canton = CH*. We relabeled this variable to make it more transparent for non-Swiss readers.

control for the whether the referendum was mandated by law or requested by the public: *RefMandatory* takes the value 1 if the referendum was mandated by law; and *RefInitiative* takes the value 1 if the referendum was initiated by the public. Three variables control for district-specific or MP-specific characteristics: *Turnout* is the level of voter turnout in an MP's district; *NewToParliament* takes the value 1 if the MP was elected for the first time in the previous election; and *NarrowMargin* takes the value 1 if the MP was elected with the fewest number of votes of any on his or her party's list, so is the most vulnerable MP among co-partisans in a given districts. And, *Latin* takes the value 1 if a canton is majority French or Italian speaking.

PSE include party dummy variables in some specifications. We also use this specification for the reasons explained by PSE (2012: 598):

In cantons with only a small number of seats in parliament the competition for these seats will usually be among center parties as they are more likely to represent the decisive voter. In large districts with many seats more parties enter the competition. If the number of seats is sufficiently large, parties which focus on votes at the boundary of the political spectrum may also win seats. In this case party affiliation of members of parliament itself could explain the observed positive impact of seats on the probability of diverging from the majority. The number of seats would then only have an indirect effect through a greater number of parties on diverging from the majority of voters instead of a direct effect. In specifications (3) and (6) we include political party affiliations of members of parliament as a very conservative test and lower bound for the influence of the electoral system on diverging from the national majority (3) and the district majority (6).

Put another way, as district magnitude increases, more parties, spread more broadly across the ideological spectrum, win representation (Cox 1990). The party dummies, in effect, account for voting "deviations" attributable to having broader partisan diversity embraced in parliament, which is more prevalent at higher district magnitudes.

PSE's central results on the deviation between MPs and their cantonal majorities are replicated in Table 2 (see Model 6 in PSE 2012: 596–597).³ The coefficient on the *Seats* variable is positive and statistically significant, indicating that the higher the district magnitude of the canton from which an MP is elected, the higher is the likelihood the MP's vote in the Assembly runs contrary to the majority vote in the MP's canton.

The adjacent column replicates PSE's estimation, using the *Clarify* software package to conduct Monte Carlo simulations, based on 1,000 draws from the multivariate normal distribution, of the effect of shifting from a value at the 25th percentile on the *Seats* variable to a value at the 75th percentile on the probability of an MP deviating from the majority position of the voters, holding the values of all other variables at their medians (Tomz et al. 2003). Note that, because the unit of observation in PSE's data is the MP vote, not the electoral district, and because there are many more MPs elected from high-magnitude cantons than from low-magnitude cantons, the 25th percentile MP is elected from a seven-member district and the 75th percentile MP is elected from 27-member district. The interpretation is that moving from a moderate district magnitude canton, such as Basel-Landschaft, to a high district magnitude canton, like Bern, increases the likelihood of an MP voting against his or her cantonal majority by 2.2 % (plus or minus 0.9 %).⁴

³Like PSE, we estimate logistic regressions with robust standard errors, clustering on canton in recognition of the likelihood that the behavior of MPs from the same district are not independent.

⁴Overall, the rate of MPs voting against cantonal majorities is 32 %.

Table 2 Replication and re-estimation of key results in PSE. *Dependent variable:* Dummy indicating whether an MP's Assembly vote on a measure deviated from the majority vote in her or his district, when the same measure was put to voters in a referendum (MP \neq District in PSE)

	Model 6 in Portmann et al. (pp. 556–557)		Alternative specification of Model 6	
	Coef.	% change p. 25 \rightarrow p. 75	Coef.	% change 0 \rightarrow 1
Seats	0.05*** (0.002)	2.2*** (0.9)		
DM = 2–3			–0.32*** (0.13)	–6.8*** (2.7)
DM = 4–6			–0.32** (0.15)	–6.8** (3.1)
DM = 7–10			–0.06 (0.15)	–1.3 (3.4)
DM = 11–20			–0.13 (0.15)	–2.9 (3.3)
DM > 20			–0.07 (0.13)	–1.6 (2.9)
Canton = Nation	–0.89*** (0.15)		–0.89*** (0.15)	
RefMandatory	–0.53*** (0.05)		–0.52*** (0.05)	
RefInitiative	–0.29*** (0.08)		–0.28*** (0.08)	
Turnout	2.34*** (0.35)		2.43*** (0.36)	
NewToParliament	–0.05 (0.05)		–0.05 (0.05)	
NarrowMargin	0.11** (0.06)		0.12** (0.06)	
Latin	0.04 (0.12)		0.03 (0.12)	
(Intercept)	–1.14*** (0.21)		–1.00*** (0.20)	
<i>N</i>	17,674		17,674	
Area under ROC curve	0.6986		0.6989	
Pseudo-R2	0.0723		0.0733	

Note: Canton = Nation is the variable Canton = CH in PSE. We felt that this alternative name would be more transparent for non-Swiss readers. *** significant below 1 %; ** significant between 1 and 5 %; * significant between 5 and 10 %. Dummy variables for parties (SVP, FDP, PS, GPS, EVP, LPS, and FPS) are included in both models but not reported. Robust standard errors for logistic models using clustering at district level are given in parenthesis. Discrete effects (% change) represent the effects on the probability to observe the dependent variable for change from the first quartile to the third quartile for continuous variables and a change from zero to one for dummy variables when all other variables are evaluated at the median. Robust and cluster corrected standard errors for discrete changes using the Delta method are given in parenthesis

PSE's model specification and their interpretation of results focus on the overall effect on MP deviations from district majorities of increasing district magnitude, with the implicit assumption that all shifts from lower district magnitude to higher district magnitude are analogous. To test whether this is in fact the case we follow one of the approaches adopted in Carey and Hix (2011), of looking at the effect of discrete changes in district magnitude on MP deviations from voters' positions. As we explained (Carey and Hix 2011: 394–395):

We chose these intervals according to a couple of guiding principles. The intervals are smaller at the low end of the magnitude scale because we expect the marginal effects to shift most quickly here, and because we are particularly interested in the marginal effects in this neighborhood. We place systems with median magnitudes of two and three into their own category because the electoral systems literature includes skepticism regarding the dynamics of partisan competition at these particular low magnitudes (see Auth 2006 and Nohlen 2006 on magnitude 2; and Taagepera and Shugart 1989 on magnitude 3). Beyond this, we aimed for groups with roughly similar numbers of elections to ensure comparable quality estimates across intervals.

Following this logic, we transform the *Seats* variable into a series of dummy variables indicating districts in ranges of district magnitude. We grouped together all single-member districts, where the lone seat is awarded by plurality, then grouped cantons with district magnitudes (DM) in the following ranges: DM = 2–3, DM = 4–6, DM = 7–10, DM = 11–20 and DM > 20. We replicate the analysis of MPs voting contrary to their cantonal level referendum majorities, but replacing the *Seats* variable used by PSE with the array of district magnitude dummies. In this model, the omitted district magnitude category is the single-member districts, and in the adjacent % *change* column, the coefficient on each district magnitude dummy is the estimated difference in probability of an MP deviating from his or her district majority if we shift from an MP elected in a single-member district to one elected in a canton in the specified district magnitude range, other variables held at their medians.

As in our earlier paper, we tried alternative ways of operationalizing district magnitude in a non-monotonic way, for example by entering both the linear and quadratic terms of the *Seats* variable. The results of these alternative specifications are not substantively different from the results we obtain using dummy variables for discrete levels of district magnitude. We prefer to present the results from using discrete dummy variables because, first, we do not see a clear theoretical reason why one non-monotonic specification should be preferred *a priori* to any other and, second, the substantive meaning of the discrete dummy variables is more straightforward to interpret than the coefficients on one or more factorial terms.⁵

As we suspected, the results are substantially different from the PSE results. In the replicated PSE model, the estimated coefficient on the single *Seats* variable was positive and significant, and PSE's simulations estimated that moving from a seven-member canton (25th percentile) to Bern (DM = 27, 75th percentile) increased the likelihood of voting against the canton majority by 2.2 % (plus or minus 0.9 %), as discussed. However, the specifications with discrete district magnitude dummies demonstrate that the effects across the range of magnitudes vary tremendously. The results of the alternative specification reveal that MPs

⁵As a robustness check we estimated all models with fixed effects for each referendum issue, and the results are identical to the results in Table 2. We also ran a variant of the alternative specification with the largest-magnitude districts (DM > 20) as the omitted category, to confirm whether districts in the lower-DM categories were statistically discernible from those at the high end. The results of this estimation are available from the authors.

from low-magnitude multi-member districts (in the $DM = 2-3$ and $DM = 4-6$ ranges) are approximately 7 % less likely to vote against cantonal majorities than are MPs elected in single-member districts (plus or minus 2.7 % for the $DM = 2-3$ range, and plus or minus 3.1 % for the $DM = 4-6$ range). In addition, MPs elected in higher-magnitude multi-member districts are indistinguishable from single-member district representatives.⁶

In short, the results on MP deviations from canton majorities suggest that MPs elected in low-magnitude multi-member districts are distinctive from their more deviation-prone colleagues on either end of the district magnitude scale. Put another way, the effect PSE find on their *Seats* variable—that MP deviations from voters' positions increase as district magnitude increases—is driven by the behavior of MPs elected in low-magnitude district magnitude seats (relative to the behavior of MPs elected in high-magnitude district magnitude seats) and not in fact by the behavior of the MPs elected in the single-member districts.

This result is particularly unexpected insofar as PSE's standard measure—voting contrary to the cantonal majority—is fundamentally majoritarian, and therefore should advantage MPs elected in the single-member district format. For example, imagine a country divided 60–40 between two central policy ideas represented, respectively, by Parties A and B, with adherents distributed uniformly throughout the country, so for any given district, the probability of a majority supporting Party A's position is 100 %. Any single-member district will elect an MP of Party A, and if MPs seek to represent the wishes of their supporters, we should never witness deviations from district majority view. Now imagine that we move to two-member districts. Party A and Party B each win one seat in each district, and MPs from the parties should split on referendums, yielding a 'deviation rate' of 50 %. The point is that by PSE's majoritarian benchmark, MPs from single-member districts well *ought* to have low deviation rates, and it should not surprise us to find higher rates of voting against district and national majorities among MPs from multi-member districts. In light of this, the *greater* congruence between MPs' and voters' behavior in low-magnitude multi-member districts is striking.

3 Conclusion

In sum, PSE's paper uses an innovative strategy to identify the effect of district magnitude on the relationship between MPs and their constituents, and generates some striking findings. This is a significant paper in the growing literature on the effect of electoral rules on micro-level political behavior (Chang 2008; Chang et al. 2011; Gagliarducci et al. 2011; Golden and Picci 2008; Hallerberg and Marier 2004; Iversen and Soskice 2006; Lizzeri and Persico 2001; Park and Jensen 2007; Persson and Tabellini 2003; Primo and Snyder 2010; Wright 2010). Our re-estimation of the main model in the paper, using thresholds of varying district magnitudes rather than a continuous *Seats* variable, refines the results in PSE in a subtle, but important, way. PSE find that MPs from lower-magnitude districts are more likely to vote the same way as the majorities in their cantons, and conclude that (pp. 605–606):

⁶Table 2 reports both pseudo- R^2 and the area under the receiver operating characteristic (ROC) curve—the ratio of deviations from popular majorities correctly versus incorrectly predicted. In terms of overall model fit, our alternative specification offers a slightly larger, but still quite modest, improvement over the basic model in PSE. None of the other alternative specifications tested (e.g., including squared or cubed permutations of the *Seats* variable) provides even as much of a marginal improvement in overall fit as does the specification with our series of district magnitude dummies.

Small district magnitude tends to better align individual deputies' decisions with the majority's preferences while proportional representation in large districts leads to more divergence. Under plurality rule, as measured by a low number of seats per district, decisions of individual members of parliament correspond most closely to district voters' preferences.

Our results confirm that MPs from lower-magnitude districts are more likely to vote with their cantonal majorities than MPs from higher-magnitude districts. However, we also find that the results in PSE are driven by the behavior of MPs in *small multi-member* districts, relative to the behavior of MPs from large multi-member districts, and *not* by the behavior of MPs in single-member districts. In fact, we find that Swiss MPs from single-member districts (Appenzell Ausserrhoden, Appenzell Innerrhoden, Glarus, Nidwalden, Obwalden, and Uri) are *less* likely to vote the same way as their cantonal majorities than MPs from low-magnitude multi-member districts (such as Basel-Stadt, Graubünden/Grigioni, Jura, Neuchâtel, Schaffhausen, Schwyz, Thurgau, and Zug). Hence, low-magnitude multi-member districts might be more desirable than high-magnitude multi-member districts from the point of view of the representation of the cantonal median voter, but we would caution against inferring from the results in PSE that on this aspect of democratic representation single-member districts are preferable to low-magnitude multi-member districts.

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