Party systems, electoral systems, and legislative fragmentation: A cross-national empirical study

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Abstract
Using electoral data from a nearly comprehensive set of the world's electoral democracies (1992–2014), including 131 independent countries and one non-sovereign territory, this article develops an explanatory model of legislative fragmentation that incorporates electoral fragmentation, the territorial patterns of party support, district magnitude, specific electoral system effects, and the balance of personal and party vote components within the incentive structures generated by electoral rules. The analysis proves that there is a strong negative association between the territorial homogeneity of the vote and legislative fragmentation, and shows that those varieties of electoral rules that increase the salience of personal component in party-centred elections tend to enhance legislative fragmentation. Due to its statistical properties, the model allows for establishing the impact of each of the factors, as well as their relative weights, with a high degree of certainty.

Keywords
electoral systems, legislative fragmentation, party system nationalization, party systems, personal vote

Introduction

Legislative fragmentation – a concept that, in its simplest definition, refers to the number of important parties in a legislative assembly – has been found to be of crucial importance for shaping executive-legislative relations (Golder, 2006; Hicken and Stoll, 2011; Jones, 1995; Shugart and Carey, 1992), coalition strategies (Cox, 1997; Taagepera and Shugart, 1989), and specific policy agendas (Brooks, 2007; Gibson and Hoffman, 2013). It has been argued that recent trends in party system fragmentation fundamentally alter the role of oppositions in well-established democracies (Best, 2013). Therefore, it is important to understand why some legislatures are more fragmented than others.

There is a large stream of research that explains party system fragmentation as a product of complex interactions between two groups of factors, sociological and institutional (Amorim Neto and Cox, 1997; Coppedge, 1997; Mozaffar et al., 2003; Ordeshook and Shvetsova, 1994; Powell, 1982). It is clear that, to a very large extent, legislative fragmentation is a product of one of the fundamental party system properties, fragmentation in the electorate. Yet it is also clear that the two phenomena are not identical. This study seeks to establish and empirically validate the relationship between legislative fragmentation and another fundamental property of party systems, the territorial homogeneity of the vote. The increased interest in the effects of this property, commonly referred to as party system nationalization, has been characteristic of cross-national political research, especially in the last decade (Caramani, 2004; Chhibber and Kollman, 2004; Jones and Mainwaring, 2003; Lublin, 2014; Morgenstern et al., 2009). As discussed in detail below, there are solid theoretical reasons to expect that the territorial homogeneity of the vote is highly consequential for legislative fragmentation. However, little research has been done so far to validate these expectations empirically.

Within the set of institutional explanations of legislative fragmentation, a prominent role is traditionally ascribed to electoral systems. A major inspiration for research on the impact of electoral systems on party system fragmentation

originated from the famous proposition or 'law' of Duverger (1954: 127), according to which the plurality single-ballot electoral system favours the two-party system. Starting with the pioneering work of Rae (1967), followed by contributions of Shugart and Carey (1992), Lijphart (1994), and many others, this stream of research consistently identifies district magnitude, defined as the number of legislative seats to be allocated in the electoral district, as the principal determinant of legislative fragmentation. By increasing the effective thresholds of representation, low district magnitude prevents political parties with small but visible levels of salience in the electorate from winning assembly seats. Even if small parties are able to gain representation, low district magnitude tends to make their seat shares disproportionally small in comparison to their vote shares.

A strong focus on the effects of district magnitude, while leading to significant advances in our understanding of the causes of party system fragmentation, at the same time results in a rather limited vision of electoral system effects. District magnitude equals one not only in single-member plurality systems, but also in two-round majority systems. The diversity of electoral systems in which district magnitude exceeds one is particularly striking, as they include both non-proportional and proportional rules, and within the latter category, a huge variety of different formulas. Of course, no claim can be made that this overwhelming diversity is not recognized in the literature. In fact, such recognition was evident already in the early work of Duverger (1954), and more recent scholarship has built on his approach to achieve further progress. At the same time, while studies focused on individual varieties of electoral rules in individual countries of the world abound, the body of cross-national research is rather limited. Even if available, such studies are normally focused on certain regions or categories of countries (e.g. Coppedge, 1997; Croissant and Völkel, 2012; Ferrara, 2011; Lijphart, 1994).

The purpose of this study is to empirically examine the effects exerted upon legislative fragmentation by party system properties and different varieties of electoral rules. In order to achieve this purpose, I use empirical evidence from a nearly comprehensive set of electoral democracies of the world, from 1992 to 2014. The first section of the analysis presents my theoretical expectations, on the basis of which I formulate a number of working hypotheses. The second section operationalizes the explanatory variables. In the third section, I describe the set of the empirical data used in this study. In the final section, the method of inquiry is explained, and the results of the analysis are reported and discussed.

Theoretical expectations and working hypotheses

Given the state of research, the main theoretical expectation regarding the impact of electoral rules upon legislative

fragmentation is unproblematic: the greater *district magnitude*, the greater legislative fragmentation (*H1*). In the course of the six decades since formulated, this hypothesis has been subjected to so thorough a discussion that it scarcely needs further theoretical elaboration. The mainstream literature on the political consequences of electoral rules, while finding that the 'law' of Duverger worked very well at the level of individual districts, at the same time revealed that it did not necessarily account for variations in the fragmentation of party systems at the national level. When explaining the exceptional cases, many scholars, including Rae (1967), Katz (1980), Powell (1982), Riker (1982) and Cox (1997), identified the territorial heterogeneity of the vote as a primary limitation of the validity of the 'law' of Duverger. In those cases when party support is unevenly spread across the localities, single-member plurality systems can be compatible with very high levels of national party system fragmentation (Meguid, 2008; Norris, 2004).

An important contribution to our understanding of this phenomenon has been made by a stream of research dealing with the 'swing ratio', defined as the expected change in a party's share of legislative seats following hypothetical changes in its share of the national vote. Already in the 1950s, it had been empirically estimated that in a single-member plurality ('first-past-the-post') system, in the conditions when the two largest parties divide the votes they win between them in the proportion A: B, the seats that they win will be divided in the proportion $A^3 : B^3$ (Kendall and Stuart, 1950). Starting with the 1950s, this so called 'cube law' has been subjected to many careful re-evaluations and refinements (Grofman et al., 1997; King, 1990; Linzer, 2012; Taagepera and Shugart, 1989). When discussing the theoretical limitations of the 'cube law', Tufte (1973: 547) observed that 'the more uniform electoral swings are across the nation, the greater will be the swing ration'. The work of Gudgin and Taylor (1979) made a decisive step towards a better understanding of this relationship. The problem is that, as put by Johnston (2002: 28), 'Gudgin and Taylor showed us the way in the late 1970s, but very few have followed their signposts', as a result of which little further work has been built on this solid foundation. At the current stage of research, however, the hypothesis that greater *territorial homogeneity of the vote* is associated with lower levels of legislative fragmentation (*H2*) can be subjected to a full-scale empirical validation with adequate tools of measurement at hand.

Turning to specific electoral system effects upon legislative fragmentation, I start with factors that can be expected to reduce it mechanically. Most obviously, such is the legal threshold of representation, which in proportional party list systems refers to the legally imposed minimum share of the vote needed to win a seat. Reducing legislative fragmentation is the primary, if not exclusive, purpose of this device, and there is some empirical evidence that it serves this purpose well (Anckar, 1997).

Unfortunately, few studies assess the impact of this factor in isolation from other components of the effective threshold of inclusion. Besides, the impact is not as direct as it may seem, for the thresholds of representation also affect fragmentation in the electorate by producing psychological effects upon voters and party elites (Pellicer and Wegner, 2014). Even more importantly, the effects of the legal thresholds of representation can be reasonably expected to be negligible in those conditions when fragmentation in the electorate is very low, meaning that all electorally visible parties qualify for seat allocation. Nevertheless, there is a lot of common sense appeal in the hypothesis that higher *legal thresholds of representation* lead to lower levels of legislative fragmentation even if electoral fragmentation is controlled for (*H3*).

I hypothesize that two varieties of non-proportional electoral rules go beyond the expected effects of district magnitude in reducing legislative fragmentation. One of them is multimember plurality. This archaic electoral system, once employed in many countries of the world before being replaced either by single-member plurality rules or by proportional representation (Colomer, 2007), currently survives in a limited – but not negligible – number of countries. Multimember plurality is notorious for its propensity to favour the representation of large parties (Lijphart, 1999: 150). Even though the available empirical evidence is not entirely conclusive (Benoit, 2001; Eggers and Fouirnaies, 2014; Golosov, 2003), the negative association between legislative fragmentation and multimember plurality is a widely observed phenomenon. Theoretically, it is quite clear that the more seat shares are to be allocated, the more parties have a chance to convert their shares of the vote into seat shares. Given that the number of available seat shares under multimember plurality rules is by definition smaller than it is under single-member plurality rules, the effect is largely mechanical. Therefore, I hypothesize that *multimember plurality rules* are negatively associated with legislative fragmentation (*H4*).

The second variety of non-proportional electoral rules that can be expected to exert a negative effect upon legislative fragmentation is the two-round majority (runoff) system. This effect includes both psychological and mechanical components. On the one hand, the first round of voting produces increased electoral fragmentation by establishing district-specific strategic incentives for individual political actors. This proposition, advanced by Duverger (1954), has been tested empirically in recent cross-national research and found to be correct (Birch, 2003). On the other hand, an extremely high effective threshold of representation in the second round of voting creates a large discrepancy between the level of electoral fragmentation, as registered in the first round, and the ultimate level of legislative fragmentation (Lijphart, 1994). A similar impact can be expected from the alternative vote ('instant runoff') system, even though the available

empirical evidence is scarce (Reilly, 2001). Thus I hypothesize that *majority electoral rules* are negatively associated with legislative fragmentation (*H5*).

Given the wide spread of mixed electoral systems in the contemporary world, it is important to estimate their impact upon legislative fragmentation. An elementary fact about the most common varieties of mixed electoral systems, defined as those systems that combine proportional and non-proportional rules for the allocation of seats in a single legislative body (Massicotte and Blais, 1999), is that seats are allocated on the basis of two different vote distributions. These varieties are mixed compensatory systems (also referred to as 'mixed member-proportional' or 'additional vote' systems), in which proportional representation seats are allocated in a way that provides a full or partial compensation for any disproportionality produced in the majoritarian section of the elections, and mixed superposition systems, also referred to as 'parallel' systems, in which no compensation of disproportionality is provided (Shugart and Wattenberg, 2001). In this study, I analyse the non-proportional components of mixed compensatory and mixed-superposition systems in separation from their proportional components. Thus it becomes possible to treat the non-proportional sections of these systems as specific cases of plurality/majority contests. Speaking of mixed compensatory systems, there are theoretical reasons to expect some reduction of legislative fragmentation in their non-proportional sections. While the topic is certainly understudied, recent empirical research suggests that similarly to what happens under two-round majority rules, mixed compensatory systems generate specific incentives for massive electoral entry of small parties (Bochsler, 2012). This happens not only because in this way small parties may count on increasing their overall visibility and thereby gaining additional votes in the proportional sections of elections, but also – and primarily – because larger parties consciously pursue vote-splitting strategies by using small parties as their substitutes. At times, this manipulative strategy greatly enhances large parties' legislative representation. Given that in most cases the gains of small parties are negligible, it becomes possible to hypothesize that *non-proportional sections of mixed compensatory electoral systems* are negatively associated with legislative fragmentation (*H6*). Here again, the level of fragmentation in the electorate emerges as a crucial intervening variable.

The available body of research on mixed-superposition electoral systems suggests that a similar motivation for increased electoral fragmentation that is not convertible into legislative fragmentation can be observed in mixed-superposition systems (Herron and Nishikawa, 2001). In this case, however, the additional incentives for the electoral entry of small parties are limited to increasing small parties' electoral visibility, which hardly can be expected to sizeably affect the discrepancies between the levels of electoral and legislative fragmentation. I do not expect any

discernible effects of this kind to occur in two other varieties of mixed electoral rules that are meaningfully present in the contemporary world, mixed single-vote systems and mixed coexistence systems.

Speaking of the effects of proportional electoral rules, my working hypotheses are based on a general theory according to which their effects are conditioned by their propensity to cultivate personal vote (Carey and Shugart, 1995; Colomer, 2011). The personalization of the vote assists minor parties in obtaining parliamentary representation. Thus the levels of fragmentation in the electorate and in the legislature approximate each other. There are two principal mechanisms that allow for the personalization of the vote in proportional electoral systems. One of them is *single transferable vote* (*STV*). While, consistent with this line of theoretical reasoning, I do hypothesize that it is positively associated with legislative fragmentation (*H7*), I do not expect the association to be very strong. STV allows for the greatest possible personalization of the vote under proportional representation rules, but at the same time it creates a disincentive for new electoral entry by allowing those candidates who lack strong personal resources to obtain votes under the labels of major parties. My expectation of the positive but limited effect of STV upon legislative fragmentation is generally supported by the available body of research (Bowler and Grofman, 2000).

To my knowledge, the effects of open list proportional representation systems upon electoral or legislative fragmentation have never been assessed empirically. However, the theory according to which the personalization of the vote is conducive to greater numbers of legislative parties clearly suggests a possibility of such a linkage. When building the set of working hypotheses for empirical validation, I took into account the fact that while open list systems are by no means a new invention, their massive spread across the world has occurred relatively recently, with many countries of Latin America and Eastern Europe opting for this variety of electoral rules in the course of the recent three decades. Since the effects of open list proportional representation are produced mostly by the competitive strategies of political actors, I expect these effects to be contingent upon prolonged processes of political learning (Gerber and Green, 1998). Therefore, for the purpose of statistical analysis I divide open list PR systems into two sub-categories: old, including those countries where such rules were in place in 1980 or earlier, and new, including all other relevant observations. I hypothesize that positive association between open list rules and legislative fragmentation can be registered for both categories, but it will be weaker for *new open list systems* (*H8*) and stronger for *old open list systems* (*H9*). The effects of other varieties of electoral rules, including single non-transferable vote and the binominal system, are not estimated in this study because of their limited presence in the available set of observations.

When formulating the hypotheses above, I noticed that some of the expected relationships can hold only if fragmentation in the electorate is controlled for. As demonstrated in the main body of research on party system fragmentation, both societal and institutional factors affect primarily the level of fragmentation of the vote. As a result of the joint operation of these factors, small parties may achieve higher or lower levels of visibility in the electorate. It is therefore important not only to empirically establish the effects of the territorial homogeneity of the vote and electoral rules upon legislative fragmentation, but also to test their impact in two different models, one excluding electoral fragmentation and the other including it. Such is the approach taken in this study. While not rejecting the possibility that legislative fragmentation is a mere epiphenomenon of fragmentation in the electorate, I subject this possibility to an empirical test by using the number of elective parties in one of the explanatory models of legislative fragmentation introduced below.

The variables

This study operationalizes its main concept, legislative fragmentation, as the effective number of legislative parties. This operationalization also applies to fragmentation in the electorate, defined as the effective number of electoral parties. In both cases, I employ the mathematical definition of the effective number of parties as proposed by Golosov (2010):

$$N_G = \sum_1^x \frac{p_i}{p_i + p_1^2 - p_i^2},$$

where sigma stands for summation; x for the raw number of parties; and p_i and p_1 for the fractional shares of the national votes or seats received by the i-th and the largest parties, respectively. The reason why this definition is preferred to the more conventional formula of Laakso and Taagepera (1979) is that, while being very close to it in the conceptual sense, Golosov's index poses an advantage that is important for this study: its values register greater distances between the cases of very low and very high fragmentation, which is particularly useful if the empirical sample includes such cases in sufficient numbers. It has to be mentioned that an analysis that used the Laakso-Taagepera index, not reported here, produced results that were different only in the numerical values of the coefficients, revealing no differences in statistical significance whatsoever. When computing the indices of electoral and legislative fragmentation, I systematically counted independent candidates as individual parties, which occasionally yielded very high values. The statistical model, however, proved to be strong enough to accommodate such fluctuations without making them exert excessive weight upon the overall results, which was demonstrated by my analysis of outliers. All votes cast for different candidates

belonging to the same parties were aggregated at the district level.

The operationalization of district magnitude (*H1*) is scarcely problematic. It is conventional to define it as the mean over all district magnitudes in a logged form, $ADM = \log(A / n)$, where A is the number of seats, and n is the number of electoral districts (Lowery et al., 2010). In most cases, such as single-member plurality, different plurality/majority electoral systems in multimember districts, and simple forms of proportional representation, the procedure of averaging did not pose any difficulty. The same approach was taken for mixed coexistence and mixed single-vote systems. For the proportional sections of mixed-superposition systems, as well as for the plurality/majority sections of all mixed systems with double vote, A in the above formula was defined as the number of seats allocated by the respective formulas. This operational definition was extended to the Hungarian electoral system of 1990–2010 with its very partial compensation (Ferrara et al., 2005). When dealing with unlinked multitier proportional representation systems, such as in Guatemala and Nicaragua, I took into account only seats allocated in subnational districts. For the proportional sections of mixed compensatory systems with sufficiently full compensation for disproportionality, which was normally the case, A was defined as the size of the assembly. The same approach was taken to compensatory multitier proportional representation systems. Note that my operational definitions of legislative fragmentation and district magnitude are consistent in the sense that the values of these variables have been established on the basis of the same sets of seats.

The territorial homogeneity of the vote (*H2*) is operationally defined as the index of party system nationalization (Golosov, 2014). The index is derived from the well-known Herfindahl-Hirschman index of concentration and thereby from the standard deviation (Feld and Grofman, 2007), a measure with very solid theoretical credentials. The formula is thus:

$$H = \sum_{1}^{n} \left(\left(1 - \frac{n - \left(\left(\sum_{1}^{n} s_i \right)^2 \Big/ \sum_{1}^{n} s_i^2 \right)}{n - 1} \right) p_i \right),$$

where sigma stands for summation; n stands for the number of electoral districts; s_i stands for the percentage or fractional share of the vote received by the i-th party in each of the electoral districts; and p_i for the fractional share of the vote received by the i-th party nationally. For nationwide districts, the index is always defined as one. The reason why I prefer the term 'territorial homogeneity of the vote' to the term 'party system nationalization' is that I seek to avoid unnecessary references to the territorial penetration of political parties, an aspect certainly beyond the scope of this analysis. Of course, this bears no substantive

implications for our understanding of the levels of party system nationalization in the respective countries. Such a categorization simply means that the territorial heterogeneity of party support does not affect the allocation of seats in nationwide multimember districts.

The legal threshold of representation (*H3*) is defined as the squared percentage share of the vote required for gaining assembly seats. Solely for ease of interpretation of the reported coefficients, the resulting values are divided by 100. Acting on the self-evident assumption that district-level thresholds do not prevent minor regional parties from entering the assembly, I took into account only nationwide thresholds, including those applied for the allocation of compensatory seats in multitier proportional representation systems. The reason for squaring the values is that I do not expect a linear relationship between the legal threshold of representation and legislative fragmentation. Very high thresholds are expected to bear disproportionately heavily on the dependent variable.

All other electoral system variables (*H4 – H9*) are coded as dichotomous: 0 = absent, 1 = present. The overall number of observations is 145, as explained below. The following list reports the number of none-zero observations for each of these variables in parentheses: multimember plurality (7), majority systems (9), non-proportional sections of mixed compensatory systems (5), single transferable vote (3), new open list systems (14), and old open list systems (17). The descriptive characteristics of the continuous variables are presented in Table 1.

The data

When building the set of observations for statistical analysis, I sought primarily to maximize its geographical diversity by including as many country cases as possible. At the first step, the pool of potentially available cases was provided by those 144 independent countries that were assigned by Freedom House (2015) to the category of electoral democracies for at least one year within the chronological limits of my inquiry, 1992 through 2014. Due to the unavailability of data on earlier elections, the Comoros are represented by elections held in 2015. The lower chronological limit is defined by the collapse of the Soviet Union, an event that was highly consequential for many regions of the world. The chronological limits of inquiry are rather wide, but this choice can be justified with reference to the fact that with more narrow limits – confined, for instance, to the recent decade – it would be necessary to exclude a large group of countries that ceased to be electoral democracies in the 2000s or later.

In fact, even among the pre-selected 144 cases, not all are fit for this study. Four countries did not hold any legislative elections during their democratic periods, normally very brief. Six countries, all of them in the Pacific,

Table 1. Descriptive characteristics of the continuous variables in the model ($n = 145$).

Variables	Mean	Median	Minimum	Maximum	Standard deviation
Legislative fragmentation	3.09	2.37	1.00	13.9	2.07
Electoral fragmentation	4.41	3.01	1.39	43.95	4.48
Logged average district magnitude	0.73	0.72	0.00	2.79	0.71
Territorial homogeneity of the vote	0.77	0.81	0.15	1.00	0.21
Legal threshold of representation	0.06	0.00	0.00	1.00	0.13

Sources: see Appendix 1.

conducted their elections on a non-partisan basis. Upon the exclusion of these cases, I had to additionally exclude three more countries, all of them in Francophone Africa, due to the lack of sufficient electoral data. I considered the completeness of the electoral data – including the lack of the 'others' category and the availability of sub-national electoral returns for the estimation of the territorial homogeneity of the vote – as essential criteria for inclusion. It has to be mentioned that my experimentation with incomplete data on the three thus excluded cases, not reported below, demonstrated that with them the statistical models would have become even stronger because of the increased explanatory power of the majority system variable. All in all, with 131 of the theoretically available 134 country cases included, it would be fair to say that the set of observations is nearly identical to the general population of the world's electoral democracies.

Each of the 131 countries enters the empirical sample with one election to the single or lower chamber of its national legislature, invariably held during the respective countries' democratic periods. I additionally included one non-sovereign territory, Northern Ireland, in order to widen an empirical basis for the estimation of the effects of single transferable vote. As explained in the previous section, some of the countries with mixed electoral systems enter the sample twice, with proportional and non-proportional tiers of their elections. The number of such cases is 13, which raises the overall number of observations to 145. The geographical breakdown of observations by region is fairly even. The following list reports the number of observations for each of the regions in parentheses: Africa (28), Latin America (20), North America and the English/Dutch speaking Caribbean (15), Asia and the Pacific (30), East Europe and the former Soviet Union (26), and West Europe (26).

In my view, many difficulties in the previous research on party system properties stemmed from the disproportionate presence of long-established democracies in empirical samples, which is unavoidable if some of the countries enter the data set with more than one election. Of course, one way to deal with this problem is to employ complex multilevel modelling. However, hierarchical models can easily be misinterpreted for causal inference (Gelman, 2006). An alternative solution is simply to avoid a multilevel structure in the data, which explains my strong preference

for having each country represented by one observation only. It is however clear that this methodological choice invites concerns about the possible influence of idiosyncrasies in particular elections upon the overall results of statistical analysis. Thus in those cases when sufficient information on more than one election was available, I selected those that could be viewed as typical, which was established by comparing the effective number of legislative parties in the given election with the 'systemic effective number of parties' (Golosov, 2013). Maximum correspondence between the two parameters qualified for inclusion. The years of included elections and data sources for each of the countries are reported in Appendix 1.

Method and findings

The method of empirical inquiry employed in this study is multiple linear regression analysis. The homoscedasticity of variances was tested graphically with scatter plots and by measuring the skewness of the distributions of standardized residuals. Despite the fact that very modest levels of heteroscedasticity have been detected, I report only robust standard errors for all estimations. The presence of multicollinearity of the independent variables has been tested with variance inflation factors and with condition indices obtained from eigenvalues. No violation of the basic assumptions of linear regression analysis has been detected, which allows for a rather confident interpretation of the observed statistical relationships. The same purpose is served by the simplicity of the models. Table 2 reports two models. The second model includes fragmentation in the electorate as the intervening variable, while the first model omits it. It has to be mentioned that one of the models not reported below included two additional factors, mixed single-vote systems and plurality/majority sections of mixed-superposition electoral systems. The latter turned out to be positively associated with legislative fragmentation, but the association is not statistically significant, while the former displayed no meaningful association with the dependent variable whatsoever. This is consistent with my theoretical expectations.

Consistent with the main body of research on party system properties, both models demonstrate that district magnitude (*H1*) is indeed a factor of decisive importance. Note

Table 2. Factors of legislative fragmentation (*n* = 145).

Variables	Coefficients (robust standard errors in parentheses)	
	Model 1	Model 2
Logged average district magnitude	1.28***(0.20)	0.63***(0.12)
Territorial homogeneity of the vote	−6.82***(1.14)	−2.17***(0.71)
Legal threshold of representation	−0.72 (0.65)	−0.93**(0.43)
Multimember plurality	−0.96**(0.39)	−0.43***(0.17)
Majority systems	0.97 (0.93)	−1.04**(0.46)
Plurality/majority sections of mixed compensatory systems	−0.54*(0.29)	−0.43***(0.14)
Single transferable vote	0.49**(0.24)	0.41*(0.22)
New open list proportional representation systems	1.43***(0.34)	0.96***(0.23)
Old open list proportional representation systems	1.72***(0.41)	1.25***(0.28)
Electoral fragmentation	N/A	0.36***(0.06)
Constant	7.13***(0.90)	2.64***(0.68)
R-squared	0.53	0.87

***significant at 0.01; **significant at 0.05; *significant at 0.1.
Sources: see Appendix 1.

that if we compare the two models, the decrease in the coefficient for the effective number of electoral parties reflects the well-established positive association between electoral fragmentation and district magnitude. But even if this association is controlled for, the impact of district magnitude upon legislative fragmentation remains very visible. The territorial homogeneity of the vote (*H2*) also exerts a statistically significant and strong impact upon legislative fragmentation. The second model suggests that, with all other parameters held constant, the effective number of legislative parties in a system where the index of territorial homogeneity equals 0.5, which indicates the presence of strong regionally based parties, exceeds the effective number of legislative parties in a system with complete territorial homogeneity of the vote by approximately one unit.

Turning to the specific effects of electoral systems, it can be observed that all of them display somewhat different patterns of causality in the two models, even though the signs of the coefficients remain unchanged in all but one case. In both models, the legal threshold of representation (*H3*) negatively affects legislative fragmentation, but the effect is much more visible if legislative fragmentation is controlled for. This is consistent with my expectation that if the effective number of parties in the electorate is small, the size of the legal threshold of representation is largely inconsequential, but it does suppress legislative fragmentation in systems with large numbers of parties. Multimember plurality (*H4*) displays a different pattern. Its negative

effects upon legislative fragmentation are highly statistically significant in both models, but in the first model the effect is much greater in strength. Thus, to a large extent the effects of multimember plurality systems upon legislative fragmentation are indirect, so that the reduction in the effective number of legislative parties stems primarily from this system's propensity to reduce the number of parties in the electorate. Note, however, that the independent effect upon legislative fragmentation remains visible in Model 2, albeit more than twice as weak as in Model 1. Majority systems (*H5*) display the most idiosyncratic pattern, as it is the only variable that changes the direction of its impact upon legislative fragmentation. This idiosyncratic pattern, however, has been anticipated in the theoretical section of this study. Consistent with the main body of research on majority systems, starting with Duverger (1954), they produce additional incentives for the electoral entry of small parties and occasionally enable them to win seats, particularly if they have coalition potential. This explains the positive direction of this variable in Model 1, even though it has to be noted that the effect is not statistically significant. But if electoral fragmentation is controlled for, then the relative permissiveness of majority systems towards small parties becomes completely overridden by the fact that such parties are not able to pass very high effective thresholds of representation set by majority rules. Thus, much in the same way as it happens with the legal thresholds of representation in proportional systems, majority systems emerge as a strong obstacle to legislative fragmentation. In fact, this is the strongest negative factor in Model 2, as it reduces the effective number of legislative parties by more than one unit.

Other explanatory variables display relatively uniform patterns of association with legislative fragmentation in the two models. As expected, legislative fragmentation is reduced in the plurality/majority of mixed compensatory electoral systems (*H6*). It is noticeable that while the strength of the effect is nearly the same in the two models, it becomes much more consistent in Model 2, which supports my reasoning about the connection between the level of fragmentation in the electorate and these systems' capacity to reduce the number of legislative parties. As expected, single transferable vote (*H7*) positively affects legislative fragmentation, even though the effect is very weak in both models. In contrast, the impact of open list proportional representation is strong, and the difference between new (*H8*) and old (*H9*) open list systems is very visible. While recent experimentation with open lists increases legislative fragmentation by 0.96, in old open list systems an increase of 1.25 is predicted by Model 2. This confirms the important role played by political learning in conditioning electoral system effects. The comparison of the two models suggests that the effects of open list representation systems, be they old or new, are strongly conditioned by the level of fragmentation in the electorate.

Conclusion

The analysis presented above confirms my theoretical expectations regarding the impact exerted by party system properties and electoral system design upon legislative fragmentation. Some of the findings are hardly novel. Of course, the primary determinant of the effective number of legislative parties is fragmentation in the electorate. There is also nothing new in establishing a positive association between legislative fragmentation and district magnitude. One would not be surprised to learn that a high legal threshold of representation does indeed suppress legislative fragmentation, even though to my knowledge, this has never been established empirically for a large cross-national sample of cases. Some other findings enhance our knowledge to a greater extent. First, the pattern of association between the territorial homogeneity of the vote and legislative fragmentation is established. Second, the analysis presented above generally confirms the theory of electoral system effects advanced in this study. Most importantly, those varieties of electoral rules that increase the salience of personal component in party-centred elections tend to increase legislative fragmentation. This is empirically established for single transferable vote and open list systems. As expected, the observed effects are contingent upon political learning. Thus I arrive at a model of the factors of legislative fragmentation that includes electoral fragmentation, the territorial patterns of party support, district magnitude, the psychological and mechanical effects of specific low-magnitude electoral systems, and the balance of personal and party vote components within the incentive structures generated by electoral rules. The model is empirically validated on a nearly comprehensive set of contemporary electoral democracies. The statistical properties of the model are such that it allows for establishing the impact of each of the factors, as well as their relative weights, with a very high degree of certainty.

These findings have policy implications for the designers of electoral systems. Many new democracies contemplate transitions from closed list proportional representation to open list systems, and indeed the spread of open list systems can be registered in several regions. While the normative merits of expanding the scope of opportunities for voter choice are undeniable, aspiring electoral engineers should be aware of the fact that in the long run open list systems may pose a danger of excessive legislative fragmentation. In these conditions, mixed electoral systems may provide an alternative that allows for making the vote more personal without increasing the number of parties in the assembly.

Appendix 1. Country cases and data sources

Explanatory note. Below, I list the sources of the data on vote distributions. Information about seat distributions and electoral systems was derived from a variety of sources, but particularly from the PARLINE database of the Inter-Parliamentary Union (2015). Among other sources of information on electoral systems, the databases of Bormann and Golder (2013) and ESCE (2014) were of superior utility. Asterisks in the list below refer to the following data sources, all accessed in August 2013 through April 2015:

*Ken Kollman, Allen Hicken, Daniele Caramani, David Backer, and David Lublin, Constituency-Level Election Archive (produced and distributed by the Centre for Political Studies of the University of Michigan), http://www.electiondataarchive.org;

**David Lublin, American University, Election Passport, http://www.electionpassport.com;

***Norwegian Social Science Data Services, European Election Database, http://www.nsd.uib.no/european_election_database;

****Adam Carr, Psephos, http://psephos.adam-carr.net.

Albania (2009) Komisioni Qendror i Zgjedhjeve, http://www.cec.org.al; Andorra (2009) Govern d'Andorra, http://www.eleccions.ad; Antigua and Barbuda (2004)**; Argentina (1999)*; Armenia (1999) Nohlen, Grotz and Hartmann, 2001; Australia (2007) Electoral Commission, http://results.aec.gov.au; Austria (2008)***; Bahamas (2007)**; Bangladesh (2008)*; Barbados (2008)**; Belgium (2010) Direction générale Institutions et Population, http://polling2010.belgium.be; Belize (2012) Elections and Boundaries Department, http://www.elections.gov.bz; Benin (2011)**; Bhutan (2013)**; Bolivia (2005)*; Bosnia and Herzegovina (2010) Centralna izborna komisija, http://www.izbori.ba; Botswana (2004)**; Brazil (2010) Tribunal Supremo Electoral, http://www.tse.jus.br; Bulgaria (1997)*; Burundi (2005) University of Antwerp, Centre for the Study of the Great Lakes Region, http://www.uantwerpen.be/en/faculties/iob/research-and-service/centre-great-lakes/dpp-burundi/elections/elec-2005; Cabo Verde (2001)*; Canada (2008)*; Chile (2009)**; Colombia (2006)*; Comoros (2015) Commission électorale nationale indépendante, http://www.cenicomores.km; Costa Rica (2006)*; Croatia (2007)*; Cyprus (2011) Ypoyrgeio Esoterikon, http://results.elections.moi.gov.cy; Czech Republic (2006)*; Denmark (2011) Danmarks Statistik, http://www.dst.dk; Dominica (2005)*; Dominican Republic (2006)**; Ecuador (2006) T Mustillo and R Madrid, Ecuador Electoral Dataset, http://repositories.lib.utexas.edu/handle/2152/16319; El Salvador (2006)**; Estonia (2003)*; Fiji (2001)****; Finland (2007)*; France (2002)*; Gambia (1992) Parlamentswahlen in Gambia 1992, http://de.wikipedia.org/wiki/Parlamentswahlen_in_Gambia_1992; Georgia (2012) Georgia Election Data, http://data.electionportal.ge/en; Germany (2009) Bundeswahlleiter, http://www.bundeswahlleiter.de; Ghana (2004)*; Greece (2004)***; Grenada (1999)*; Guatemala (2007)**; Guinea-Bissau (1994)*;

Guyana (2006)*; Haiti (2006)****; Honduras (2001)*; Hungary (1994)*; Iceland (2009)***; India (2004)*; Indonesia (2004) International Foundation for Electoral Systems, http://www.ifes.org; Ireland (2007) Elections Ireland, http://electionsireland.org; Israel (2003) The Knesset, http://www.knesset.gov.il; Italy (1992) Ministero dell'Interno, http://elezionistorico.interno.it; Jamaica (2002)**; Japan (2009) Ministry of Internal Affairs and Communications, http://www.soumu.go.jp; Kenya (2013)**; Kosovo (2014) Komisioni Qendror i Zgjedhjeve, http://www.kqz-ks.org; Latvia (2011) Centrālā vēlēšanu komisija, http://www.velesanas2011.cvk.lv; Lesotho (2002)**; Liberia (2005)**; Libya (2012) High National Election Commission, http://web.archive.org/web/20130128085201/http://elections2012.ly/home/entity_results/?lang=ar; Liechtenstein (2009) Information und Kommunikation der Regierung, http://www.landtagswahlen.li; Lithuania (2008) Vyriausioji rinkimų komisija, http://www.vrk.lt; Luxembourg (2009) M. Álvarez-Rivera, Election Resources on the Internet, http://www.electionresources.org/lu/data; Macedonia (2008)***; Malawi (1999)*; Maldives (2009)**; Mali (2002) Ministère de l'administration territoriale et des collectivités, www.matcl.gov.ml/pdf/RsltLegis2002-Tour1.pdf; Malta (2008) Malta Elections, http://www.um.edu.mt/projects/maltaelections; Mauritius (2010)**; Mexico (2006) Instituto Federal Electoral, http://www.ife.org.mx; Moldova (2009) Asociaţia pentru Democraţie Participativă 'ADEPT', http://www.e-democracy.md; Monaco (2008) Résultats des élections, http://www.elections.monaco.net; Mongolia (2012) Songuuliin Eronxii Xoroo, http://www.gec.gov.mn; Montenegro (2009) Drzavna izborna komisija, http://www.rik.co.me; Mozambique (2009) Electoral Institute for Sustainable Democracy in Africa, http://www.content.eisa.org.za/old-page/mozambique; Namibia (2009) Electoral Commission, http://www.ecn.na; Nepal (1994) Nepal Research: Website on Nepal and Himalayan Studies, http://nepalresearch.org/politics/background/elections_old/election_1994_constituency_results_english.pdf; Netherlands (2010)***; New Zealand (2008) Electoral Commission, http://www.elections.org.nz; Nicaragua (2001)**; Niger (2011) La Cour constitutionnelle, http://cour-constitutionnelle-niger.org; Nigeria (2003)*; Northern Ireland (2003) N Whyte, Northern Ireland Elections, http://www.ark.ac.uk; Norway (2009)***; Pakistan (2013) Election Commission, www.ecp.gov.pk; Panama (2009) Tribunal Electoral, http://www.tribunal-electoral.gob.pa; Papua New Guinea (2002) M Singer, District Level Electoral Data on the Internet, http://web.archive.org/web/20080430221917/http://www.duke.edu/∼mms15; Paraguay (2008) Justicia Electoral, http://www.tsje.gov.py; Peru (2011) Oficina Nacional de Procesos Electorales, http://www.web.onpe.gob.pe; Philippines (1998)*; Poland (2007)***; Portugal (2009) Comissao Nacional de Eleicoes, http://eleicoes.cne.pt; Romania (2000)*; Russia (2003) Tsentral'naya izbiratel'naya komissiya, http://www.izbirkom.ru; Samoa (2011)****; San Marino (2006) Segreteria di Stato per gli Affari Interni, http://www.elezioni.sm; Sao Tome and Principe (1994) Nohlen, Thibaut and Krennerich, 1999; Senegal (2012) Commission Electorale Nationale Autonome, deposited at http://www.dakaractu.com/Senegal-Legislatives-2012-Tableau-des-Resultats-Scrutin-Departemental-et-Scrution-Proportionnel-DOCUMENT-PDF_a27891.html; Serbia (2012) Republicka Izborna Komisija, http://www.rik.parlament.gov.rs; Seychelles (2007) Office of the Electoral Commission, http://www.ecs.sc; Sierra Leone (2012) National Electoral Commission, http://www.nec-sierraleone.org; Slovakia (2002)***; Slovenia (2008)***; Solomon Islands (1993) Solomon Islands Elections, http://solomonislandselections.files.wordpress.com/2015/04/solomons-election-database-1980-2014-for-sharing.xlsx; South Africa (2009) Independent Electoral Commission, http://www.elections.org.za; South Korea (2012) National Election Commission, www.nec.go.kr; Spain (2004)***; Sri Lanka (2004)*; St. Kitts and Nevis (2010)**; St. Lucia (2006)**; St. Vincent and Grenadines (2005)**; Suriname (2010)**; Sweden (2010) Valmyndigheten, http://www.val.se; Switzerland (2011) Bundesverwaltung Statistik, http://www.bfs.admin.ch; Taiwan (2004)*; Tanzania (2010) National Electoral Commission, http://nec.go.tz; Thailand (2011) Office of the Election Commission, http://www.ect.go.th/th/wp-content/uploads/2013/10/mp_54.pdf; Timor-Leste (2012) Secretariado Técnico de Administração Eleitoral, http://www.stae.tl; Trinidad and Tobago (2010)**; Tunisia (2011) Instance Supérieure Indépendante pour les Elections, http://www.isie.tn; Turkey (2011)***; Ukraine (2007) Tsentral'na vyborcha komisiia, http://www.cvk.gov.ua; United Kingdom (1997)*; United States (2006)*; Uruguay (2009) Corte Electoral, http://elecciones.corteelectoral.gub.uy; Vanuatu (2012)****; Venezuela (1993) T Mustillo, Venezuela Electoral Dataset, http://repositories.lib.utexas.edu/handle/2152/16391; Zambia (2006)*.

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