

How electoral systems affect MPs' positions*

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Abstract

The question how different electoral systems affect the representation of voters in parliaments has been a thorny issue for a considerable time. While some research suggests that first-past-the-posts systems should lead to a closer correspondence between the preferences of the electoral district's median voter and of its representative, other work concludes that in proportional representation systems, especially with open lists, candidates have an incentive to cultivate a strong personal vote.

To study this question we take advantage of two peculiarities of the Swiss political system, namely that in the same chamber of the parliament some members are elected in PR- and some in plurality elections and that direct democratic instruments play an important role. The second element, given that for a series of votes in parliament voters have to decide on the same issue, allows us to estimate the policy positions of MPs and the median voter of each electoral district in the same policy space. We find that MPs elected in plurality elections are on average closer to their respective median voter. In PR districts, MPs are much more widely spread around the median voters' preferences.

*This study has been realized using the data collected in the “Living in Switzerland” project, conducted by the Swiss Household Panel (SHP), which is based at the Swiss Foundation for Research in Social Sciences FORS, University of Lausanne. The project is financed by the Swiss National Science Foundation. It also employs data from the Swiss election studies (<http://www.selects.ch>). The paper draws in part on the master's thesis of Martin (2008) and an earlier version has been presented at the Annual Meeting of the American Political Science Association, Toronto (September 3-6, 2009). Extremely helpful comments by Karen Long Jusko, as well as the help of the Swiss *Parlamentsdienste* and especially Ernst Firschknecht and Andreas Sidler, who provided the bulk of the empirical data used here and helped us using it, are gratefully appreciated. The Swiss National Science Foundation (Grant No 100012-111909) provided generous funding.

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1 Introduction

A consensus seems to exist in the literature that electoral systems affect the way in which interests are represented in parliaments. More precisely, the rules under which members of parliament (MPs) are elected influences the attention they pay either to broad-based constituency preferences or more narrow-based special interests (e.g., Denzau and Munger, 1986; Bawn and Thies, 2003). Where the literature disagrees, however, is regarding the exact relationship between electoral systems (i.e., majoritarian and proportional representation) and the type of representation. In a series of recent articles (e.g. Dow, 2001; Blais and Bodet, 2006; Ezrow, 2007; Ezrow, 2008; Warwick, 2009; Golder and Stramski, 2010; Powell, 2010) a debate has emerged on how congruence between citizens and their representatives (MPs, parties, and governments) should be measured and whether and how this congruence depends on the electoral system.

At the theoretical level and focusing on the electoral connection¹ scholars disagree whether majoritarian systems lead to more centripetal (to use the term employed by Cox, 1990) competition, or whether proportional representation favors more moderate candidates. At the empirical level studies of this relationship are hampered by the well known (at least since the work by Achen, 1977, 1978) difficulties in measuring representation. Achen (1977, 1978) alerted the discipline that finding correlations between voter and MP positions in no way allows us to judge how well voters are represented by elected officials. His proposed solutions, however, require measures on the same scale, something largely amiss in most empirical studies.²

In the present paper we first review the various strands of research dealing with the relationship of voter and MP preferences. Concurring with Golder and Stramski (2010) we emphasize that in studies on congruence the exact type of relationship to be studied needs to be clearly defined. As Blais and Bodet (2006) argue the first and important relationship in this context is the relationship between voters and MPs.³ From this (largely) theoretical literature we derive a

¹The contributions of Blais and Bodet (2006) and Golder and Stramski (2010) nicely distinguish between the relationship between citizens and party positions, respectively different types of congruence.

²Powell (2010) offers a systematic review of different empirical strategies for measuring citizen-government congruence.

³While finding the conceptualization offered by Golder and Stramski (2010) appealing, we

simple hypothesis that we will assess with a novel dataset. This dataset combines the full voting record of MPs in the Swiss lower house of parliament from three legislative periods with the voting results in referendum campaigns. Given that both MPs and citizens voted on a series of identical issues (with exactly the same question for them to consider) we can use these referendum votes to link the voter preferences to MP preferences. This allows us to circumvent the pernicious problem in the study of representation, namely the lack of common scales (e.g., Achen, 1978; Powell, 2010). We discuss in section three the methods we use by drawing on work linking voting behavior in different institutional settings by Bailey and Chang (2001) (see also Bailey, 2007; Shor, Berry and McCarty, 2008) and as employed by Masket and Noel (2008, 2009) to link constituency preferences with MP preferences. While this dataset allows us to estimate simultaneously ideological positions of voters (more precisely the median voter) and their elected MPs, the Swiss context offers an additional advantage for the theoretical question we are interested in. A small proportion of the MPs of the lower house are elected in majoritarian elections, while the rest are elected through proportional representation. Section four reports our main empirical results which demonstrate that in majoritarian electoral systems the MPs are located on average more closely to the median voter’s preferences than in proportional representation systems. Hence, proportional representation systems lead to MPs being much more spread out in ideological terms than majoritarian systems. Section five concludes.

2 Electoral systems, incentives and representation

First theoretical insights on how electoral systems relate to the positions of candidates and MPs appeared in models of spatial competition. Early work by Hotelling (1929) and Downs (1957) demonstrated that if voters vote for the closest (in policy and/or spatial terms) candidate in a majoritarian election with only two candidates the latter two should position themselves at the location of the

consider a closer look at the exact “mechanics” linking voters to political actors (e.g, MPs, parties, governments) as proposed by Blais and Bodet (2006) necessary. During the time when Israel elected its prime-minister in a direct election, any measure of congruence involving the government would have a different meaning than during the time when parliament selected the prime-minister. For this reason, presumably, Golder and Stramski (2010) also exclude all presidential and semi-presidential regimes from their analysis.

median voter (provided such a median exists) (for a review see Grofman, 2004). Extensions to the various forms of proportional representation proved more difficult, and the discussion in Downs (1957) lacks the formal elegance of his treatment of majoritarian systems. An early attempt to model proportional representation systems appeared in Greenberg and Shepsle (1987).⁴ These authors were able to show that the equilibrium positions of candidates and parties in a one-dimensional electoral competition have to be spread along the policy continuum (see also Shepsle and Cohen, 1990; Shepsle, 1991).

Cox (1990)⁵ offered a first systematic and comprehensive treatment of how electoral systems affect the equilibrium positions of political parties. He identified a series of characteristics of electoral systems that influence the positions political parties take in equilibrium, namely v the number of votes, k the number of seats to be gained, (p and c being minor elements for what follows). In addition, m , the number of competitors, also affects the characteristics of the electoral competition. According to his theoretical analysis we would expect central clustering in majoritarian elections if $m > k$ and $m \leq 2v$ and dispersion if $m > k$ and $m > 2v$ (Cox, 1990, 912f).⁶ In proportional representation districts Cox's (1990, 921) analysis leads us to expect central clustering if $m > v$ and $m \leq 2v$ and dispersion if $m > 2v$.⁷

While the models discussed so far all rely on deterministic voting by voters, a series of more recent studies assumes probabilistic voting (e.g., Coughlin, 1992). While the exact characteristics of the equilibria often differ, the presence of convergence in majoritarian elections, even with multiple candidates (see Lin, Enelow and Dorussen, 1999), and divergence in proportional representation systems (see Schofield, Sened and Nixon, 1998), carry over under most conditions.

Obviously all these spatial models assume that political parties, especially in proportional representation elections, take ideological positions and thus act as

⁴Some preceding work (e.g., Sugden, 1984; Greenberg and Weber, 1985) focused on very specific and hardly used forms of proportional representation.

⁵See also the precursor study by Cox (1987) on equilibria under different electoral institutions and the more comprehensive treatment in Cox (1997).

⁶Different results obtain if partial abstention or cumulation is allowed, but this is not the case in our empirical study, given that in the majority districts in Switzerland these options are not possible. Consequently, we do not develop this further here.

⁷Ideally, we would have liked to test also a hypothesis based on Cox's (1990) work. As discussed below, however, in our empirical data m is almost always sufficiently large to predict dispersion in all districts.

unitary actors. In most parliamentary systems this is assumed to hold due to the considerable party discipline. Candidates and future MPs have obviously, however, also incentives to appeal to specific groups of voters, possibly independently of their political party (see the work on the German parliamentary system by Stratmann, 2006; Zittel and Gschwend, 2008, discussed below). Work by Denzau and Munger (1986) and Bawn and Thies (2003) deals exactly with this question. In their more general analysis Bawn and Thies (2003) find that MPs elected under closed-list proportional representation respond more heavily to special interest groups than those elected in majoritarian systems. Vice-versa the former respond less to more broad-based voter interests. Bawn and Thies's (2003) careful analysis highlights the complex interplay of different features of electoral systems which leads them to a very prudent assessment of the latter's combined effects.

Much less prudence transpires in Carey and Shugart's (1995) analysis of electoral systems in terms of the incentives the latter create for MPs to cultivate a personal vote (see also Shugart, 2008). They consider that three elements affect these incentives, namely whether there is a fixed ballot, whether votes are pooled across a party and whether voters cast a vote for a party or not. Assessing the various possible combinations Carey and Shugart (1995) propose two rank orderings of electoral systems based on whether they create incentives for MPs to cultivate a personal vote, one for single member districts and one for multi-member districts.⁸ For our purposes it is notable that while the single-member district elections according to plurality and with party endorsements are lowest in creating incentives for a personal vote among single member district elections, open-list proportional representation with multiple votes rank third lowest in the second ranking. Strictly speaking the two rankings proposed by Carey and Shugart (1995) do not allow for comparisons across single member and multi-member electoral systems. Hence, their study offers less information than Bawn and Thies's (2003) analysis.

More recently work by Powell (2000, 2010), McDonald and Budge (2005), Blais and Bodet (2006), Warwick (2009) and Golder and Stramski (2010) has considered the full chain of representation from voters through MPs to governments and the policies the latter adopt. While Powell (2000, 2010) largely confines

⁸The theoretical underpinnings for these rank orderings are rather implicit.

his work on assessing how votes are translated into government majorities under different electoral systems, McDonald and Budge (2005), more ambitiously, attempt to find correspondences between voter preferences and policy outcomes.⁹ Blais and Bodet (2006) consider the relationships between voter preferences and both party positions and government positions and come to the conclusion that in proportional representation systems parties are more dispersed around the voters' preferences, but coalition formation leads to similarly centrist government positions as in majoritarian systems. Dow (2001), based on a select number of cases, finds strong evidence that parties are more dispersed in proportional representation than in plurality systems, while Ezrow (2008), based on a more comprehensive set of cases and a different methodology, finds no such effect. Relatedly, and based on a more careful conceptualization of congruence, Golder and Stramski (2010) find no significant difference in terms of congruence between proportional representation and plurality systems. Powell (2010) argues and presents empirical evidence, however, that the period studied by Blais and Bodet (2006) (and Golder and Stramski, 2010, for that matter) is special, as in most previous periods the congruence between voter preferences and government positions is smaller in majoritarian systems than in proportional representation systems.

More fine-grained analyses are presented by Stratmann (2006) who finds that in the German Bundestag voting against party lines in roll call votes is more frequent among members with a direct mandate than among those elected on party lists. Similarly, the former MPs are also more likely to be in committees that allow for direct funds for their electoral districts.¹⁰ Relatedly Zittel and Gschwend (2008) find that candidates running in German single member districts employ different campaign styles than candidates running on party lists in multi-member districts. Similarly, Tavits (2009) presents in a recent comparative studies that MPs with stronger local roots in their electoral district are more likely to defect from the party line in parliamentary voting. Interestingly enough, the author only finds mixed and somewhat counter-intuitive results for the effect of district

⁹Related to this work are the studies by Persson and Tabellini (2003), who present some empirical results on the provision of public goods, which rely in part on similar arguments dealing with the incentives that different electoral systems create for MPs (Persson and Tabellini, 2001). See also Myerson (1993) for an argument about the effect of electoral systems on corruption (see also Persson, Tabellini and Trebbi, 2000).

¹⁰Stratmann and Baur (2002) also study the incentives for pork barrel as a function of electoral systems.

magnitude on defection from the party line (Tavits, 2009, 806).

Based on these various theoretical considerations we propose the following hypothesis:

Hypothesis 1: In proportional representation systems the MPs locate more widely dispersed around the median voter, while in majoritarian systems MPs cluster more closely around the median voter.

This hypothesis is clearly implied under Bawn and Thies’s (2003) analysis and under certain conditions by Cox’s (1990) work.¹¹ To note here is the fact that we will test this hypothesis on the basis of ideological positions of MPs and their median voters. Some of the theoretical work discussed above is, however, more geared toward explaining the position of candidates. Needless to say, in equilibrium, many of the candidate configurations should translate more or less directly into the configurations of MPs.¹²

3 Data and methods

As discussed above a major challenge for studies trying to assess how electoral systems affect representation is the well-known problem of assessing representation highlighted by Achen (1977, 1978) and discussed in this specific context by King, Laver, Hofferbert, Budge and McDonald (1993).¹³ More precisely, accurate tests of the propositions discussed above require information on opinions and policy positions on the exact same scales both for MPs or parties and their voters. Such data is, however, almost never available. Even in situations where both party members, MPs and voters responded to questions on policy positions worded exactly in the same way, we cannot be sure that the various interviewees responded to the same stimulus (see for instance Feldman, 1991). Similarly, even if the same observational data is used to estimate voter and party preferences as discussed by Powell (2010) for the party manifesto studies, this hardly yields the

¹¹As mentioned above, the implication by Cox’s (1990) work is more fine-grained, but our empirical data does not allow us to test these implications. Regarding Carey and Shugart’s (1995) rank orderings they cannot be used across proportional representation and plurality electoral systems.

¹²Though see Achen’s (1978) finding that elected MPs, generally Republican incumbents, are less “representative” of voter preferences.

¹³See also the critique presented by King and Laver (1999) and the response by McDonald, Budge and Hofferbert (1999), as well as the well argued empirical critique of Warwick (2009).

necessary data to establish validly the hypothesized differences.¹⁴

3.1 Data

For this reason we rely on the voting record of both voters and MPs of the lower house in Switzerland for the¹⁵ period 1996-2007, spanning three legislative periods. Switzerland has a double advantage for the present study. First of all, since 1995 the lower house of the Swiss parliament employs an electronic voting system recording all votes by MPs. Hence, a complete voting record is available, circumventing problems of selection bias if only requested (or selected) roll call votes are available (see for instance Hug, 2010 (forthcoming)).¹⁶ Second, given the varying sizes in the electoral districts in which MPs of the lower house are elected, some are elected in majoritarian elections, while the others are elected in proportional representation systems (Lutz and Selb, 2007). In addition the way citizens cast votes (i.e., an open list system) should make finding empirical support for hypothesis 1 even more challenging according to some authors (see for instance Carey and Shugart, 1995).

Table 5 provides the list of cantons, and thus electoral districts, as well as some provisional information on the policy positions of the voters. More precisely, using both three surveys from the Swiss election studies and a large-scale survey, namely the Swiss Household Panel (SHP) of 2004, we calculate the mean position of the voters in each district on the left-right scale.¹⁷ This already provides some information on the positions of the voters and how much dispersed they are across districts. While the estimates differ a bit across survey instruments, the results reported below, based on the Swiss election study surveys, remain largely identical when using other surveys.

¹⁴Interesting to note is that Powell (2010) finds quite considerable correlations between the various measurement strategies he discusses. It might well be, however, that all of them yield equally biased information (see also Ezrow, 2008).

¹⁵Ideally, we would also like to cover the upper house, where all members except two are elected in majoritarian elections. Unfortunately, the upper house does not use an electronic voting system and as a consequence only very little information on the voting record of these MPs is available (see Von Wyss, 2003; Bütikofer and Hug, 2010).

¹⁶Early studies using this data appear in Jeitziner and Hohl (1997), Hermann, Leuthold and Kriesi (1999), and Hug and Schulz (2007).

¹⁷The observations from the Swiss election study were weighted as suggested, while for the SHP data we provide two estimates, given the nature of the survey. First we calculate the mean (and dispersion) of all persons interviewed. In a second step we first aggregate the left-right position to the household-level and then calculate the mean and dispersion.

Table 5 about here

For the MPs we have for the three legislative periods (45th – 47th) information on 2790, respectively 2797 and 2981 votes.¹⁸ Among each of those roughly 3000 votes for each legislative period we find 39, 40, and 19 votes where the voters were confronted with exactly the same question at the ballot box.¹⁹

3.2 Methods

Having at hand behavioral data which allows direct comparisons between MPs and voters the question is how we may analyze them to compare policy positions of these two sets of actors. Recent work on ideal-point estimation (for an excellent survey see Poole, 2005) has shown possibilities how policy positions may be estimated across different institutional contexts which are directly comparable. Bailey and Chang (2001) (see also Bailey, 2007; Shor, Berry and McCarty, 2008) have used roll call votes and decision information to provide estimates of policy positions of congressmen, judges and presidents. The main idea behind these models is that as long as either two sets of actors have voted on the same proposal in different institutions, or the same actor has belonged to different institutions at different times, we may use these observations (votes on the same proposal, respectively votes by the same person) to bridge our estimations across different institutions and thus make the estimates directly comparable.

Masket and Noel (2008, 2009) have applied this exact same technique to votes by citizens and MPs in California, taking advantage of the numerous votes by

¹⁸This corresponds to the full voting record, except in situations where the electronic voting system malfunctioned (rarely) and the first few sessions of the 45th legislative period. We provide more detail on the data in the appendix.

¹⁹There are few votes in the last period, since between a vote in parliament and a popular vote up to a couple of years may pass. Again, in the appendix we provide more detail on these bridging observations. In addition, as described in detail in the appendix we faced in the 45th and 46th the situation that for some popular initiatives parliament chose to submit a counter project. In that situation the final passage vote in parliament pits the initiative against the counter project, while in the popular vote, each of these projects is voted upon separately. In the analyses presented below we retained the MPs' vote as is and combined it with a variable for the cantons indicating whether they accepted the counterproposal or the initiative. Our results barely change if we use any of the other three codings discussed in the appendix. Concerning another coding decision our results would be strengthened if we included also parliamentary votes from the beginning of the 45th legislature, but which were held under different rules. To provide conservative estimates, we refrain from presenting these stronger results.

California’s citizens.²⁰ We employ exactly the same proceedings and combine for each legislative period the MPs’ votes with the voting results in the electoral districts, which correspond to the decisions of the median voter. Following Clinton, Jackman and Rivers (2004) (see also Martin and Quinn, 2002; Gelman and Hill, 2006) we use a one-dimensional item-response theory model to estimate left-right positions of both MPs and the median voters.²¹

4 Empirics

Our estimations provide ideal-point estimates both for the MPs during the three legislative periods and the median voters of the 26 electoral districts. Figure 1 provides graphical illustrations of these estimates. Not surprisingly we find quite some variation of the ideal-points estimated for the MPs. The confidence intervals of these estimates are, however, on average quite small. Much larger are these intervals for the estimates of the median voters’ positions. This can not surprise, since we use much less information to estimate the latter’s position. Not surprising is also the result, that the median voters’ positions are much more centrist than the MPs.

Figure 1 about here

Exactly these differences in positions are, according to our discussion above, related to the electoral system. For simplicity we present our tests of hypothesis 1 graphically as boxplots and provide non-parametric Wilcoxon (1945)-Mann and Whitney (1947) tests based on a comparison of the distributions between the two electoral systems.²² Our main dependent variable is the absolute deviation of an MP’s position from the median voter of her district. We take the log of this distance to allow for easier comparisons with the parametric tests presented in the appendix.

The three panels in figure 2 depict the boxplots of the logged absolute deviance for all MPs present in one of the three legislatures we consider. In all

²⁰Their analyses are hampered, however, by the fact that by the heavy use of initiatives and the latter’s direct nature few bridging observations are available.

²¹Refraining from estimating a second dimension is justified by Hug and Schulz’s (2007) analysis of the roll call data of the Swiss MPs, demonstrating the importance and predominance of the first dimension.

²²In the appendix we report various parametric tests that support the conclusions presented here.

three legislatures the median of the logged absolute deviance is lower in plurality districts than in proportional representation districts. Only in the 45th and in the 47th legislature is the distribution significantly different (at least according to the “interocular traumatic test” (Joe Berkson cited in Edwards, Lindman and Savage, 1963, 217)).²³.

Figure 2 about here

While figure 2 already provides some support for our hypothesis 1, it is obviously based on what Golder and Stramski (2010) call the “absolute citizen congruence.” While such a measure may make sense in some contexts, in most, as Achen (1978) and Cox (1990) implicitly argue, this absolute deviance has to be put in relation to the voter’s dispersion. We do so by dividing the absolute distance between an MP and her median voter by the standard deviation of the voter distribution as reported in table 5. The resulting boxplots are depicted in figure 5.

Figure 5 about here

Again, figure 5 suggests that there are systematic differences between proportional representation and plurality districts, with the exception of the 46th legislature. The differences for the first two legislatures are somewhat reduced, but equally strong, both in substantive and statistical terms.²⁴ Surprising is, again, 46th legislature where the suggested relationship hardly materializes. A closer inspection of the relevant panels in figures 2 and 5 shows that compared to the two other legislatures an outlying case with a low value of dispersion is missing in the boxplot for the majoritarian districts. At the same time in all legislatures majoritarian districts have always at least one outlier with a large distance from the median voter. An inspection of these MPs suggests that they are largely incumbent legislators. Hence, incumbent MPs, as in Achen’s (1978) analysis, seem less constrained by the median voter’s preferences, which might explain the deviant legislature.

Our analyses clearly demonstrate that proportional representation systems create incentives for MPs to diverge more strongly from the median voter’s po-

²³The differences between the two distributions in these two legislatures are also statistically significant as the Wilcoxon-Mann-Whitney test and p values in parenthesis suggest: 45th 279 (0.067), 46th 583 (0.816) and 47th 265 (0.013)

²⁴The Wilcoxon-Mann-Whitney test and p values in parenthesis are the following 45th 232 (0.116), 46th 464 (0.669) and 47th 263 (0.012)

sition than in majoritarian systems.²⁵ This is clear support for our hypothesis, mostly inspired from Bawn and Thies’s (2003) theoretical work and implicitly relying on Cox’s (1990) theoretical models. Given the distribution of data we were unable to test Cox’s (1990) more precisely measured implication, given that for almost all districts we would have predicted dispersion. This is largely due to the fact that the number of candidates and party lists submitted are much higher than what Cox’s (1997) theoretical models would predict. Hence, with such high values for m , the equilibrium conditions analyzed by Cox (1990) would almost always predict dispersion.

5 Conclusion

That electoral systems affect MPs is probably a truism. The literature diverges, however, when it comes to specify at the theoretical level how electoral systems affects the ideological positions of MPs. The theoretically soundest implications suggest that in proportional representation systems MPs and candidates have an incentive to diverge from the median voter of their district and to spread-out over the ideological space. In majoritarian systems, however, except under specific circumstances as highlighted by Cox (1990), convergence toward the median voter is expected.

While these theoretical insights are well-established, empirical tests are hampered by the fact that appropriate measures for the ideological positions of MPs and their (median-) voters on identical scales are often impossible to come by. We took advantage in the present study of the fact that Swiss voters vote on a sizeable number of topics with identical questions as those that MPs have voted upon. Using these votes as “bridging observations” allowed us to estimate in a common ideological space the position of the MPs in three legislatures and the position of their median voters. Using these estimates we were able to demonstrate that MPs elected by proportional representation are on average farther away from their median voters than their colleagues elected in majoritarian systems. This effect remained even when we controlled for the ideological dispersion of voters (estimated from a separate source) which might be related to the electoral system

²⁵In additional parametric tests we also controlled for the magnitude of the electoral districts whose effect was, however, systematically dwarfed by the difference between proportional representation and plurality systems.

used.

On the other hand we were not able to find support for Cox's (1997) more precise implications, linking dispersion or its absence not only to the electoral system but also to the number of votes, the number of seats to be gained and the number of competitors. It is exactly the latter element which in the Swiss context causes problems. Given the very high number of competitors, Cox's (1997) theoretical model predicts dispersion in almost all electoral districts. Hence, it cannot take account of the differences occurring between different electoral systems.

While Switzerland's frequent use of referendums allowed us to estimate on an identical scale the positions of MPs and the median voter, some readers might question whether our results are more general. More specifically, it might be argued that given the atypical government system (i.e., government ministers individually elected by parliament for four year terms and not revocable during these terms, see Klöti, 2001) MPs are not subject to as much party discipline as those in parliamentary systems. Recent assessments of party cohesion (e.g. Hug, 2010 (forthcoming)) in the lower chamber of the Swiss parliament suggest, however, that it is almost as high as in parliamentary democracies (e.g. Depauw and Martin, 2009). Consequently, lacking party cohesion in the Swiss parliament cannot question the generality of our results.

Appendix

Table 2 provides the number of variables and bridging observations used for estimating the ideal-points. All popular votes are bridging observations, except three votes in legislature 46 that have not been registered in the lower house because the electronic voting system malfunctioned. In legislatures 45 and 46, various numbers of bridging observations are listed. Indeed, it is possible that an initiative is accompanied by a counter proposal. This gives rise to two votes in the districts (accept or reject the initiative and accept or reject the counter proposal) and only one vote in the parliament (accept the initiative or the counter proposal). This happened once in the legislature 45 and once in the legislature 46. Having tried four ways of dealing with these votes,²⁶ we obtain different possible numbers of bridging observations. However the four various estimations of ideal points are very similar and this in both legislatures concerned. For a comparison among the various estimations and also the corresponding regressions, see the earlier version of this paper.

The bridging observations and other popular votes are listed in tables 3, 4 and 5. The votes with no number are the counterproposals and the votes that have not been registered in the lower house. We see from these tables that there is delay of approximately one year between the MPs' votes and the districts' votes. Table 6 lists the parameters of the item-response theory model we used for estimating the left-right positions.

The tables 7 to 11 display various versions of the regressions presented above. The dispersion of voters used in table 7 is based on SHP data collected in 2004. However one can argue that this measure have changed between the 45th legislature and the 47th legislature. The data from the "Swiss electoral studies"²⁷

²⁶In a first version we created the variable "accept the counter proposal or the initiative" for the cantons. It was feasible because none of the districts accepted both. In a second version we adapted the results of the MPs to the two votes in the districts, assuming that the MPs who chose the counter proposal are in fact rejecting the initiative, and that the MPs who chose the initiative are rejecting the counter proposal. In a third version the variables are built up the same except that the MPs having chosen the initiative have a missing value in the variable "accept or reject the counter proposal" and the MPs having chosen the counter proposal have a missing value in the variable "accept or reject the initiative." The last version is the roll call without those problematic votes.

²⁷Swiss Electoral Studies, Swiss Foundation for Research in Social Sciences, Marie-Christine Fontana, Peter Selb, Romain Lachat: Electoral Surveys in Switzerland - 1971 - 2003 (Cumulative dataset). Production: SIDOS, Swiss information and data archive service for the social

allow for an estimate of the dispersion of the voters at the beginning of each legislature²⁸. Table 8 presents the regression estimated with this latter measure of voters’ dispersion. The coefficients do not considerably differ, even though the coefficient of the variable “proportional system” becomes negative in the third model of legislature 46, it is still not significant at all.

A more controversial concern is the use of voters’ dispersion as control variable. Indeed, as highlighted by Achen (1978), Cox (1990) and Golder and Stramski (2010), if we are interested in comparing congruence across different kinds of political units, it is often not sufficient to use a measure of absolute congruence and control with the dispersion of voters. Table 9 displays regressions, the dependent variable of which being the logarithm of the absolute deviance standardized by the dispersion of voters. The models still show similar trends.

The deviance in the models presented so far have been estimated from roll calls containing only final votes. Indeed, because non final votes could reflect tactic votes instead of frank attitude (see (see for instance Bütikofer and Hug, 2008), we preferred to base our estimations on final votes only. Other advantages are that final votes have a lower rate of missing values and that the Markov Chains we obtained bear more resemblance to only noise plus a constant. However if strategic votes are part of the game, one can also argue that those votes should be taken into account. Tables 8 and 9 present outcomes obtained from estimations based on all votes²⁹, respectively with non-standardized and standardized measures of deviance. Again, the results are rather similar.

Table 2 about here

Table 3 about here

Table 4 about here

Table 5 about here

Table 6 about here

Table 7 about here

Table 8 about here

Table 9 about here

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²⁸The measure is not available for the electoral district of Obwald for the 45th and 46th legislature, due to the size and design of the sample. Thus Obwald can not be included in the corresponding regressions.

²⁹We excluded “motions of order” even if these can also be viewed as generating strategic voting.

Table 10 about here

Table 11 about here

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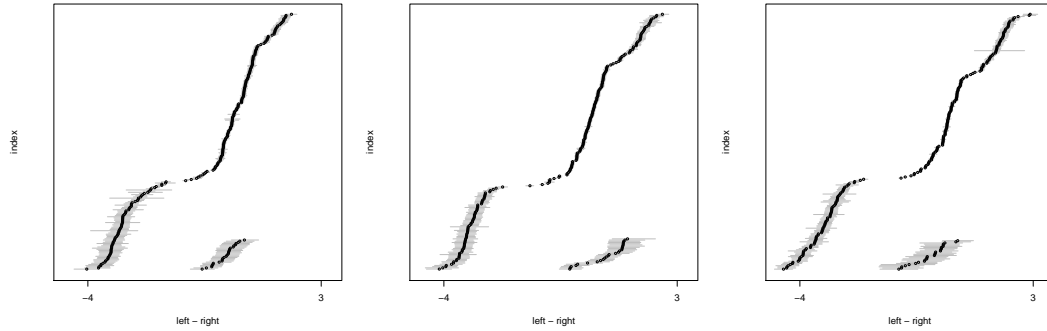
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Figures

Figure 1: Position estimates for the 45th, 46th and 47th Legislature

a



^a*Legend:* The points provide point estimates for the positions of the MPs and the median voters (in the middle at the bottom of each panel, while the vertical lines depict the confidence intervals of these estimates.

Figure 2: Boxplot of logged absolute deviance for the 45th, 46th and 47th Legislature

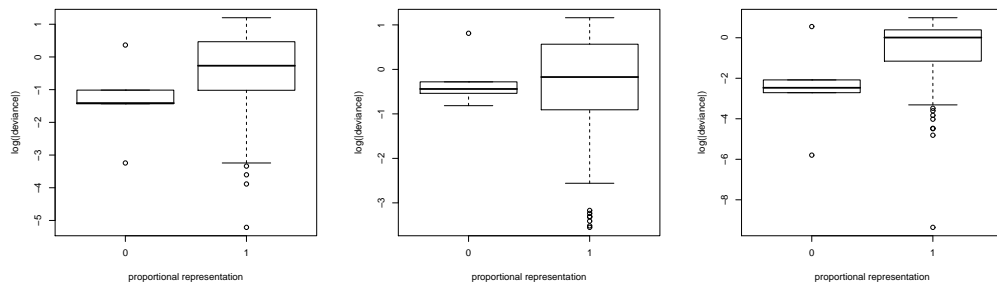
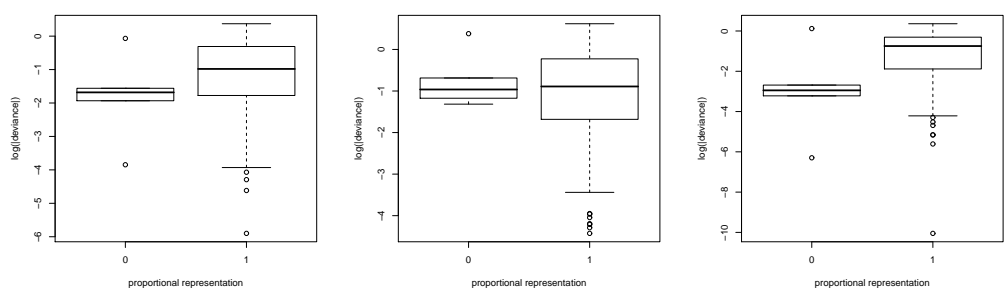


Figure 3: Boxplot of logged absolute deviance relative to voter dispersion for the 45th, 46th and 47th Legislature



Tables

Table 1: Heterogeneity in left-right positions across cantons (Swiss election studies 1995-2003 and Swiss Household panel 2004)

Canton of residence ^b	1995		1999		2003		2004 all		2004 individual	
	m	sd	m	sd	m	sd	m	sd	m	sd
AG	5.18	1.94	5.41	2.08	5.43	2.28	4.57	1.99	4.71	1.80
AI	5.29	1.64	7.00	2.51	6.03	2.06	6.00	1.16	6.00	1.00
AR	5.07	1.75	38	5.62	5.20	2.29	4.95	1.91	5.08	2.13
BE	5.09	2.05	986	5.27	4.92	2.22	4.80	2.00	4.80	1.84
BS	5.53	2.11	242	5.22	4.64	2.37	4.34	2.04	4.46	1.91
BL	4.99	2.20	177	5.08	4.35	2.41	3.79	2.29	3.78	2.33
FR	5.02	2.28	184	4.73	4.60	2.58	4.57	2.20	4.41	1.94
GE	4.81	2.13	321	4.78	4.63	2.65	4.16	2.41	4.35	2.17
GL	5.91	2.40	56	5.30	4.86	2.48	4.88	1.54	5.15	0.92
GR	5.70	1.64	157	6.03	4.88	2.54	4.53	2.00	4.63	1.71
JU	4.47	1.77	57	5.27	4.09	2.15	3.75	2.63	4.00	1.00
LU	5.23	1.96	367	5.66	5.26	2.10	4.72	1.72	4.78	1.61
NE	5.40	2.07	123	4.34	5.10	2.31	4.27	2.54	4.20	2.38
NW	5.83	1.61	19	5.55	5.39	1.75	4.60	1.65	4.33	1.63
OW	7.00	0.00	9	NA	5.58	2.36	5.17	1.95	5.15	1.66
SG	4.88	1.91	405	5.18	5.34	2.46	4.95	1.99	4.76	1.91
SH	5.39	2.20	89	5.34	5.17	2.23	3.93	2.22	3.95	2.13
SO	5.61	1.90	229	4.58	5.01	2.10	4.40	1.99	4.64	1.64
SZ	5.63	2.11	77	5.81	5.32	2.10	5.11	2.11	5.21	1.77
TG	5.18	2.12	192	5.54	5.64	2.02	5.02	1.93	5.09	1.76
TI	5.50	2.43	280	5.14	4.94	2.34	4.71	2.46	5.00	2.39
UR	6.40	1.22	32	6.00	5.00	1.50	4.57	1.83	5.22	1.83
VD	4.95	2.30	533	4.94	4.91	2.52	4.26	2.40	4.21	2.12
VS	5.60	1.95	271	4.96	5.24	2.21	4.71	2.08	4.95	1.90
ZG	5.34	2.46	84	5.19	5.42	2.11	5.37	2.00	5.36	2.03
ZH	5.15	1.91	1164	5.11	5.12	2.27	4.73	1.95	4.77	1.81

^a

^a Source: Marie-Christine Fontana, Peter Selb, Romain Lachat: Electoral Surveys in Switzerland - 1971 - 2003 (Cumulative dataset).

Production: SIDOS, Swiss information and data archive service for the social sciences, Neuchtel. Distributed by SIDOS (weighted according to provided weights) and Swiss Household Panel (SHP) ("all" is based on all respondents, "individual" on main respondent in household).

^bThe cantons with majoritarian elections are AI, AR (only in 2003), GL, NW, OW, and UR.

Table 2: Bridging Observations and Votes

	Legislature			
	45 (1995-96)	45 (1996-99)	46	47
Number of votes in the National Council	191	2790	3227	3765
Number of final votes in the National Council	-	181	213	161
Number of votes in the districts	7	34	45	19
Number of “bridge” observations	7	33/34/32	41/42/40	19

Table 3: Bridging observations in the 45th legislature

Vote	Title	Date in Parliament	Date in the Districts
2684	Volksinitiative "für ein flexibles Rentenalter ab 62 für Frau und Mann"	18.12.1998	26.11.2000
2683	Volksinitiative "für eine Flexibilisierung der AHV - gegen die Erhöhung des Rentenalters für Frauen"	18.12.1998	26.11.2000
2948	Volksinitiative "für eine Regelung der Zuwanderung" 19.03.1999 24.09.2000		
3614	Verfassungsartikel über eine Energielenkungsabgabe für die Umwelt	08.10.1999	24.09.2000
3615	Verfassungsartikel über eine Förderabgabe für erneuerbare Energien	08.10.1999	24.09.2000
-	Volksinitiative "für einen Solarrappen"	08.10.1999	24.09.2000
3606	Bundesbeschluss über die Genehmigung der sektoriellen Abkommen zwischen der Schweizerischen Eidgenossenschaft einerseits und der Europäischen Gemeinschaft andererseits	08.10.1999	21.05.2000
3250	Volksinitiative "für die Halbierung des motorisierten Strassenverkehrs zur Erhaltung und Verbesserung von Lebensräumen (Verkehrshalbierungs-Initiative)"	18.06.1999	12.03.2000
2688	Volksinitiative "zum Schutze des Menschen vor Manipulationen in der Fortpflanzungstechnologie (Initiative für menschenwürdige Fortpflanzung [FMF])"	18.12.1998	12.03.2000
3242	Volksinitiative "für eine gerechte Vertretung der Frauen in den Bundesbehörden (Initiative 3. März)"	18.06.1999	12.03.2000
3641	Volksinitiative "für Beschleunigung der direkten Demokratie (Behandlungsfristen für Volksinitiativen in Form eines ausgearbeiteten Entwurfs)"	08.10.1999	12.03.2000
3613	Bundesbeschluss über die Justizreform	08.10.1999	12.03.2000
2682	Bundesgesetz über die Mutterschaftsversicherung	18.12.1998	13.06.1999
2233	Bundesgesetz über die Invalidenversicherung	26.06.1998	13.06.1999
2468	Bundesbeschluss über die ärztliche Verschreibung von Heroin	09.10.1998	13.06.1999
2237	Bundesbeschluss über dringliche Massnahmen im Asyl- und Ausländerbereich	26.06.1998	13.06.1999
2235	Asylgesetz	26.06.1998	13.06.1999
2679	Bundesbeschluss über eine neue Bundesverfassung	18.12.1998	18.04.1999
1865	Bundesgesetz über die Raumplanung	20.03.1998	07.02.1999
2470	Volksinitiative "Wohneigentum für alle"	09.10.1998	07.02.1999
2231	Bundesbeschluss betreffend die Verfassungsbestimmung über die Transplantationsmedizin	26.06.1998	07.02.1999
2464	Bundesbeschluss über die Änderung der Voraussetzung für die Wählbarkeit in den Bundesrat	09.10.1998	07.02.1999
1861	Bundesgesetz über die Arbeit in Industrie, Gewerbe und Handel	20.03.1998	29.11.1998
497	Volksinitiative "für eine vernünftige Drogenpolitik"	21.03.1997	29.11.1998
2008	Bundesbeschluss über einen befristet geltenden, neuen Getreideartikel	29.04.1998	29.11.1998
1866	Bundesbeschluss über Bau und Finanzierung von Infrastrukturvorhaben des öffentlichen Verkehrs	20.03.1998	29.11.1998
1550	Volksinitiative für die 10. AHV-Revision ohne Erhöhung des Rentenalters	19.12.1997	27.09.1998
504	Volksinitiative für preisgünstige Nahrungsmittel und ökologische Bauernhöfe	21.03.1997	27.09.1998
1554	Bundesgesetz über eine leistungsabhängige Schwerverkehrsabgabe	19.12.1997	27.09.1998
580	Volksinitiative S.o.S. - Schweiz ohne Schnüffelpolizei	21.06.1996	07.06.1998
500	Volksinitiative zum Schutz von Leben und Umwelt vor Genmanipulation (Gen-Schutz-Initiative)	21.03.1997	07.06.1998
1552	Bundesbeschluss über Massnahmen zum Haushaltsausgleich	19.12.1997	07.06.1998
496	Volksinitiative Jugend ohne Drogen	21.03.1997	28.09.1997
254	Bundesbeschluss über die Finanzierung der Arbeitslosenversicherung	13.12.1996	28.09.1997
188	Bundesbeschluss über die Aufhebung des Pulverregals	13.12.1996	08.06.1997
767	Volksinitiative für ein Verbot der Kriegsmaterialausfuhr	04.10.1996	08.06.1997
579	Volksinitiative EU-Beitrittsverhandlungen vors Volk!	21.06.1996	08.06.1997
387	Bundesgesetz über die Arbeit in Industrie, Gewerbe und Handel	22.03.1996	01.12.1996
372	Volksinitiative gegen die illegale Einwanderung	22.03.1996	01.12.1996
182	Gegenentwurf der Bundesversammlung zur Volksinitiative Bauern und Konsumenten - für eine naturnahe Landwirtschaft	21.12.1995	09.06.1996
178	Bundesbeschluss über den Uebertritt der bernischen Gemeinde Vellerat zum Kanton Jura	21.12.1995	10.03.1996

Table 4: Bridging observations in the 46th legislature

Vote	Title	Date in Parliament	Date in the Districts
4505	Bundesbeschluss zur Neugestaltung des Finanzausgleichs und der Aufgabenteilung zwischen Bund und Kantonen (NFA)	03.10.2003	28.11.2004
4512	Bundesgesetz über die Erwerbsersatzordnung für Dienstleistende in Armee, Zivildienst und Zivilschutz (Erwerbsersatzgesetz, EOG)	03.10.2003	26.09.2004
4509	Bundesbeschluss über den Bürgerrechtserwerb von Ausländerinnen und Ausländern der dritten Generation	03.10.2003	26.09.2004
4507	Bundesbeschluss über die ordentliche Einbürgerung sowie über die erleichterte Einbürgerung junger Ausländerinnen und Ausländer der zweiten Generation	03.10.2003	26.09.2004
–	Bundesgesetz über die Änderung von Erlassen im Bereich der Ehe- und Familienbesteuerung, der Wohneigentumsbesteuerung und der Stempelabgaben	20.06.2003	16.05.2004
4501	Bundesbeschluss über die Finanzierung der AHV/IV durch Anhebung der Mehrwertsteuersätze	03.10.2003	16.05.2004
4502	Bundesgesetz über die Alters- und Hinterlassenenversicherung (11. AHV-Revision)	03.10.2003	16.05.2004
–	Volksinitiative “Lebenslange Verwahrung für nicht therapierbare, extrem gefährliche Sexual- und Gewaltstraftäter	20.06.2003	08.02.2004
3253	Obligationenrecht (Miete). Änderung	13.12.2002	08.02.2004
4513	Gegenentwurf zur Volksinitiative “Avanti - für sichere und leistungsfähige Autobahnen”	03.10.2003	08.02.2004
2179	Volksinitiative “für ein ausreichendes Berufsbildungsangebot”	22.03.2002	18.05.2003
3267	Volksinitiative “MoratoriumPlus - Für die Verlängerung des Atomkraftwerk-Baustopps und die Begrenzung des Atomrisikos”	13.12.2002	18.05.2003
3259	Volksinitiative “Strom ohne Atom - Für eine Energiewende und die schrittweise Stilllegung der Atomkraftwerke”	13.12.2002	18.05.2003
3257	Volksinitiative “Gleiche Rechte für Behinderte”	13.12.2002	18.05.2003
3139	Volksinitiative “Gesundheit muss bezahlbar bleiben”	05.12.2002	18.05.2003
3255	Volksinitiative “für einen autofreien Sonntag pro Jahreszeit - ein Versuch für vier Jahre”	13.12.2002	18.05.2003
1898	Volksinitiative “Ja zu fairen Mieten”	12.03.2002	18.05.2003
2887	Bundesgesetz über den Bevölkerungsschutz und den Zivilschutz	04.10.2002	18.05.2003
2888	Bundesgesetz über die Armee und die Militärverwaltung (Armee XXI)	04.10.2002	18.05.2003
–	Bundesgesetz über die Anpassung der kantonalen Beiträge an Spitalbehandlungen	21.06.2002	09.02.2003
2880	Bundesbeschluss über die Änderung der Volksrechte	04.10.2002	09.02.2003
2181	Bundesgesetz über die obligatorische Arbeitslosenversicherung und die Insolvenzschiädigung	22.03.2002	24.11.2002
2184	Volksinitiative “gegen Asylrechtsmissbrauch”	22.03.2002	24.11.2002
1148	Elektrizitätsmarktgesetz	15.12.2000	22.09.2002
2176	Gold für AHV, Kantone und Stiftung (Gegenvorschlag zur Goldinitiative)	22.03.2002	22.09.2002
–	Volksinitiative “Überschüssige Goldreserven in den AHV-Fonds”	–	22.09.2002
1901	Volksinitiative “für Mutter und Kind - für den Schutz des ungeborenen Kindes und für die Hilfe an seine Mutter in Not”	14.12.2001	02.06.2002
1175	Schweizerisches Strafgesetzbuch (Schwangerschaftsabbruch, Fristenregelung)	23.03.2001	02.06.2002
1395	Volksinitiative “für eine kürzere Arbeitszeit”	22.06.2001	03.03.2002
1594	Volksinitiative “für den Beitritt der Schweiz zur Organisation der Vereinten Nationen (UNO)”	05.10.2001	03.03.2002
1400	Volksinitiative “für eine Kapitalgewinnsteuer”	22.06.2001	02.12.2001
1397	Volksinitiative “Solidarität schafft Sicherheit: Für einen freiwilligen zivilen Friedensdienst (ZFD)”	22.06.2001	02.12.2001
1396	Volksinitiative “für eine glaubwürdige Sicherheitspolitik und eine Schweiz ohne Armee”	22.06.2001	02.12.2001
1388	Volksinitiative “für eine gesicherte AHV - Energie statt Arbeit besteuern!”	22.06.2001	02.12.2001
1398	Bundesbeschluss über eine Schuldenbremse	22.06.2001	02.12.2001
1155	Bundesbeschluss über die Aufhebung der Genehmigungspflicht für die Errichtung von Bistümern	15.12.2000	10.06.2001
904	Bundesgesetz über die Armee und die Militärverwaltung (Ausbildungszusammenarbeit)	–	10.06.2001
905	Bundesgesetz über die Armee und die Militärverwaltung (Bewaffnung)	06.10.2000	10.06.2001
912	Volksinitiative “für mehr Verkehrssicherheit durch Tempo 30 innerorts mit Ausnahmen (Strassen für alle)”	06.10.2000	04.03.2001

<i>continued</i> Vote	Title	Date in Par- liament	Date in the Districts
570	Volksinitiative "für tiefere Arzneimittelpreise"	08.06.2000	04.03.2001
704	Volksinitiative "Ja zu Europa!"	23.06.2000	04.03.2001
457	Bundespersonalgesetz	24.03.2000	26.11.2000
453	Volksinitiative "für tiefere Spitalkosten"	24.03.2000	26.11.2000
456	Volksinitiative "Sparen beim Militär und der Gesamtverteidigung - für mehr Frieden und zukunftsgerichtete Arbeitsplätze"	24.03.2000	26.11.2000
455	Volksinitiative "Mehr Rechte für das Volk dank dem Referendum mit Gegen- vorschlag"	24.03.2000	24.09.2000

Table 5: Bridging observations in the 47th legislature

Vote	Title	Date in Parliament	Date in the Districts
4920	Volksinitiative "für demokratische Einbürgerungen"	05.10.2007	01.06.2008
4216	Bundesgesetz über die Verbesserung der steuerlichen Rahmenbedingungen für unternehmerische Tätigkeiten und Investitionen	22.03.2007	24.02.2008
4550	Volksinitiative "Gegen Kampfjetlärm in Tourismusgebieten"	22.06.2007	24.02.2008
154	Bundesgesetz über die Invalidenversicherung	06.10.2006	17.06.2007
3479	Volksinitiative "Für eine soziale Einheitskrankenkasse"	07.10.2006	11.03.2007
3110	Bundesgesetz über die Familienzulagen	24.03.2006	26.11.2006
3116	Bundesgesetz über die Zusammenarbeit mit den Staaten Osteuropas	24.03.2006	26.11.2006
2860	Änderung des Asylgesetzes	16.12.2005	24.09.2006
2819	Bundesgesetz über die Ausländerinnen und Ausländer	16.12.2005	24.09.2006
2824	Volksinitiative "Nationalbankgewinne für die AHV"	16.12.2005	24.09.2006
2815	Bundesbeschluss über die Neuordnung der Verfassungsbestimmungen zur Bildung	16.12.2005	21.05.2006
1446	Arbeitsgesetz (Ladenöffnungszeiten in Zentren des öffentlichen Verkehrs)	08.10.2004	27.11.2005
2259	Volksinitiative "für Lebensmittel aus gentechnikfreier Landwirtschaft"	17.06.2005	27.11.2005
1745	Bundesbeschluss über die Ausdehnung des Personenfreizügigkeitsabkommens auf die neuen EU-Staaten und über die Revision der flankierenden Massnahmen	17.12.2004	25.09.2005
46	Bundesgesetz über die eingetragene Partnerschaft gleichgeschlechtlicher Paare (Partnerschaftsgesetz, PartG)	18.06.2004	05.06.2005
1741	Bundesbeschluss über die Genehmigung und die Umsetzung der bilateralen Abkommen zwischen der Schweiz und der EU über die Assoziierung an Schengen und Dublin	17.12.2004	05.06.2005
255	Bundesgesetz über die Forschung an embryonalen Stammzellen	19.12.2003	28.11.2004
531	Bundesbeschluss über eine neue Finanzordnung	19.03.2004	28.11.2004
533	Volksinitiative 'Postdienst für alle'	19.03.2004	26.09.2004

Table 6: Inference Parameters

	Legislature		
	45 (1996-99)	46	47
Number of Parameters to estimate	608/610/606	670/672/668	573
Burn in	5000	5000	5000
Number of Iterations	100000	100000	100000
Thinning Interval	25	25	25
Sample Size of the Chain	4000	4000	4000

Table 7: The effect of electoral systems on the log of the absolute deviation

	Legislature								
	45			46			47		
proportional representation	0.690 (0.452)		0.461 (0.497)	0.111 (0.459)		0.059 (0.501)	1.107 (0.398)		0.638 (0.470)
Dispersion (Cox, 1990)		-0.295 (0.217)	-0.232 (0.227)		-0.064 (0.244)	-0.054 (0.254)		-0.343 (0.183)	-0.274 (0.206)
Dispersion of voters			0.248 (0.381)			0.071 (0.410)			0.536 (0.310)
constant	-0.762 (0.445)	-0.046 (0.087)	-1.019 (0.794)	-0.095 (0.450)	0.022 (0.095)	-0.184 (0.853)	-0.809 (0.392)	0.318 (0.070)	-1.433 (0.633)
<i>N</i>	220	220	220	212	212	212	225	225	225
Resid. sd	1.176	1.177	1.178	1.272	1.272	1.278	0.961	0.970	0.957

Standard errors in parentheses

Table 8: The effect of electoral systems on the log of the absolute deviation using the dispersion of voters from “selects”

	Legislature								
	45			46			47		
proportional representation	0.877		0.548	-0.049		-0.239	1.984		1.761
	(0.499)		(0.573)	(0.430)		(0.550)	(0.563)		(0.624)
Dispersion (Cox, 1990)		-0.427	-0.432		-0.223	-0.240		-0.484	-0.112
		(0.196)	(0.199)		(0.199)	(0.207)		(0.262)	(0.283)
Dispersion of voters			0.814			-0.158			0.500
			(0.414)			(0.371)			(0.533)
constant	-1.347	-0.416	-2.612	-0.284	-0.298	0.290	-2.496	-0.494	-3.420
	(0.493)	(0.081)	(0.892)	(0.424)	(0.077)	(0.908)	(0.556)	(0.100)	(1.299)
<i>N</i>	220	220	219	212	212	210	225	225	225
Resid. sd	1.102	1.098	1.090	1.039	1.036	1.045	1.361	1.388	1.364

Standard errors in parentheses

* indicates significance at $p < 0.05$

Table 9: The effect of electoral systems on the log of the absolute deviation standardized by the dispersion of voters

	Legislature								
	45			46			47		
proportional representation	0.614 (0.498)		0.440 (0.502)	-0.280 (0.436)		-0.362 (0.442)	1.748 (0.563)		1.540 (0.614)
Dispersion (Cox, 1990)		-0.429 (0.195)	-0.399 (0.198)		-0.201 (0.202)	-0.229 (0.205)		-0.517 (0.260)	-0.237 (0.280)
constant	-1.818 (0.492)	-1.144 (0.081)	-1.579 (0.503)	-0.787 (0.430)	-1.029 (0.078)	-0.673 (0.442)	-2.996 (0.555)	-1.219 (0.099)	-2.759 (0.622)
<i>N</i>	220	220	220	212	212	212	225	225	225
Resid. sd	1.100	1.092	1.092	1.053	1.052	1.052	1.360	1.377	1.361

Standard errors in parentheses

* indicates significance at $p < 0.05$

Table 10: The effect of electoral systems on the log of the absolute deviation - using all votes

	Legislature								
	45			46			47		
PR	0.601 (0.533)		0.319 (0.570)	-0.023 (0.557)		-0.183 (0.593)	1.107 (0.398)		0.638 (0.470)
Dispersion (Cox, 1990)		-0.354 (0.210)	-0.331 (0.213)		-0.200 (0.257)	-0.206 (0.262)		-0.343 (0.183)	-0.274 (0.206)
Dispersion of voters			0.294 (0.381)			0.209 (0.432)			0.536 (0.310)
constant	-0.681 (0.527)	-0.032 (0.087)	-0.960 (0.818)	0.019 (0.549)	0.027 (0.100)	-0.228 (0.921)	-0.809 (0.392)	0.318 (0.070)	-1.433 (0.633)
<i>N</i>	220	220	220	212	212	212	225	225	225
Resid. sd	1.179	1.175	1.177	1.344	1.342	1.348	0.961	0.970	0.957

Standard errors in parentheses

* indicates significance at $p < 0.05$

Table 11: The effect of electoral systems on the log of the absolute deviation standardized by the dispersion of voters - using all votes

	Legislature								
	45			46			47		
proportional system	0.338 (0.533)		0.188 (0.539)	-0.253 (0.557)		-0.327 (0.565)	0.870 (0.396)		0.643 (0.431)
Dispersion (Cox, 1990)		-0.355 (0.209)	-0.342 (0.213)		-0.179 (0.258)	-0.204 (0.262)		-0.376 (0.181)	-0.259 (0.196)
constant	-1.151 (0.527)	-0.760 (0.087)	-0.946 (0.540)	-0.484 (0.549)	-0.703 (0.100)	-0.382 (0.565)	-1.309 (0.391)	-0.408 (0.069)	-1.050 (0.437)
<i>N</i>	220	220	220	212	212	212	225	225	225
Resid. sd	1.179	1.172	1.174	1.344	1.343	1.345	0.957	0.958	0.955

Standard errors in parentheses

* indicates significance at $p < 0.05$