

Toward a Bidirectional Account of the Relationship between Party System Size and Electoral Institutions

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Abstract: This paper investigates the reciprocal relationship between changes in party system size and electoral rules, giving explicit attention to both long-term and short-term effects. A form of Seemingly-Unrelated-Regression is employed to simultaneously estimate models of changes toward permissive electoral rules, changes toward stronger electoral rules, and changes in electoral party system size. The findings demonstrate the importance of long-term, cumulative changes in party system size on electoral reform and the importance of short-to-medium-term changes in electoral rules on party system size. Disproportionality in the vote-to-seat translation is found to have mixed and inconsistent effects on electoral rule changes.

Do electoral institutions drive party system size or does party system size drive the selection of electoral institutions? Scholarship in this area has amassed support for both sides of this relationship. On the one hand, a long tradition of literature has given us a good degree of understanding about ways in which electoral systems shape and structure the size of the party system (Duverger 1954; Rae 1967; Taagepera and Shugart 1989; Lijphart 1994; Ordeshook and Shvetsova 1994; Cox 1997; Neto and Cox 1997; Benoit 2001; Clark and Golder 2006; Singer and Stephenson 2009). On the other hand, there have always been scholars urging us to look at the relationship the other way around, with party system size as a determinant of electoral system choice (Grumm 1958; Lipson 1964; Shugart 1992; Dunleavy and Margetts 1995; Colomer 2005, Remmer 2008).

Despite the tendency of scholars to emphasize one direction of the relationship or the other, most recognize the potential for the relationship between electoral and party systems to flow both ways (Benoit 2007). Even Duverger (1984), who is perhaps the most renowned proponent of the effects of electoral systems on party systems, alludes to this relationship when he speaks of electoral systems registering “images which they have partly created themselves” (p. 34). Although recent scholarship has devoted some empirical attention to both directions of this relationship (Shugart 1992; Colomer 2005; Remmer 2008), this research tends to have two shortcomings. First, changes in electoral rules and changes in party system size are usually modeled independently from one another, although doing so ignores the information that the two processes have in common. Second, the focus is typically on short-run changes and influences of party system size, and vice versa, when it is likely that long-run relationships exist between the two.

I seek to fill these gaps by explicitly addressing both sides of the relationship between party system size and electoral institutions, taking a long-term perspective regarding their relationship, and utilizing a simultaneous equations approach to examine how each affects the other. More specifically, I expect that: (1) the effects of changes in electoral institutions on party system size will occur in the short-run, but also over the long-run, and (2) one-directional changes in party system size and disproportionality that accumulate over time will drive electoral rule changes. I draw on data from 23 established democracies from 1945 to 2010 to evaluate these propositions, employing a form of Seemingly-Unrelated-Regression (SUR) that simultaneously estimates three equations: a model of changes toward more permissive electoral rules, a model of changes toward stronger electoral rules, and a model of changes in party system size. The findings support most of the expectations. Electoral rule changes are found to have both short and long term effects on party system size, while one-directional changes in party system size that accumulate over time appear to be followed by changes in electoral rules that reinforce these trends. I find disproportionality, however, to have inconsistent effects on electoral rule changes.

The paper proceeds as follows. In the next two sections, I review what we know about the relationship between electoral institutions and party system size. In section four I develop precise expectations about both directions of the relationship between party system size and electoral institutions. Section five discusses the data and measurements used in the analysis. In section six I build and estimate models of changes in electoral rules for 23 democracies from 1945-2010 using a form of SUR. Section seven discusses the findings and the implications for scholarship on party system size and electoral reform. The final section discusses the general conclusions of the study.

II. The Effects of Electoral Systems on Party Systems

Institutional approaches to the study of party system size depict electoral rules as constraints on the number of electorally viable political parties. Scholarship in this vein has drawn on Duverger's (1954) "law" that single-member-district plurality (SMD-p) methods of election tend to produce two-party systems, as well as his "hypothesis" that proportional representation (PR) systems promote multiparty systems, to examine cross-national differences in party system size. This body of work has progressed beyond Duverger's initial propositions to identify and analyze the precise causal mechanisms that drive the effects of electoral rules on party system size (Rae 1967; Riker 1982; Lijphart 1994; Ordeshook and Shvetsova 1994; Neto and Cox 1997; Cox 1997; Clark and Golder 2006; Singer and Stephenson 2009). As a result, we have a fairly solid understanding of how and why electoral rules affect the size of the party system (Shugart 2005).

According to Duverger, the tendency for SMD-p systems to produce two major parties is a result of mechanical and psychological effects of the electoral system. The core ideas behind these two types of effects have since been elaborated upon and extended beyond SMD-p systems to all types of electoral rules. The mechanical effects of electoral rules occur as votes are translated into legislative seats. The more disproportionate the vote-to-seat translation is, the smaller the number of parties that receive representation in the legislature. Thus, any aspect of the electoral system that affects the proportionality of the vote-to-seat translation will also affect legislative party system size. Although district magnitude – the number of legislators elected per electoral district – is often regarded as the central electoral system characteristic in this regard, other electoral system attributes such as the electoral formula, the threshold of representation, and the number of seats distributed at an upper electoral tier are also known to exert mechanical

effects on the number of parties receiving legislative representation (Taagepera and Shugart 1989; Gallagher 1991, 1992; Lijphart 1994; Elklit and Roberts 1996; Benoit 2000).

Duverger's psychological effect comes into play when voters, parties, candidates, and other political actors perceive the mechanical effects of electoral systems and adjust their behavior accordingly. Voters perceive which parties stand the best chance at winning seats in the legislature and choose their most preferred option from this set of viable parties. Conversely, voters (along with aspiring candidates and party donors) will desert parties that stand little chance of winning representation so as to not waste their votes. Parties themselves may drop out of existence or merge with larger parties when they cannot breach the threshold of legislative representation. Thus, over time the number of parties receiving votes should come to approximate the numbers of parties receiving seats, making the mechanical effects of the electoral system less apparent (Shugart 1992; Benoit 2002; Best 2010, 2012).

Duverger's description of the psychological effect was used to explain why SMD-p systems tended to produce two party systems (Duverger 1954). With one available seat in the district, political actors would desert all but the two most viable contenders. This propensity for voters and political elites to behave strategically in response to the mechanical effects of the electoral system has been extended to PR systems most notably by Cox (1997), whose "M+1 rule" holds that no more than one plus the number of candidates elected in the district ($M =$ district magnitude) can be viable contenders for a legislative seat, thus making $M+1$ an effective upper bound on the number of viable political parties in the district. Similar to examinations of the mechanical effects, research on these strategic constraints has tended to focus on district magnitude, although any electoral rule that has a mechanical effect is capable of generating

incentives to behave strategically. Electoral thresholds, upper tiers, and electoral formulas have all been linked to evidence of strategic behavior (Benoit 2001; Hooghe et al. 2005; Best 2012).

The literature on electoral systems and the constraints they impose on party systems is now relatively mature (see Shugart 2005). We can expect “permissive” electoral institutions that encourage proportional vote-to-seat translations (e.g. large district magnitudes, low national thresholds of representation, compensatory upper tiers, and proportional formulas) to encourage higher numbers of parties, and “strong” electoral institutions that produce severe disproportionalities in the vote-to-seat translation (e.g. low district magnitudes, high thresholds of representation, plurality and majority formulas) to result in lower numbers of political parties. However, few scholars employing an institutional approach to party system size have given serious consideration to the potential for the relationship to work the other way around; that is, for party system size to affect the type and properties of the electoral system. Upon closer inspection, it is apparent that this is mostly a consequence of research design. While most scholarship has focused on explaining cross-national differences in party system size under relatively static electoral rules, the bidirectional relationship between electoral and party systems can only be examined by observing how they ebb and flow in response to one another over time. As a result, scholarship that takes a dynamic approach to the study of party system and electoral rules tends to give more explicit attention to both sides of this relationship (Shugart 1992; Colomer 2005; Remmer 2008; Best 2012).

III. The Effects of Party Systems on Electoral Systems

At least as far back as Grumm (1958), scholars have argued that the adoption of electoral rules is shaped by the preexisting configuration of political parties. Accounts of switches from

majoritarian to proportional electoral systems in Western democracies such as Rokkan's (1970) and Boix's (1999) commonly depict electoral systems as the products of choices made by ruling political parties faced with unprecedented electoral upheaval. In a similar line of research, Colomer's (2005) analysis finds that increases in party system size commonly preceded large changes from majoritarian to proportional systems.

Recently, there has been a flurry of research on electoral reform in response to the large electoral rule changes in Italy, Japan, and New Zealand, the democratization and electoral choices of Eastern and Central European countries, and growing talk of electoral reform in the plurality systems of Canada and the United Kingdom (see, for example, the recent 2011 special issue of *West European Politics* 33(4) devoted to the topic, as well as Dunleavy and Margetts 1995; Norris 1997; Birch 2003; Colomer 2004; Gallagher and Mitchell 2005; Blais 2008). This burgeoning body of work has highlighted the incredible diversity of both the types and the causes of electoral reform (see Katz 2005; Benoit 2007; Jacobs and Leyenaar 2011; Renwick 2011). Although a multitude of factors have now been shown to affect electoral reform, party systems continue to play a significant explanatory role.

Among the many accounts of the roles played by political parties in electoral reforms are those that specifically reference changes in party system size and fragmentation as precipitating factors of electoral rule changes (Shugart 1992; Dunleavy and Margetts 1995; Colomer 1995; Remmer 2008). The supporting argument in this line of research is that changes in party system size increase the uncertainty and risk surrounding elections for parties in power, and shape the power and influence of minor parties that may favor more permissive electoral rules. Consequently, parties in power will tend to reshape electoral rules to better suit prevailing electoral trends. To lend empirical support to the argument, we often observe party system size

increasing or decreasing at least a couple of elections prior to major changes in electoral rules that reinforce these trends (Shugart 1992; Colomer 2005; Remmer 2008; Best 2012).

In addition, changes in the electoral party system that are not reflected in the legislature may initiate electoral reforms by generating popular discontent. Renwick (2011) identifies five categories of citizen/elite involvement in electoral system change (p. 457). Although it is most common for elites to impose electoral system changes without regard to citizen preferences, he finds that reforms that involve interactions between elites and citizens are becoming increasingly common in established democracies. As disproportionalities in vote-to-seat translations grow, so may the discontent of citizens who support electoral reform.

IV. Putting it Together: Party System Size and Electoral Reform

The above discussion leads to straightforward propositions about how party system size should respond to changes in electoral institutions. Shifts to more permissive institutions – those that decrease disproportionality in the vote-to-seat translation – should facilitate increases in party system size, while shifts to stronger institutions – those that increase disproportionality should lead to declines in party system size. The full effects of these changes are likely to fully manifest themselves slowly over subsequent elections, as voters and elites gather information about the new rules and adjust their behavior accordingly (Shugart 1992; Tavits and Annus 2006; Best 2010, 2012).

Formulating propositions about how party system size is likely to affect changes in electoral systems is more complicated and requires careful consideration of differences between shifts toward more permissive or stronger electoral institutions. While scholarship tends to treat shifts toward permissive and strong institutions as two sides of the same coin, different aspects of party system size are likely to come into play depending on the direction of the shift. Shifts

toward more permissive electoral rules are likely to occur when electoral party system size has been on the rise, but legislative party system size has not. If the increases in electoral party system size were matched with corresponding increases in legislative party system size, then there would be no incentive to switch to more permissive electoral rules. The current electoral institutions would already be permissive enough to accommodate these changes. Thus, shifts toward more permissive electoral rules should be affected only by increases in electoral party system size that produce greater disproportionality in the vote-to-seat translation.

Shifts toward stronger electoral rules may be associated with changes in party system size in at least one of two ways. Firstly, there is some suggestion in the literature that shifts toward stronger electoral institutions reinforce prevailing trends, meaning that these shifts are responses to declines in party system size (Shugart 1992; Remmer 2008). If this is the case, then declines in both electoral and legislative party system size should increase the probability of observing shifts toward stronger electoral rules. However, one may also expect stronger electoral rules to be imposed in party systems that have become too fragmented, as a way of limiting the numbers of parties that gain access to the legislature (for instance, see Hooghe et al. 2005). If this motivation underlies shifts toward stronger rules, then increases in only legislative, not electoral, party system size should drive these changes. Since legislative party system size is important in both sets of expectations, I focus on this measure of party system size in the analyses of strong rule changes.

There is also likely to be a long-term component regarding the effects of party system size on electoral rules. Cross-national literature on changes in electoral rules often includes only

very recent changes in party system size in the analyses (e.g. Remmer 2008).¹ Shifts toward more permissive electoral rules, however, are unlikely to occur in response to one highly disproportional election outcome. Rather, they are likely to occur when disproportionalities occur on a regular basis and can be expected to occur in the future. Thus, we can expect electoral rule changes to occur in response to cumulative or enduring changes in party system size, rather than in response to short-term changes in party system size.

Finally, we might expect the effects of party system size on electoral rules to be more tenuous and contingent than those of electoral rules on party system size. Parties (and voters) do not have any choice about working within the confines of electoral rules. Electoral rules define the incentives for party formation and voting behavior and, consequently, cannot be avoided. However, political actors can avoid changing the electoral system. Changes in party system size may create the necessary incentives to undertake electoral reform, but whether such reform occurs depends on a multitude of other factors including the expectations of political elites, the rules regarding rule changes, or any number of idiosyncratic factors (Benoit 2007). Thus, we may expect the effects of electoral rules on party system size to be more predictable and consistent than the effects of party system size on electoral rule changes.

V. Data and Measurement

I draw on data from 23 established democracies from 1945-2010 to test these expectations about the relationship between electoral institutions and party system size.² There are some challenges

¹ Accounts of electoral rule changes in single countries, however, commonly stress overall trends in party system size and disproportionality as important influences.

² The democracies are: Australia, Austria, Belgium, Canada, Denmark, Finland, France, Germany, Great Britain, Iceland, Ireland, Israel, Italy, Japan, Luxembourg, Malta, the Netherlands, New Zealand, Norway, Portugal, Spain, Sweden and Switzerland. Data on party

in generating variables that accurately represent the complexity of electoral rules. Many aspects of the electoral system affect the disproportionality of the vote-to-seat translation, such as district magnitude, the electoral formula, electoral thresholds, assembly size and distributions of seats by an upper tier. Here, I rely on two summary measures of electoral rules that roughly capture the difficulty of winning a seat in the legislature. The first of these measures is what I will refer to as adjusted district magnitude. This variable equals average district magnitude (assembly size/number of districts) for systems without a decisive upper tier and assembly size for systems with a decisive and compensatory upper tier. A decisive and compensatory upper tier is one that has enough seats to distribute to make the overall outcome of the vote-to-seat translation highly proportional and independent from the district magnitude of the lower tier. I follow the formula described by Gallagher and Mitchell (2005), and deem an upper tier to be decisive if the proportion of seats allocated by the upper tier is equal to or greater than $1/(2M+1)$, where M is the average district magnitude.³ Following the literature in this area, I take the natural log of the adjusted average district magnitude.⁴

vote shares, party seat shares, assembly size, district magnitude, the number of districts, the percentage of upper tier seats, and legal thresholds were compiled from Mackie and Rose (1991), Caramani (2000), Grofman and Lijphart (2002), Golder (2005), the ACE project at <http://aceproject.org> (see also the International Institute for Democracy and Electoral Assistance at www.idea.int), the Inter-Parliamentary Union (IPU) at <http://www.ipu.org/>, Adam Carr's election website, the *Political Handbook of the World*, as well as various official election websites, issues of the *European Journal of Political Research* and *Electoral Studies*.

³ In some cases, the exact number of upper tier seats is missing from the available data and inferences were made about whether the percentage of upper tier seats exceeded the necessary threshold to be decisive by drawing on imprecise accounts of this number (e.g. roughly a third of Belgium's seats were distributed by an upper tier for most of the post-WWII era, although the exact number is unavailable) or by inferring the approximate number of upper tier seats from other election years when the same electoral system was employed. These inferences were only made for a few unambiguous cases. The inferred number of upper tier seats was always significantly above or below the decisive percentage.

⁴ For ease of exposition, I simply refer to "adjusted district magnitude."

The second summary variable is the effective nationwide threshold of representation, which taps the difficulty of winning a legislative seat more directly. A threshold of representation captures the vote percentage necessary to win a seat in the national legislature. Sometimes this threshold is specified by electoral law, but in the absence of a legal threshold, the “effective” threshold can be estimated using information about the other elements of the electoral system. Typically, scholars have estimated the effective threshold using Lijphart’s (1994) formula that relies on district magnitude. However, Taagepera has shown that this captures the effective threshold per district, not the effective threshold for winning a seat nationally. He calculates the nationwide effective threshold as the vote percentage at which a party has a 50-50 chance of winning a seat, formally as $T=75/[(M+1)(S/M)^{0.5}]$ where M is the district magnitude and S is assembly size (Taagepera 2002). I use this equation to calculate the effective nationwide threshold when there is no legal threshold of representation. Otherwise, the effective nationwide threshold equals the formal legal threshold for national representation.

The calculations of both adjusted district magnitude and the nationwide effective threshold capture very small changes in assembly size and the number of districts, raising the question of what exactly constitutes a “change” in electoral rules. For instance, should a change in adjusted district magnitude of 4 to 4.1 be treated the same as a change from 4 to 10? Following Lijphart (1994) only changes of 20 percent or greater in the adjusted district magnitude or the nationwide effective threshold are treated as changes in electoral rules. The dependent variables in the following analyses record whether there was a change (“1”) or not (“0”) in electoral rules. Changes toward permissive and strong rules are analyzed separately.⁵

⁵ In all, there are 18 changes in adjusted district magnitude of 20% or greater. Ten of these changes are increases and eight are decreases. There are 22 recorded changes in the nationwide effective threshold, 13 of which are decreases and nine are increases.

Party system size is measured using two calculations of the effective number of parties (Laakso and Taagepera 1979). The first calculation of the effective number of parties uses party vote shares (ENP-Votes) and represents electoral party system size, while the second uses party seat shares (ENP-Seats) and represents legislative party system size. Since electoral rule changes are expected to occur in response to disproportionalities in the vote-to-seat translation, I also employ Gallagher's least squares index of disproportionality (Gallagher 1991). In addition to calculating changes in the effective number of parties and disproportionality, I also calculate the cumulative changes in these variables over time, in order to capture general patterns of increases or decreases that have occurred since the last electoral rule change.

VI. Analysis

Following the discussion above, shifts toward more permissive electoral rules are estimated as a function of electoral party system size in the last election, the lagged change in electoral party system size, and the cumulative change in electoral party system size since the last change in electoral rules, as well as the lagged level, change, and cumulative change in disproportionality. The full equation is presented in Equation 1, where the dependent variable takes a value of one if there has been a shift toward more permissive institutions and zero otherwise. Shifts toward stronger electoral rules are estimated in a similar manner with the lagged level, change, and cumulative change in legislative party system size and disproportionality, as in Equation 2.

$$\text{Eq. 1} \quad \text{Permissive} = \alpha + \beta_1(\text{ENP-Votes}_{t-1}) + \beta_2(\Delta\text{ENP-Votes}_{t-1}) + \beta_3(\text{Cumulative}\Delta\text{ENP-Votes}) + \beta_4(\text{Dispro}_{t-1}) + \beta_5(\Delta\text{Dispro}_{t-1}) + \beta_6(\text{Cumulative}\Delta\text{Dispro}) + e$$

$$\text{Eq. 2} \quad \text{Strong} = \alpha + \beta_1(\text{ENP-Seats}_{t-1}) + \beta_2(\Delta\text{ENP-Seats}_{t-1}) + \beta_3(\text{Cumulative}\Delta\text{ENP-Seats}) + \beta_4(\text{Dispro}_{t-1}) + \beta_5(\Delta\text{Dispro}_{t-1}) + \beta_6(\text{Cumulative}\Delta\text{Dispro}) + e$$

Regarding the effects of changes in electoral institutions on party system size, the error-correction model presented as Equation 3 below will provide estimates of both the short and long term dynamics of this relationship.

$$\text{Eq.3 } \Delta \text{ENP-Votes}_t = \alpha + \beta_1(\Delta \text{Adj.DM}_t) + \beta_2(\Delta \text{NatThresh}_t) + \beta_3(\text{ENP-Votes}_{t-1}) + \beta_4(\text{Adj.DM}_{t-1}) + \beta_5(\Delta \text{NatThresh}_{t-1}) + e$$

In Equation 3, β_1 and β_2 will estimate the immediate effects of changes in district magnitude and the nationwide threshold, β_3 will estimate the speed at which ENP-Votes returns to equilibrium after a change, and dividing β_4 or β_5 by the speed of error correction (β_3) will give us the total long-term effect of one-unit change in district magnitude or the nationwide threshold on electoral party system size (see DeBoef and Keele 2006).

Although none of the dependent variables in any of these equations appear directly as independent variables in others⁶, all three of these equations are related in obvious ways. There is a natural sequence of events, where a change in party system size produces a change in electoral institutions, which then produce subsequent changes in party system size. Furthermore, all three rely on the same data and are motivated by the same underlying processes: the behavior of voters and parties. In statistical terms, this implies that the error terms of the equations are likely to be correlated, and that all three of these equations should be estimated simultaneously. I do so by employing a form of Seemingly-Unrelated-Regressions (SUR).⁷ The SUR estimates explicitly model the correlations in the error terms of the equations that are likely to occur when multiple outcomes are motivated by the same processes. Table 1 reports the SUR estimates with

⁶ This is true only in a technical sense, since the change in the institutional variables are included in Equation 3 in continuous form and the lagged change in ENP-Votes is included in both Equations 1 and 2.

⁷ I use the CMP user-written Stata package to produce the estimates, which allows one to employ model specifications for both binary and continuous dependent variables; see Roodman (2011).

changes in adjusted district magnitude as the dependent variable in Equations 1 and 2, and changes in ENP-Votes as the dependent variable in Equation 3.

[Table 1 about here]

Taking Equation 3 first, the negative and significant coefficient for the lagged ENP-Votes variable signals an error-correction process, where deviations from the equilibrium ENP-Votes are corrected over time. However, the rate of error-correction in the model appears to be quite slow, at about ten percent of the deviation per election. The estimated coefficients on the lagged levels of the institutional variables are in the expected directions and statistically significant, but on their own these coefficients tell us only about the effect of adjusted district magnitude and the nationwide threshold on party system size at time $t+1$. When divided by the rate of error correction, they tell us the total long-term effect of these variables on ENP-Votes, which is distributed over future elections at the rate determined by the error-correction mechanism. The total long-run effect is estimated here to be approximately 0.4 for district magnitude and -0.5 for the nationwide threshold. These estimates are in the expected directions, with increases in district magnitude and decreases in the nationwide threshold associated with increases in ENP-Votes, and are statistically significant.⁸ However, given the slow estimated rate of error-correction, the substantive long-term effects of the institutional variables on changes in party system size are not likely to be fully realized until the distant future, if at all. The most apparent effects are observed in the current and subsequent elections. The coefficient on the change in district magnitude is positive and significant, suggesting that an increase in district magnitude produces an immediate and substantial increase in electoral party system size. Similarly, an

⁸ The long-term effect of adjusted district magnitude is significant at a 90% confidence level, while the long-term effect of the nationwide effective threshold is significant at the 95% level. These estimates of the significance levels were obtained through a separate instrumental variable equation.

increase in the nationwide effective threshold is negatively and significantly related to changes in electoral party system size, producing significant effects that occur immediately. Changes in electoral institutions, then, do have the expected effects on electoral party system size, with much of this effect occurring within a couple of elections.

Turning attention to the estimates of Equation 1, the lagged level of ENP-Votes is significantly associated with decreases in the likelihood of observing a change to a more permissive adjusted district magnitude. This is in the opposite direction than expected, suggesting larger party systems are less likely to witness changes to more permissive electoral rules. As this coefficient is likely tapping into cross-national differences in party system size, it may simply be revealing the tendency for countries with larger party systems to already possess permissive electoral rules. The variables capturing changes in party system size are therefore of greater interest. The lagged change in ENP-Votes is not a significant predictor of the likelihood of observing an increase in adjusted district magnitude, but the cumulative change in ENP-Votes is a positive and significant predictor of observing such an increase. These findings suggest that it is not the changes in party system size that occur in the previous election that matter, but how these changes accumulate over time. The more increases in party system size accumulate, the more likely we are to observe a change toward a larger adjusted district magnitude. In other words, it appears to be long-term, rather than short-term, changes in party system size that produce changes in electoral rules.

The findings are mixed regarding the effects of disproportionality on changes to more permissive district magnitudes. The estimated coefficient on the lagged level of disproportionality is statistically significant, suggesting that higher levels of disproportionality are positively associated with changes toward more permissive district magnitudes. This is in

line with expectations that growing disproportionality will pressure elites to adopt more permissive electoral rules. However, the cumulative change in disproportionality is negative and significant, suggesting that the more disproportionality grows over time the less likely it is that we observe a switch toward more permissive rules.

The estimates of Equation 2 reveal mixed relationships between legislative party system size and switches to stronger electoral rules. On the one hand, the positive and significant coefficient for the lagged change in ENP-Seats suggests that large increases in legislative party system size are associated with almost immediate reductions in adjusted district magnitude. On the other hand, the negative and significant coefficient for the cumulative change in ENP-Seats suggests that as increases in legislative party system size accumulate over time, the less likely we are to observe shifts toward stronger electoral rules. These conflicting results may be due in part to the fact that ENP-Seats is included in the calculation of the cumulative change in ENP-Seats. To tease out the independent effects of both of the change variables, the models were re-estimated omitting one at a time (results not shown). The coefficient for cumulative change in ENP-Seats remained negative and statistically significant after omitting the lagged change in ENP-Seats. In contrast, the coefficient on the lagged change in ENP-Seats reversed direction and became insignificant without the cumulative change in the model. Thus, the cumulative change in ENP-Seats appears to be more important in shaping the incentives to switch toward stronger district magnitudes. The findings regarding disproportionality and changes toward stronger district magnitudes run counter to expectations, similar to of Equation 1. Larger levels of disproportionality are associated with an increased likelihood of observing changes to stronger rules.

Judging by the results presented in Table 1, cumulative changes in party system size appear to be consistent and significant influences on changes in adjusted district magnitude. However, the substantive effects of these variables are difficult to ascertain from the coefficients alone. Figure 1 plots the predicted probabilities of observing both permissive and strong changes in adjusted district magnitude, along with 95 percent confidence intervals, for cumulative changes in party system size ranging from -2 (a total decline of two in the effective number of parties since the last change in district magnitude) to +2 (a total increase of two in the effective number of parties since the last change in district magnitude), holding all other variables constant at their means.⁹ Regarding permissive changes in adjusted district magnitude, only cumulatively positive changes have a significant effect. As increases in electoral party system size accumulate from zero to two, the probability of observing a shift toward a more permissive adjusted district magnitude increases by over 0.2; however, cumulative declines in party system size do not appear to have any significant effect. In contrast, both cumulative increases and decreases in legislative party system size appear to affect the probability of observing changes toward stronger district magnitudes. Cumulative declines in legislative party system size are associated with relatively high probabilities of observing changes in district magnitude. These probabilities decline as the cumulative change switches from overall declines to overall increases.

[Figure 1 about here]

Finally, the estimated correlations between the error terms of the three equations in Table 1 reveal significant correlations between all three pairs of equations. Thus, estimating these equations simultaneously appears to have led to gains in efficiency that would not be had if they were estimated separately.

⁹ The cumulative change in ENP-Votes ranges from -2.5 to 6.9, while the cumulative change in ENP-seats ranges from -1.9 to 5.7.

Table 2 presents the estimates for the same set of equations using the nationwide effective threshold as the dependent variable in Equations 1 and 2. The estimates of Equation 3 share some similarities with the results presented in Table 1. The rate of error correction is again estimated to be quite slow with approximately 10 percent of the deviation corrected per election. The coefficients on the lagged levels of the institutional variables are in the expected directions and statistically significant, suggesting that a change in adjusted district magnitude or the nationwide effective threshold has a significant effect on party system size in the next election (at $t+1$) and a similar long-term effect as discussed in relation to Table 1. The short-term, immediate effects are also in the expected directions and statistically significant.

Regarding the effects of changes in party system size on changes in electoral rules, the results are similar but not identical to those for adjusted district magnitude. The lagged level in ENP-Votes and the lagged change in ENP-Votes are both significantly associated with a decrease in the likelihood of observing a switch to a lower threshold, while the coefficient on the cumulative change in ENP-Votes fails to reach statistical significance. When a change toward a stronger threshold is the dependent variable, lagged levels and lagged changes in ENP-Seats are positively associated with changes toward stronger thresholds, while the cumulative change in ENP-Seats is negatively associated with a switch to a stronger threshold. Again, when each coefficient is examined separately, the cumulative effect of changes in ENP-Seats is found to be more the more consistent predictor.

Regarding disproportionality, only the lagged level of disproportionality is a statistically significant predictor of changes toward stronger thresholds, but this effect appears to be in the opposite direction than what was expected. For the three equations presented in Table 2, only Equations 1 and 2 are observed as having significant correlations between the error terms.

VII. Discussion

The above analyses have produced several interesting findings. Firstly, changes in adjusted district magnitude and the effective nationwide threshold do have the expected effects on party system size, but their short-term effects are more convincing than their long-term effects, if only because of the very slow rate of error correction. This stands in rough contrast to previous findings that highlighted long-term effects (Best 2012) but may be in accordance with Shugart's observation that changes in electoral rules appear to produce changes in party system size that are realized after only a few elections (Shugart 1992).

Secondly, increases or decreases in party system size that accumulate over time often lead to electoral rule changes that reinforce these trends. In three out of the four sets of estimates, long-term increases in electoral party system size are associated with changes toward more permissive electoral rules, while long-term decreases in legislative party system size are associated with changes toward stronger electoral rules. Overall, the findings suggest that changes in party system size appear to have stronger and more consistent effects on electoral rule changes after they have accumulated over time to some kind of tipping point. This observation is roughly in line with Colomer's finding that majoritarian systems tend to switch toward more proportional electoral rules after party system size has increased to approximately four political parties (Colomer 2005), but is more general in the sense that it applies to subtle changes in electoral rules and works in the opposite direction as well. Generally, it is the long-term accumulation of changes party system size that appears to provide political elites with the necessary incentives to contemplate electoral rule changes.

Finally, the mixed results regarding disproportionality leave open many questions about the effect of disproportionality on electoral rule changes. The results suggest that higher levels of disproportionality are associated with all types of rule changes (permissive and strong), short-term changes in disproportionality are not associated with electoral rule changes at all, and long-term increases in disproportionality are negatively associated with changes toward more permissive district magnitudes. These inconsistent findings suggest that the relationship between disproportionality and electoral rules comes with contingencies and complications. Growing disproportionality might provide a good amount of pressure for electoral reform, but it may also prevent those with the incentives to undertake reforms – new, smaller and underrepresented parties – from obtaining the political power necessary implement reforms. The current debate about electoral reform (or the lack thereof) in Great Britain is a good example of how pressure to reform may coexist with a lack of reform when disproportionality is high. Changes in electoral rules are more likely to occur when the representatives of smaller and underrepresented parties most affected by disproportional vote-to-seat translations have some say in the political process. In terms of disproportionality, this may imply a greater propensity for electoral reform where substantial disproportionalities exist, but are not so great that small parties are entirely excluded from the legislature. This also suggests that we are less likely to observe electoral reform in strongly majoritarian or plurality systems, where disproportionality is quite high, and more likely to observe reform in moderately proportional systems. These claims are generally in line with much research on electoral reform, as well as the observably low frequency of electoral reform in majoritarian systems and the comparatively high frequency of electoral reform in more proportional systems.

VIII. Conclusion

While most scholarship recognizes, either explicitly or implicitly, that changes in party system size and electoral institutions are linked and arise from similar processes, few have given explicit theoretical and empirical attention to both sides of this relationship. The discussion and findings presented here have highlighted the theoretical underpinnings of both sides of the relationship between electoral systems and party system size, and demonstrated efficiency gains from using a simultaneous-equations approach. Moreover, the findings suggest that focusing on only the short-term influences on both party system size and electoral rule changes may cause one to miss important long-term effects. Scholarship on electoral reform has drawn a good amount of attention to the importance of future or expected effects of electoral rules on party system size. The results presented here not only support this general vision of electoral reform, but also suggest that such reforms often occur in response to long-term, cumulative changes in party system size. In light of this information, a complete account of electoral rule changes appears to require a long-run perspective that looks backward in time as well as forward.

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Figure 1 Cumulative Change in Party System Size and the Probability of a Change in District Magnitude

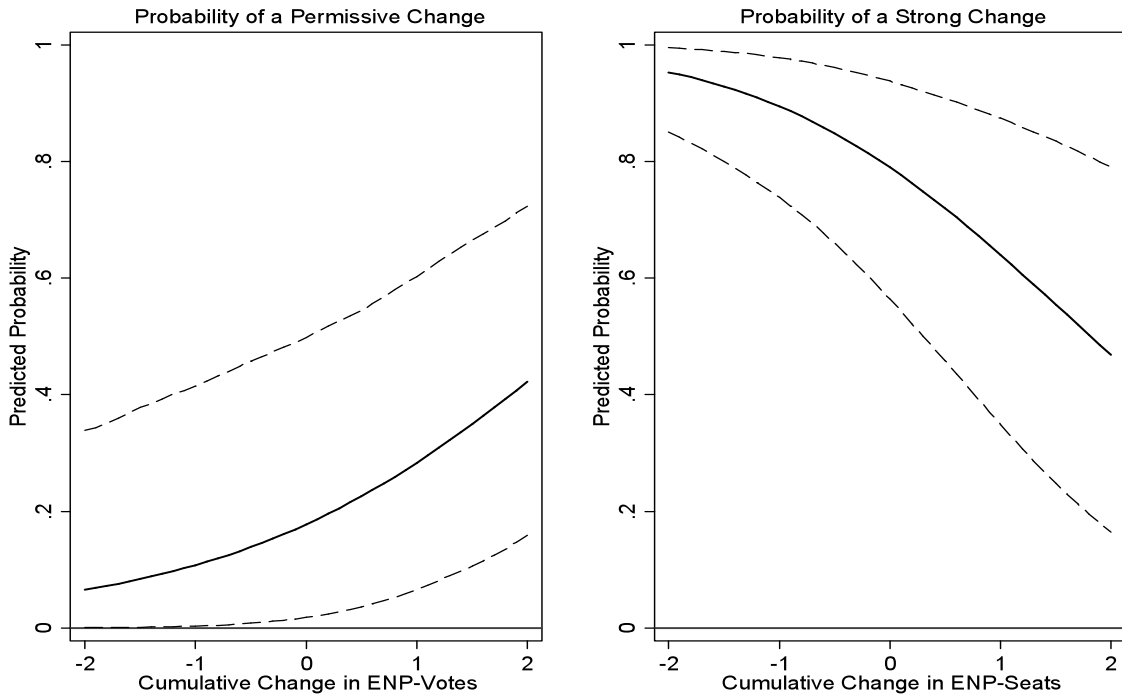


Table 1 Electoral Party System Size and Changes in District Magnitude in 23 Established Democracies

	Equation 1 DV: Switch to Higher Adj. District Magnitude	Equation 2 DV: Switch to Lower Adj. District Magnitude	Equation 3 DV: Δ ENP-Votes
ENP-Votes _{t-1}	-.31** (.13)		-.10** (.05)
Δ ENP-Votes _{t-1}	-.14 (.11)		
Cumulative Δ in ENP-Votes	.42** (.14)		
Disproportionality _{t-1}	.05* (.03)	.06** (.02)	
Δ Disproportionality _{t-1}	.04 (.03)	-.02 (.07)	
Cumulative Δ in Disproportionality	-.06** (.02)	-.03 (.03)	
ENP-Seats _{t-1}		.15 (.10)	
Δ ENP-Seats _{t-1}		.63** (.30)	
Cumulative Δ in ENP-Seats		-.47*** (.12)	
Δ Adj. District Magnitude			.52*** (.09)
Δ Nat. Effective Threshold			-.16* (.10)
Adjusted District Magnitude _{t-1}			.04*** (.01)
Nationwide Effective Threshold _{t-1}			-.05** (.02)
Constant	-1.12* (.61)	-3.20*** (.45)	.44** (.20)
N	386	386	409
Insig_3	-.35 *** (.10)		
Atanhrho_12	-1.14*** (.19)		
Atanhrho_13	-.88** (.31)		
Atanhrho_23	.44* (.23)		

Notes: Table entries are coefficients from Seemingly-Unrelated Regressions (SUR) with country-clustered standard errors in parentheses. The CMP package for Stata was used produce the maximum likelihood estimates for all equations, where the first two equations are specified as probit models and the third equation approximates OLS. Significance tests are two-tailed. *** $p \leq .001$, ** $p \leq .05$, * $p \leq .10$.

Table 2 Electoral Party System Size and Changes in the Nationwide Effective Threshold in 23 Established Democracies

	Equation 1 DV: Switch to Lower Nat. Eff. Threshold	Equation 2 DV: Switch to Higher Nat. Eff. Threshold	Equation 3 DV: ΔENP-Votes
ENP-Votes _{t-1}	-0.18* (.09)		-0.10** (.05)
Δ ENP-Votes _{t-1}	-0.41*** (.07)		
Cumulative Δ in ENP-Votes	.18 (.12)		
Disproportionality _{t-1}	-0.02 (.04)	.07* (.04)	
Δ Disproportionality _{t-1}	.04 (.05)	-0.04 (.05)	
Cumulative Δ in Disproportionality	-0.02 (.02)	-0.02 (.03)	
ENP-Seats _{t-1}		.27*** (.08)	
Δ ENP-Seats _{t-1}		.40* (.23)	
Cumulative Δ in ENP-Seats		-.31** (.12)	
Δ Adj. District Magnitude			.30** (.11)
Δ Nat. Effective Threshold			-.19* (.10)
Adjusted District Magnitude _{t-1}			.04*** (.01)
Nationwide Effective Threshold _{t-1}			-.06** (.02)
Constant	-1.32** (.43)	-3.68*** (.61)	.49** (.21)
N	386	386	409
Insig_3	.36*** (.10)		
Atanhrho_12	-.62** (.29)		
Atanhrho_13	-.24 (.26)		
Atanhrho_23	.10 (.19)		

Notes: Table entries are coefficients from Seemingly-Unrelated Regressions (SUR) with country-clustered standard errors in parentheses. The CMP package for Stata was used produce the maximum likelihood estimates for all equations, where the first two equations are specified as probit models and the third equation approximates OLS. Significance tests are two-tailed. *** $p \leq .001$, ** $p \leq .05$, * $p \leq .10$.