

The long and the short of it: Electoral institutions and the dynamics of party system size, 1950–2005

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Abstract. While institutional theories of party system size are usually examined cross-nationally, there is ample reason to expect that changes in electoral institutions will affect party system size within countries as well. Although some of this effect may occur immediately, most of the effects are likely to be realised over time and across subsequent elections. A series of error-correction models examine the short- and long-term effects of changes in electoral institutions on party system size. The results indicate that changes in electoral institutions do produce the expected effects on party system size, and that these effects occur mostly over the long term.

Keywords: electoral system; electoral institutions; party system size; error-correction model

Institutional theories posit a strong relationship between the electoral institutions in a country and the size of the party system. To date, there has been no shortage of evidence for this claim (e.g., Cox 1997; Duverger 1963[1954]; Golder & Clark 2006; Lijphart 1994; Neto & Cox 1997; Ordeshook & Shvetsova 1994; Rae 1967; Singer & Stephenson 2009; Taagepera & Shugart 1989). Cross-national differences in party system size are often explained by variations in electoral institutions such as district magnitude, ballot structure or electoral formula. And once in a while, a country's switch from one electoral system to another, such as New Zealand's switch from a single-member-district plurality (SMD-p) system to a mixed-member proportional (MMP) system, gives researchers the opportunity to explore the effects of institutional changes within a single country (e.g., Johnston & Pattie 2002; Vowles 1995). Yet despite the wealth of attention devoted to the relationship between electoral institutions and the size of the party system, we know relatively little about how party system size ebbs and flows in response to within-country changes in electoral institutions (but see Colomer 2005; Remmer 2008). In short, we know relatively little about the dynamics of the relationship between electoral institutions and party system size.

Radical changes from one electoral system to another are rare among Western democracies, but this is not to say that electoral institutions do not

change.¹ They do. Countries employing a proportional representation system may alter their district magnitude, modify the allocation of legislative seats with the introduction of an upper tier, raise or lower the electoral threshold for representation, or change their electoral formula. Modifications of electoral laws may have fleeting or long-lasting effects on the size of the party system, depending on the nature of these changes and the responses of political actors.

There is even more to be said about the dynamic relationship between electoral laws and party system size in terms of timing. One might expect a change in a country's district magnitude, for example, to have an effect on the size of the party system. But would we expect this effect to occur in the next election? Or would we expect the effect to occur slowly, over several elections, as voters and parties adjust to the new district magnitude? Cross-national studies of party system size, even those that employ time-series data, commonly overlook the possibility that changes in institutions might produce changes in party system size that are only fully realised after several – or many – elections (but see Tavits & Annus 2006).

The primary contribution of the current project is to both explain and analyse the short- and long-term effects of electoral institutions on party system size. In doing so, I demonstrate that the relationship between electoral institutions and party system size is dynamic and requires a cross-time perspective. By exploring this dynamic relationship, this project also presents new evidence in support of the effect of (changes in) electoral institutions on (changes in) party system size. I begin by elucidating the specific relationships between electoral institutions and party system size. This requires distinguishing between the number of parties that receive votes in an election (electoral party system size) and the number of parties that receive legislative representation (legislative party system size). Furthermore, I consider the expected direct and indirect effects of institutional changes on party system size and ask whether we should expect these effects to occur immediately or over the long term. Much of the relationship between electoral institutions and party system size is dependent on the strategic actions of voters and parties. This leads to the expectation that changes in a country's electoral institutions will produce changes in party system size that take more than one election to be fully realised.

Using data from ten Western democracies, I estimate a series of error correction models that capture the short- and long-term dynamics of party system size. The results indicate that changes in electoral institutions do produce the expected changes in party system size, and that these changes in party system size are distributed across future elections. Furthermore, the effects of electoral institutions on electoral party system size appear to work only indirectly through legislative party system size. Because the few studies of

electoral institutions and party system size that examine this relationship over time, such as Remmer's (2008) analysis of 18 Latin American democracies, argue that the direction of causality flows in the opposite direction – that is, from party system size to changes in electoral institutions – I devote the last section to consideration of the likely causal direction.

Electoral institutions and party system size

The relationship between electoral laws and party system size is documented by a long tradition of research (Cox 1997; Duverger 1963[1954]; Golder & Clark 2006; Lijphart 1994; Neto & Cox 1997; Ordeshook & Shvetsova 1994; Rae 1967; Taagepera & Shugart 1989), which posits the more restrictive the electoral system, the smaller the size of the party system, where the restrictiveness of the electoral system is determined by the (dis)proportionality of the vote-to-seat translation. Consequently, the factors affecting the proportionality of the vote-to-seat translation, such as district magnitude, an upper electoral tier and the electoral threshold will determine the constraints placed upon the size of the party system.

The basic logic behind the constraints imposed by electoral institutions can be traced to Duverger (1963[1954]), whose propositions that single-member-district plurality (SMD-p) systems constrain the size of the party system to equal two, while proportional representation (PR) systems allow for greater numbers of political parties, have been generalised to apply to a range of electoral systems (e.g. Cox 1997). According to Duverger, SMD-p systems constrain the size of the party system through mechanical and psychological effects. In terms of mechanical effects, the winner-take-all nature of SMD-p systems results in a disproportional translation of votes into seats, preventing small parties from achieving legislative representation and leaving only two parties or candidates as viable contenders for the district seat. The psychological effect results from the perception of this mechanical effect by voters and parties. Voters will not want to waste their votes on parties that stand little chance of winning representation. Therefore, voters will vote strategically for one of the larger parties and desert their preferred smaller parties under SMD-p rules. A similar logic applies to smaller parties and potential candidates, who will drop out of the race, or else join with larger parties in order to maximise their chances of obtaining office.

As no electoral system has a perfectly proportional translation of votes into seats, the basic logic of the mechanical and psychological effects applies to other electoral systems as well. District magnitude (Cox 1997; Gallagher 1991; Taagepera & Shugart 1989), electoral allocation rules (Benoit 2000) and

electoral thresholds (Gallagher 1992) can all produce disproportionality and, therefore, pose mechanical barriers to smaller parties seeking legislative representation. As in SMD-p systems, voters and political elites should behave strategically by anticipating the mechanical effects of these electoral institutions and adjusting their behaviour accordingly (Cox 1997).

Institutional theories of party system size thus give us a straightforward proposition about electoral institutions and party system size: the more disproportional the mechanical effects of electoral systems, the stronger the incentives for voters and parties to behave strategically, and the smaller party system size should be (e.g., Cox 1997; Cox & Shugart 1996; Duverger 1963[1954]).² When representational prospects look bleak due to mechanical barriers to representation, political parties should either fail to emerge or should merge with larger parties (e.g., Hooghe et al. 2005) and voters should cast their ballots for less-preferred, but larger political parties. This basic expectation, straightforward and intuitive as it is, masks a more complicated relationship between electoral institutions and party system size. Specifically, the effect of electoral institutions on party system size contains both direct and indirect components. And party system size can be measured at two different levels: at the electoral level, in terms of the number of parties receiving votes; and at the legislative level, in terms of the number of parties receiving seats.

Electoral institutions have a direct effect on legislative party system size by determining how votes will translate into legislative seats. This effect is quite clear and is commonly referred to as the 'mechanical effect'. Electoral institutions also constrain the size of the party system at the electoral level, but their effects in this case are only indirect and contingent on the accurate perceptions and strategic actions of voters and parties. Voters and political elites are expected to perceive the mechanical effects of electoral institutions and adjust their behaviour accordingly. Both voters and candidates are expected to desert parties that they anticipate will be unrepresented in the legislature. Strategically minded voters and politicians will, therefore, anticipate the mechanical effects of electoral institutions and adjust their behaviour so that they support only parties with a reasonable chance of being represented through the country's electoral institutions (e.g., Cox 1997).

It is the strategic behaviour of voters and politicians that allows us to formulate expectations about the relationship between electoral institutions and party system size at the electoral level (Singer & Stephenson 2009). Perceptions of mechanical effects by voters and parties will constrain party system size at the electoral level in a way that is similar to the constraints imposed at the legislative level. However, it is legislative party system size itself, rather than the electoral institutions, that has the most direct relationship with electoral party system size. If voters and parties are able to perceive or

predict the likely mechanical effects of electoral institutions accurately, then we should observe party system size at the electoral and legislative levels maintain a long-term one-to-one equilibrium relationship (see Best 2010).³ Changes in electoral institutions are likely to disrupt this equilibrium, but the disruption should be temporary. When a given vote distribution produces a disproportional vote-to-seat translation, voters and parties should respond by deserting weaker parties and supporting stronger parties. In time, the strategic actions of voters and parties should produce an electoral party system that closely resembles the legislative party system.⁴ Thus, over the long term, electoral and legislative party system size should move together in an equilibrium relationship.

Specific predictions about how changes in electoral institutions are likely to affect party system size at both the electoral and legislative levels follow directly from this discussion. Changes that increase disproportionality and restrict the number of parties receiving legislative representation should decrease legislative party system size. Conversely, changes that increase proportionality and relax restrictions on the number of parties receiving legislative representation should increase legislative party system size.⁵ These changes in legislative party system size should then feed back into electoral party system size, since voters and parties will strategically adjust to the new rules. Thus, changes in electoral institutions should also affect electoral party system size via their effects on legislative party system size.

The timing of change

Most examinations of the relationship between electoral institutions and party system size analyse the relationship cross-nationally. However, the discussion presented above about the likely effects of institutions on party system size makes it clear that many of the effects of institutional changes will be indirect and, consequently, more likely to be distributed over future elections. The effect of electoral institutions on party system size is driven by the perceptions or anticipations of the mechanical effects by political actors and the strategic behaviour that results from these anticipated effects. Political actors are better equipped to behave strategically if they have information about the likely effects of the new rules and more experience with the electoral system (Johnston & Pattie 2002; Tavits & Annus 2006). Thus, we would expect any changes in party system size that occur after a change in electoral institutions to take some time to become fully realised, as political actors gain information about party fortunes under the new rules.

If our expectations of the relationship between institutions and party system size are correct, then electoral party system size should roughly reflect legislative party system size due to the strategic anticipation of the mechanical effects of electoral institutions. Should the electoral institutions change in a way that allows for more parties to receive more proportional representation in the legislature, some of the effect may be witnessed immediately, as votes are translated into seats in a more proportional manner. However, much of the effect is likely to be distributed over future elections, as the electoral party system responds to the new potentials for legislative representation. Perhaps aspiring politicians will form new parties, or voters will learn that they can now support smaller parties without wasting their votes. These changes are likely to take at least an election or two to occur as voters and political elites gain experience and information under the new rules and organise accordingly.

Just as the effect of changes of institutions on legislative party system size is likely to be distributed over future elections, the indirect effects of these changes on electoral party system size are likely to occur over future elections as well, as the first election under the new rules will be the best source of information about how the rules will affect legislative representation. Informed voters and political elites are likely to recognise the consequences of a dramatic shift from an SMD-p system to a more proportional system, but smaller and more technical changes to electoral institutions may leave some doubt or ignorance about their likely effects on the party system. Elections under the new rules will then be the best means of gathering this sort of information.

In summation, changes in electoral institutions are unlikely to produce changes in party system size that are realised immediately. Much of the effect of electoral institutions on party system size works indirectly through the accurate anticipation of the mechanical effect by voters and political elites. Thus, much of the effect of changes in electoral institutions is likely to be distributed over future elections as voters and political elites learn how the new rules affect the representation of parties in the legislature.

Data and measures

Among the institutional variables linked to party system size, district magnitude has attracted the most attention from scholars, while the percentage of seats allocated by an upper tier and electoral thresholds are also known to affect the proportionality of the vote-to-seat translation and, consequently, party system size. Large district magnitudes increase the proportionality of election results and provide incentives for greater numbers of parties to

contest elections and for voters to support smaller and sincerely preferred parties. Thus, increases in district magnitude should encourage increases in party system size, while decreases should restrict party system size. The proportion of seats allocated by an upper tier is a common mechanical means by which to affect the proportionality of legislative representation, leading us to expect that increases in the proportion of seats allocated by the upper tier will increase proportionality and, thereby, party system size. Electoral thresholds that specify a certain percentage of the vote necessary to win any seats in the legislature are a direct way of limiting the number of parties that gain representation. Consequently, we should expect an inverse relationship between electoral thresholds and party system size.

Ten Western democracies exhibit changes in at least one of these three features of their electoral systems since 1950: Austria, Denmark, Iceland, Ireland, Italy, New Zealand, Netherlands, Norway, Sweden and Switzerland. The nature and magnitude of these changes is presented in Table 1.⁶ Two of the countries considered here – Italy and New Zealand – changed their electoral system type in the mid-1990s when both switched to mixed-member proportional systems. In Italy, this change is captured by the dramatic drop in average district magnitude and smaller adjustments made to the percentages of upper tier seats. In New Zealand, this change registers primarily with the introduction of a proportional upper tier, along with the imposition of a 5 per cent threshold (not shown). Aside from these large changes in electoral systems, most of the remaining changes reflect the willingness and ability of countries to tinker with their system by modifying district magnitude or the upper tier in a more modest manner.⁷

Notably, many but not all of the changes are in the direction of increased proportionality. New Zealand's switch from an SMD-p to an MMP system was certainly a change in this direction, as were many of the increases in district magnitude and percentage of seats allocated by the upper tier. Changes run less frequently in the direction of decreased proportionality.

To measure the size of the party system, I use two calculations of the Effective Number of Parties (ENP) (Laakso & Taagepera 1979).⁸ The first is calculated using party seat shares and measures legislative party system size (ENP-Seats). The second is calculated using party vote shares and measures electoral party system size (ENP-Votes).⁹

Error-correction models of party system size

The long- and short-term relationships of interest are properly modeled with an error-correction model. Error-correction models are a general class of models

Table 1. Changes in average district magnitude (DM) and the percentage of upper tier seats, 1950–2005

Country	Election year	Prior DM	New DM	Prior % upper tier	New % upper tier
Austria	1956			14.6	11.0
	1959			11.0	12.1
	1962			12.1	10.3
	1966			10.3	8.5
	1971	6.6	20.3	8.5	8.7
	1975			8.7	6.6
	1979			6.6	7.7
	1983			7.7	10.4
	1986			10.4	11.5
	1990			11.5	13.7
	1994	20.3	4.3	13.7	50.3
Denmark	1953	4.6	5.9	29.5	22.9
	1971	5.9	8.0		
	2001			22.9	20.6
Iceland	1959	1.5	6.1	21.2	18.3
	1987	6.1	6.3	18.3	20.6
Ireland	1961	3.7	3.8		
	1969	3.8	3.4		
	1977	3.4	3.5		
	1981	3.5	4.0		
Italy	1976			10.5	9.5
	1979			9.5	12.1
	1983			12.1	11.9
	1987			11.9	14.4
	1992			14.4	19.8
	1994	19.7	1.0	19.8	24.6
New Zealand	1996			0.0	45.8
	2005			45.8	41.2
Netherlands	1956	100.0	150.0		
Norway	1973	7.5	8.2		
	1985	8.2	8.3	0.0	4.8
Sweden	1956	8.2	8.3		
	1970	8.3	11.1	0.0	11.4
	1976			11.4	11.2
	1994	11.1	10.7		
Switzerland	1963	7.8	8.0		
	1979	8.0	7.0		

that estimate the speed at which variables return to their equilibrium relationship after a deviation in the relationship has occurred (see De Boef & Keele 2008). As a class of estimators, error-correction models are particularly useful for examining and distinguishing between short- and long-term effects of one variable on another. The basic form of an error-correction model is as follows:

$$\Delta Y_t = \alpha_0 + \alpha_1 Y_{t-1} + \beta_0 \Delta X_t + \beta_1 X_{t-1} + \varepsilon_t \quad (1)$$

In Eqn 1, α_1 will estimate the speed at which the two variables, X and Y, return to their equilibrium state after a deviation from this relationship has occurred. The estimate of β_0 will capture the immediate, short-run effect of a one unit change in X on Y, while β_1/α_1 is the estimate of the long-run multiplier, which tells us the total long-run effect of a one unit change in X on Y. Put differently, the long-run multiplier will tell us the total change in Y that occurs after a unit change in X, distributed over future time periods. The estimate of α_1 is the estimated rate of error correction, which tells us the speed at which X and Y return to equilibrium after a deviation has occurred. In other words, the long-term effect of a change in X on Y is distributed across future time periods. The estimate of α_1 (the lagged level of the dependent variable) will tell us the proportion of this total effect that is realised in each time period.

In the present context, an error-correction model can tell us the short- and long-term effects of a change in electoral institutions on party system size. As explained above, we generally have strong reasons to expect a change in electoral institutions to produce a change in party system size that is distributed over future elections, while some of the effect might also occur immediately. With these expectations, error-correction models are perfectly suited to the task at hand.

Electoral institutions and legislative party system size

Electoral institutions exhibit a direct effect on legislative party system size through the mechanical effect of translating votes into seats. While some of this effect may occur immediately, much of it will likely be distributed over subsequent elections as the number of parties receiving votes adjusts in response to the new institutional rules. The appropriate error-correction model is as follows.¹⁰

$$\begin{aligned} \Delta \text{ENP-Seats}_t = & \alpha_0 + \alpha_1 \text{ENP-Seats}_{t-1} + \beta_0 \Delta(\ln)\text{District Magnitude}_t + \\ & \beta_1 \Delta(\text{sqrt})\text{Upper Tier}_t + \beta_2 \Delta\text{Threshold}_t + \\ & \beta_3 (\ln)\text{District Magnitude}_{t-1} + \beta_4 (\text{sqrt})\text{Upper Tier}_{t-1} + \\ & \beta_5 \text{Threshold}_{t-1} + \varepsilon_t \end{aligned} \quad (2)$$

Following the form of a basic error-correction model, the dependent variable is the change in the ENP-Seats, while the coefficient on the lagged level of ENP-Seats – α_1 – will estimate the rate of error correction. The estimated coefficients on the first-differenced variables ($\beta_0, \beta_1, \beta_2$) will capture the immediate, short-term effects of a unit change in these variables on legislative party system size. The estimated coefficients on the lagged levels of the institutional variables ($\beta_3, \beta_4, \beta_5$) will tell us the effect of a unit change in of the variable on party system size in the next election ($t+1$).¹¹ Moreover, each of these coefficients divided by the rate of error correction will give us the long-run multiplier: the total amount of change in the ENP-Seats produced by a unit change in the institutional variable that is distributed over future elections. For instance, β_3/α_1 will tell us the total effect of a one unit change in (ln)district magnitude on legislative party system size that is distributed over future elections. Furthermore, α_1 is an estimate of the proportion of this total long-term effect that will be realised in each time period and, as such, will tell us the speed at which the total long-term effect occurs. Table 2 reports the results of this error correction model using data from the ten Western democracies.¹²

The estimates of the short-term effects tell us the immediate and short-lived effect of a one unit change in the institutional variable on legislative party

Table 2. The short- and long-term effects of electoral institutions on the effective number of legislative parties, 1950–2006

	Short-term effects	Long-term effects	Total long-term effects
$\Delta(\ln)\text{District Magnitude}$	-0.43* (0.17)		
$\Delta(\text{sqrt})\text{Upper Tier}$	0.20* (0.08)		
$\Delta\text{Threshold}$	0.03 (0.12)		
ENP – Seats _{t-1}		-0.23* (0.08)	0.66* (0.05)
(ln)District Magnitude _{t-1}		0.15* (0.07)	0.19* (0.03)
(sqrt)Upper Tier _{t-1}		0.04 (0.03)	-0.31* (0.03)
Threshold _{t-1}		-0.07* (0.03)	
Constant		0.56* (0.18)	
R ²		0.25	
N		148	

Notes: Coefficients reported with panel-corrected standard errors in parentheses. The total long-term effects are calculated by dividing the coefficient on the lagged independent variable in the error correction model by the rate of error correction. Standard errors and significance levels are estimated via the Bewley transformation regression (Bewley 1979). * = $p \leq 0.05$. Significance tests are one-tailed.

system size.¹³ Regarding upper tier seats, legislative party system size increases 0.2 for every one unit increase in (sqrt)upper tier. This finding is significant and in line with expectations about the effects of upper tier seats on party system size. However, the estimated coefficients for (ln)district magnitude and the electoral threshold are in the opposite direction from that which was expected. Changes in (ln)district magnitude appear to produce a short-term decrease in legislative party system size, while the imposition of a higher threshold appears to result in a modest (though statistically insignificant) increase in legislative party system size. Upon closer inspection, the significance of the coefficient for (ln)district magnitude is due solely to Italy's switch to a MMP system (and an average district magnitude equal to one), and disappears when this country is excluded from the model. Similarly, the threshold variable only reflects the change in New Zealand, which was accompanied by a more dramatic – and proportional – change in the country's electoral system. This variable is likely tapping into the burst in support that occurred for new or minor parties at the time of New Zealand's switch to a MMP system.

When we take a longer view of changes in legislative party system size, each of the three institutional variables performs in accordance with expectations. Furthermore, the estimated coefficient on the lagged ENP-Seats variable is negative and significant, signaling the appropriateness of the error-correction model. The estimated coefficients on the lagged levels of the institutional variables represent the effect of a unit change on legislative party system size in the next election, while these coefficients divided by the rate of error correction will tell us the total long-term effect (as shown). These results tell us that a one unit increase in (ln)district magnitude will, throughout subsequent elections, result in an increase in legislative party system size of approximately 0.7. A unit increase in (sqrt)upper tier will result in a 0.2 increase in legislative party system size, distributed over future elections, while a unit increase in the electoral threshold will result in a decrease of 0.3. The estimated rate of error-correction tells us that 23 per cent of this total long-term effect will be realised in each subsequent election.

Electoral institutions and legislative party system size

The relationship between electoral institutions and electoral party system size is a bit more complex than the relationship analysed in the previous section since electoral institutions have only an indirect effect on the number of parties receiving votes and, for this effect to occur, voters and political elites must engage in strategic behaviour. Since voters and political elites respond to mechanical effects by observing the number of parties receiving representation, legislative party system size should be the primary force that directs

electoral party system size (Best 2010). Electoral institutions should, therefore, only affect electoral party system size via their effect on legislative party system size. Consequently, I first estimate an error-correction model of electoral party system size using only legislative party system size as the independent variable (Model 1), using the following equation:

$$\Delta\text{ENP-Votes}_t = \alpha_0 + \alpha_1\text{ENP-Votes}_{t-1} + \beta_0\Delta\text{ENP-Seats}_t + \beta_1\Delta\text{ENP-Seats}_{t-1} + \varepsilon_t \quad (3)$$

If voters and political elites are operating as we expect within the confines of electoral institutions, then there should be a long-term equilibrium relationship between electoral party system size and legislative party system size. Once we have accounted for short-term deviations in this relationship, represented in Eqn 3 by β_0 , and the general propensity for voters to support parties that fail to receive representation, represented in Eqn 3 by α_0 , then strategic voters and parties should produce an electoral party system that closely resembles the legislative party system. Over the long term, we would expect electoral and legislative party system size to be in an equilibrium relationship, as voters and political elites desert parties that fail to win representation.

Model 2 then estimates the long- and short-term effects of changes in specific electoral institutions on electoral party system size with the following equation.

$$\begin{aligned} \Delta\text{ENP-Votes} = & \alpha_0 + \alpha_1\text{ENP-Votes}_t + \beta_0\Delta(\ln)\text{District Magnitude}_t + \\ & \beta_1\Delta(\text{sqrt})\text{Upper Tier}_t + \beta_2\Delta\text{Threshold}_t + \\ & \beta_3(\ln)\text{District Magnitude}_{t-1} + \beta_4(\text{sqrt})\text{Upper Tier}_{t-1} + \\ & \beta_5\text{Threshold}_{t-1} + \varepsilon_t \end{aligned} \quad (4)$$

This model will tell us the degree to which electoral institutions influence electoral party system size in the short and long term, with the expectation that most of the effects will be distributed over future elections. Finally, Model 3 puts both electoral institutions and legislative party system size into the same error-correction model of electoral party system size, estimated as follows:

$$\begin{aligned} \Delta\text{ENP-Votes}_t = & \alpha_0 + \alpha_1\text{ENP-Votes}_{t-1} + \beta_0\Delta(\text{sqrt})\text{ENP-Seats} + \\ & \beta_1\Delta(\ln)\text{District Magnitude}_t + \beta_2\Delta(\text{sqrt})\text{Upper Tier}_t + \\ & \beta_3\Delta\text{Threshold}_t + \beta_4\text{ENP-Seats}_{t-1} + \beta_5(\ln)\text{District Magnitude}_{t-1} + \\ & \beta_6(\text{sqrt})\text{Upper Tier}_{t-1} + \beta_7\text{Threshold}_{t-1} + \varepsilon_t \end{aligned} \quad (5)$$

Table 3. The short- and long-term effects of electoral institutions on the effective number of electoral parties, 1950–2005

	Model 1	Model 2	Model 3
<i>Short-term effects</i>			
Δ ENP – Seats	0.95* (0.04)	–	1.03* (0.03)
Δ (ln)District Magnitude	–	–0.18 (0.19)	0.20* (0.08)
Δ (sqrt)Upper Tier	–	0.23* (0.09)	0.02 (0.04)
Δ Threshold	–	–0.13 (0.14)	–0.09 (0.07)
<i>Long-term effects</i>			
ENP – Votes _{t-1}	–0.48* (0.10)	–0.18* (0.07)	–0.63* (0.11)
ENP – Seats _{t-1}	0.49* (0.10)	–	0.70* (0.11)
(ln)District Magnitude _{t-1}	–	0.10 (0.07)	–0.08* (0.02)
(sqrt)Upper Tier _{t-1}	–	0.02 (0.03)	–0.04* (0.01)
Threshold _{t-1}	–	–0.06* (0.03)	–0.01 (0.01)
Constant	0.15* (0.07)	0.61* (0.22)	0.19* (0.07)
R ²	0.87	0.15	0.90
N	152	148	148

Notes: Coefficients reported with panel-corrected standard errors in parentheses. * = $p \leq 0.05$. All significance tests are one-tailed.

Table 4. The total long-term effects of electoral institutions on the effective number of parties, 1950–2005

Total long-term effects	Model 1	Model 2	Model 3
ENP – Seats	1.02* (0.02)	–	1.13* (0.03)
(ln)District Magnitude	–	0.56* (0.067)	–0.13* (0.02)
(sqrt)Upper Tier	–	0.11* (0.03)	–0.07* (0.01)
Threshold	–	–0.32* (0.03)	–0.02 (0.01)

Notes: The total long-term effects are calculated by dividing the coefficient on the lagged independent variable in the error correction model by the rate of error correction. Standard errors and significance levels are estimated via the Bewley transformation regression (Bewley 1979). * = $p \leq 0.05$. Significance tests are one-tailed.

This model will determine whether electoral institutions exert an effect on electoral party system size (either in the short or long term), or whether they only affect electoral party system size via their influence on the legislative party system.

Table 3 presents the results of all three models, while Table 4 presents the estimates and standard errors of the total long-term effects of legislative party

system size and electoral institutions on electoral party system size. Turning first to the results of Model 1, we can see that legislative party system size does produce a long-term equilibrium relationship with electoral party system size. The estimated coefficient on the lagged ENP-Seats variable is positive, and exhibits a significant total long-term effect on electoral party system size that is statistically indistinguishable from one. This suggests that after an increase (or decrease) of one in the effective number of legislative parties, the effective number of electoral parties will increase (or decrease) by one as well over future elections. The estimated coefficient on the ENP-Votes variable tells us that that approximately 48 per cent of this total long-term effect will be realised in each subsequent election. The estimate of the short-term effect of legislative party system size reveals that electoral and legislative party system size usually differs by approximately one party in any given election.

Model 2 presents the long- and short-term effects of changes in electoral institutions on electoral party system size. In the short term, only (sqrt)upper tier exerts a positive and significant impact on electoral party system size. The estimated coefficients for (ln)district magnitude and the electoral threshold fail to reach conventional levels of statistical significance, and the sign on the coefficient for (ln)district magnitude is the opposite of what was expected. Regarding the long-term effects, however, the estimated coefficients and total long-term effects for the institutional variables conform to what was expected. For every one unit increase (decrease) in (ln)district magnitude, electoral party system size will increase (decrease) a total of 0.6 over future elections. For every one unit increase (decrease) in (sqrt)upper tier, electoral party system size will increase (decrease) by 0.1 over subsequent elections. And for every one unit increase (decrease) in the electoral threshold, electoral party system size will decrease (increase) by 0.3 over future elections. The estimated rate of error-correction in this model, however, is rather slow, at a rate of approximately 18 per cent per election. Thus, changes in electoral institutions do produce the expected long-term effects on party system size, but it will take many elections to fully realise these effects.

Finally, the results of Model 3 indicate generally that electoral institutions affect electoral party system size primarily through their effect on legislative party system size. The estimates of the long-term effects of electoral institutions on electoral party system size actually reverse direction in the presence of legislative party system size. However, district magnitude has a significant and positive short-term effect after controlling for legislative party system size. This may be explained by the fact that district magnitude is a more obvious source of disproportionality than upper tier seats, making the effect of upper tier seats more mechanical in nature and the effects of district magnitude more psychological and strategic in nature. The rate of error correction in Model 3

is approximately 60 per cent per election. This is faster than those estimated by the previous models, but again, it is legislative party system size that is exerting the primary long-term effect here.

Figure 1 displays the cumulative changes in both legislative and electoral party system size in response to a one unit change in electoral institutions (as estimated in Model 2 for electoral party system size) the cumulative change in electoral party system size produced and a one unit change in legislative party system size (as estimated in Model 1).¹⁴ Generally, changes in electoral institutions exert faster and stronger effects on legislative party system size than on electoral party system size. This difference is most pronounced with respect to (ln)district magnitude, where the total long-term effect is approximately 0.1 higher for legislative party system size. Among the institutional variables, (sqrt)upper tier produces the most modest changes in both electoral and legislative party system size.

Figure 1 also reveals the differences between the effects of the institutional variables and the effects of legislative party system size on electoral party system size. While the total long-term effects of changes in electoral institutions take about 15 elections to fully occur, a change in the number of parties represented in the legislature produces a corresponding change in electoral party system size that is almost fully realised over the next five elections. Thus,

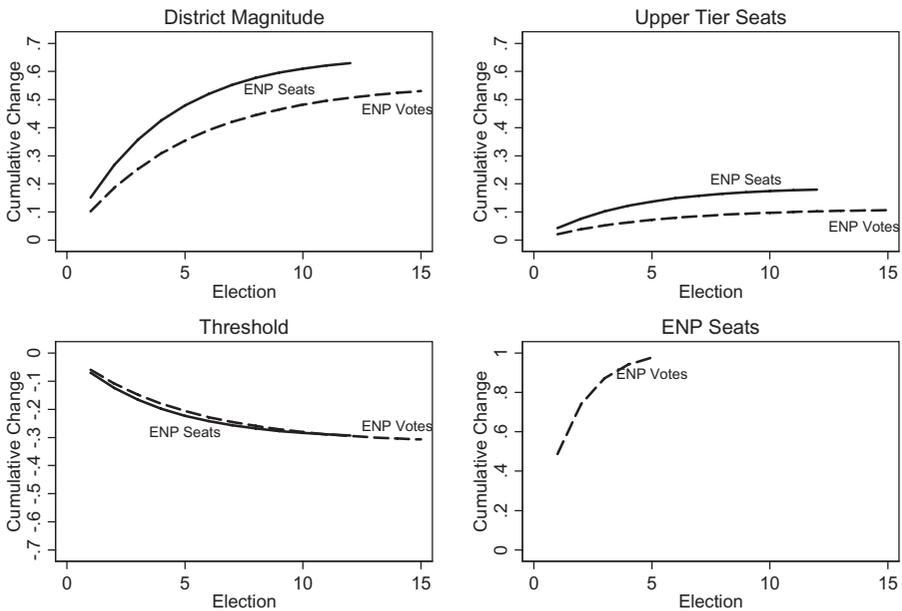


Figure 1. The total long-term effects of electoral institutions on party system size.

the primary effects of the institutional variables appear to be on legislative party system size, while legislative party system size is itself the best predictor of electoral party system size.

Party systems, institutions and endogeneity

The results of the analyses presented above appear to diverge from two recent dynamic studies of electoral institutions and party system size. Colomer (2005) and Remmer (2008) fail to find any consistent and significant effect of changes in electoral institutions on party systems. Instead, they posit a relationship between electoral institutions and party system size that is ‘upside-down’ (Colomer 2005) – that is, changes in party systems drive changes in electoral institutions. Importantly, the findings presented here suggest that these studies have failed to find any effects of electoral institutions on party systems not because these effects do not exist, but because their studies focused only on the short-term effects of electoral institutions. As demonstrated above, an analysis of only short-term effects of institutional changes will mask much, if not all, of the effect that electoral institutions have on party systems.¹⁵

Remmer (2008) and Colomer (2005) may miss the effects of electoral institutions on party system due to their focus on single-election effects, but the question of reciprocal causality is one that deserves serious consideration. In the above sections it has been demonstrated that changes in electoral institutions are likely to produce changes in party system size that take longer than one election to be fully realised, and, consequently, this work encourages scholars to take a long(er)-term perspective when analysing the relationship between electoral system and party system size. This does not eliminate the possibility of reciprocal causality. Furthermore, electoral institutions have often changed in the direction of increased proportionality, which leaves some room to suspect that increases in party system size have been pushing electoral systems in this direction.

Remmer (2008) makes a compelling argument that relatively large changes in party system size should increase the likelihood of electoral institutional change, and that the change in electoral institutions should be in the same direction as the change in party system size. According to her argument, electoral dynamics should shape the incentives of larger parties to change the electoral rules by affecting the level of uncertainty in election outcomes, while smaller parties will be more or less empowered to shape electoral rules depending on their electoral wins or losses (Remmer 2008: 8–9). Thus, increases in party system size should result in more permissive (i.e., more proportional) electoral rules, while decreases in party system size should result

in more restrictive electoral rules. The results of Remmer's analysis of changes in the rules that translate votes into seats (such as district magnitude) in 18 Latin American democracies support these expectations. Since part of her study focuses on the rules that translate votes into seats, her analyses provide a proper framework to examine questions of endogeneity in the ten Western democracies considered here.¹⁶

As a first glance at the potentially endogenous relationship between electoral institutions and party system size, I present the timing of changes in party system size and district magnitude (along with the major electoral reforms in New Zealand and Italy) in Figure 2. Indeed, while changes in party system size often follow from changes in electoral institutions, there is some evidence that increases in party system size may push electoral systems toward greater proportionality. This is particularly noteworthy in Italy and New Zealand, where the party system began to fragment prior to the change in electoral system. There is also some evidence that increases in party system size precipitated the 1987 change in Iceland toward greater proportionality. One should not make too much of this point, however, since fragmentation in other countries, such as Austria and Denmark, occurs after a change in district magnitude.

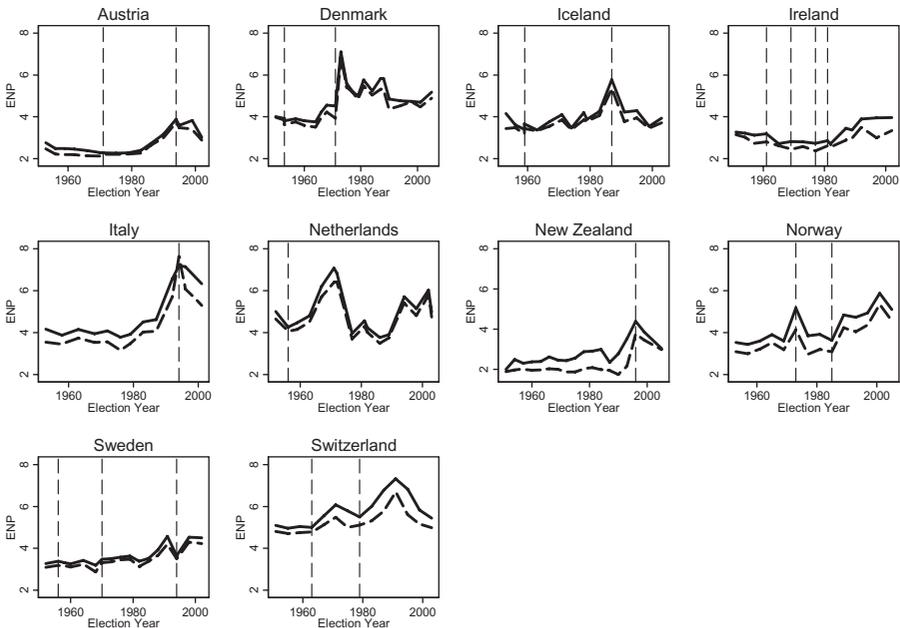


Figure 2. Changes in the effective number of parties over time. Vertical lines represent the year of a change in district magnitude as listed in Table 1, or in the case of Italy and New Zealand, the year of major electoral reform.

To provide more systematic analysis of the effects of electoral dynamics on changes in electoral institutions, I estimate simple multinomial logit models of electoral change.¹⁷ These models are similar to those estimated by Remmer (2008), where the dependent variable takes on three values: zero (the baseline category, representing no change in electoral institutions), one (a change toward more permissive electoral rules) and two (a change to stronger, more restrictive electoral rules). Two independent variables are used to predict electoral change: the lagged change in party system size (ΔENP_{t-1}), and the lagged level of party system size (ENP_{t-1}). Additionally, the models include country-specific fixed effects (not reported). Table 5 presents the estimates of these models for both electoral (ENP-Votes) and legislative (ENP-Seats) measures of party system size.¹⁸

The models provide some, but little, support for the effects of party system size on electoral institutional change. Lagged positive changes in electoral party system size (ENP-Votes) do appear to have a positive effect on the likelihood of observing a change to more permissive institutions; however, the size of the effect is very slight. Holding both ENP-Votes variables constant at their means, the predicted probability of a country switching to more permissive electoral rules is 0.04. When the lagged change in ENP-Votes is increased one standard deviation, the probability of switching to more permissive electoral rules increases only to 0.08, and even a case such as Denmark's critical 1973 election, where the ENP-Votes increased dramatically by 2.6, the predicted probability of switching to more permissive electoral rules in the next election is 0.38. All of the other estimated coefficients are either statistically insignificant, in the opposite direction from that which was expected, or both.

Table 5. Multinomial logit model of changes in electoral institutions

	Votes		Seats	
	Permissive	Strong	Permissive	Strong
$\Delta\text{ENP-Votes}_{t-1}$	1.04* (0.54)	-1.02 (0.92)		
ENP-Votes_{t-1}	-1.15* (0.42)	-0.25 (0.51)		
$\Delta\text{ENP-Seats}_{t-1}$			1.22 (0.76)	-0.14 (0.55)
ENP-Seats_{t-1}			-1.51* (0.63)	-0.31 (0.56)
Constant	1.55 (1.84)	-0.88 (1.81)	2.52 (2.36)	-0.73 (1.90)
Pseudo R ²	0.27		0.26	
N	142		142	

Notes: Table entries are estimated coefficients with robust standard errors in parentheses. The baseline category is no change in electoral institutions. Country-specific fixed effects are estimated but not reported. * $p \leq 0.05$. Significance tests are one-tailed.

The lagged levels of both ENP-Votes and ENP-Seats appear to have statistically significant coefficients that suggest an increase in party system size decreases the probability of switching to more permissive electoral rules. This is precisely the opposite of what we would expect if the causal arrow ran from party systems to changes in electoral institutions.

Despite persuasive arguments for a reciprocal causal relationship between electoral institutions and party system size, the findings presented here suggest that, at least for this set of Western democracies, it is primarily electoral institutions that shape party systems. However, just as the effects of electoral institutions on party system size are more complex and nuanced than typically recognised in empirical analyses, the effects of party systems on electoral institutions may be more complex than the simple relationship analysed here. For instance, there is some preliminary evidence here to suggest that changes in party system size can contribute to large, overarching changes in a country's electoral system (such as those in Italy and New Zealand), while playing little to no role in more modest changes in electoral rules. Delving deeper into the intricacies of dynamic relationships should certainly be a primary objective for future studies of electoral institutions and party system size.

Conclusion

Most studies of the relationship between electoral institutions and party system size focus on explaining cross-national differences. The arguments and evidence presented here suggests that cross-time, within-country studies are necessary to accurately analyse the dynamics of this relationship. Electoral institutions may exert a direct, mechanical effect on legislative party system size, but a large part of their effects occurs indirectly through the actions of voters and parties. Although political actors may change their behaviour instantaneously when electoral institutions change, it is more likely that they gather information about the mechanical effects of the new rules by observing election results. The propensity of political actors to behave strategically within the confines of electoral rules is likely to increase over time as more and more information about the mechanical effects of electoral institutions becomes available. Stated simply, the effects of changes in electoral institutions are likely to be realised across more than one election.

The findings presented here emphasise the importance of long-term relationships between electoral institutions and party system size. Changes in district magnitude, upper tier seats and electoral thresholds all affect party system size in the ways we would expect. Some of their effects occur

immediately, but much of their effects are distributed over subsequent elections. Importantly, these long-term effects provide additional support for the equilibrium relationship between electoral institutions (and their effect on legislative representation) and electoral party system size. We expect electoral party system size to adjust in a manner that corrects deviations from its equilibrium relationship with legislative party system size. Changes in electoral institutions are a primary way in which deviations from this equilibrium relationship can occur. Thus, the long-term relationship observed between changes in electoral institutions and party system size supports the basic mechanisms that underlie this equilibrium relationship. Political actors appear to respond to deviations from equilibrium produced by changes in electoral institutions in ways that correct these deviations over time.

Different features of a country's electoral system may have slightly different effects on party system size, both in terms of strength and timing, depending on the degree to which their likely (mechanical) effects on party system size are immediately apparent to political actors. The evidence presented here finds stronger effects for district magnitude and the electoral threshold than for upper tier seats. This could be due to the fact that changes in district magnitude and the electoral threshold are more obvious to voters, candidates and political parties than are adjustments to an upper tier. Political parties are likely to have a rough sense of their chance of receiving representation in a district with a given district magnitude and voters will likely recognise that an electoral threshold will discriminate against smaller parties. The electoral threshold is arguably the feature that is the most apparent to both voters and parties, and this variable exhibits significant short-term effects on electoral party system size even after controlling for legislative party system size.

Electoral institutions account for part of the dynamics in party system size, but certainly do not tell the whole story. Party system size is not determined by electoral institutions alone, but is forged from a workable combination of preferences and institutions. This study has found that legislative party system size is a better predictor of electoral party system size than electoral institutions alone. Considering the important role of preferences in party system size, this finding should not be surprising. Legislative party system size represents not only the mechanical effects of the electoral system, but also the configuration of voter preferences under these rules, while electoral institutions tell only one side of this story. Although the results presented here suggest electoral institutions produce the expected effects on party system size, a complete understanding of changes in party system size must include an account of how the preferences of political actors ebb and flow over time within the confines of electoral institutions.

Acknowledgements

I would like to thank the referees and the editors of this journal for helpful comments and suggestions.

Notes

1. Western democracies constitute an ideal set of countries for a cross-time study of the relationship between institutions and party systems. This is due to their long tradition of democracy, relatively stable party systems, and similarities in patterns of voter alignments.
2. As Cox (1997) notes, these constraints imposed by the electoral system serve as an upper bound on party system size.
3. The one-to-one long-term relationship should occur only after we have accounted for any current deviations from equilibrium, as well as the proportion of voters who are willing to cast sincere ballots for parties that do not receive legislative representation. Generally, we may always expect some (usually small) proportion of the voting population to engage in sincere voting behaviour, irrespective of electoral rules or which parties receive legislative representation. The estimate of α_0 in Eqn 3 provides an estimate of this proportion.
4. It is possible, but unlikely, that a change in electoral institutions may produce an instantaneous change in the behaviour of voters and politicians. It may be possible if voters and politicians are fully informed about the changes and their likely effects on legislative party system size, and are able to coordinate and adjust their behaviour accordingly. Thus, this is unlikely to occur except in extreme circumstances of change (such as a switch from a very disproportional to a very proportional electoral system) where voters and political elites have a wealth of information about the change at their disposal. However, the effect is still likely to be delayed due to the organisational requirements of forming a party, such as finding and recruiting candidates, creating a platform and developing credibility.
5. This assumes that there are some parties that are currently receiving fewer seats than they are votes, or that there is a demand for other or new parties to receive representation.
6. Data on average district magnitude, electoral thresholds and the upper tier is from Golder (2005), the International Institute for Democratic Assistance (IDEA, www.idea.int) and various editions of this journal. Belgium is omitted due to missing data. Please consult the web appendix for a further discussion of case selection and a series of robustness checks on the findings presented here.
7. Iceland's shift in 1959 to a more proportional system is among the more substantial of these changes. Circumstances such as the need to redistrict or produce a certain degree of proportionality likely underlie some of the smaller changes in electoral institutions.
8. I utilise the ENP at the national level as the dependent variable. Although the effects of district magnitude are often more appropriately modeled at the district level (Singer & Stephenson 2009), analysis of districts over time is difficult since a change in district magnitude often implies the creation of a new district and one that is not comparable to the last. Due to this difficulty, as well as the appropriateness of the national level for other institutional variables, I employ a national measure of party system size with the recognition that the analysis likely masks interesting variations at the district level.

9. Party vote and seat shares are from Mackie and Rose (1991) and various editions of this journal.
10. The relationship between electoral institutions and party system size is often viewed as conditional on societal heterogeneity, where societal heterogeneity is thought to capture the underlying demand for political parties. Most scholars use ethnic or religious heterogeneity as a proxy for societal diversity, with mixed results. Important work by Stoll (2008) demonstrates that the estimated relationship between proxies of societal diversity, electoral institutions and party system size can vary quite dramatically depending on which proxy of societal diversity is chosen. It is also problematic that none of these proxies for societal diversity varies across time. Here, I focus on exploring the dynamic relationship between electoral institutions and party system size with hopes of laying the groundwork for future studies that can incorporate societal heterogeneity.
11. Following the literature, I use the log of average district magnitude and the square root of the percentage of seats in allocated in an upper tier in all reported models. See Katz (1997) for a thorough discussion of the nonlinear relationships between electoral institutions, disproportionality and party system size.
12. The substantive and statistical significance of the findings do not change in any of the models presented here when country-specific fixed effects are included, except for the total long-term effect of (\ln) district magnitude, which is reduced but still significant, and the speed of error correction, which is increased. Most substantive and statistical effects are also unchanged after dropping from the analysis the two countries – Italy and New Zealand – that undertook large changes in their electoral systems, with the exceptions of the short-term effect of (\ln) district magnitude, which becomes statistically insignificant, and a slightly over-responsive relationship between legislative and party system size in Model 1 of Table 4. Please consult the web appendix for further details.
13. Immediate, in this context, refers to the effects in the first election held under the new institutional rules.
14. Figure 1 shows the number of elections that it takes for 95% of the total long-term effect to be realised.
15. I am grateful to an anonymous referee for this insightful point.
16. Colomer (2005), in contrast, focuses on changes from majoritarian to proportional rules, or vice versa.
17. Multinomial logit models impose the often restrictive assumption of the Independence of Irrelevant Alternatives (IIA). The results of Hausman tests indicate IIA is not a problem in the models presented here, but perhaps more importantly, logical reasoning tells us IIA should not be a large problem since the different outcomes are not properly characterised as substitutions for one another.
18. In some circumstances, countries undertook electoral reforms that were at once permissive and restrictive, such as an increase in district magnitude along with a simultaneous decrease of the percentage of upper tier seats. These cases were treated as zeros in the models presented in Table 5; however, separate models were estimated for changes in district magnitude and upper tier seats to ensure that this coding did not affect the results (see the web appendix). Regarding district magnitude, the estimated coefficient on the lagged changes in ENP-Votes became statistically insignificant, which suggests that the significant result found in Table 5 is produced only by changes in upper tier seats. Regarding upper tier seats, the estimated coefficient for the lagged changes in ENP seats became positive and statistically significant. Upon closer inspection, it became apparent that this result was produced solely by the big electoral changes of Italy and

New Zealand, and that the significant finding for the lagged change in ENP-Votes was produced by Iceland, Italy and New Zealand. When these countries were removed from the analysis all significant effects for the lagged change variables disappeared. The models were also estimated using a larger sample of Western democracies. Again, the estimated coefficient on the lagged change in ENP-Votes became statistically insignificant. Thus, it may be proper to conclude that the lagged changes in these variables contribute to electoral reform only in exceptional and rather dramatic circumstances.

Supporting Information

Additional Supporting Information may be found in the online version of this article:

Appendix Table A1. Results reported in Table 2 excluding Italy and New Zealand

Appendix Table A2. Results reported in Table 3 excluding Italy and New Zealand

Appendix Table A3. Results reported in Table 4 excluding Italy and New Zealand

Appendix Table A4. Results reported in Table 2 with Japan included

Appendix Table A5. Results reported in Table 3 with Japan included

Appendix Table A6. Results reported in Table 4 with Japan included

Appendix Table A7. Results reported in Table 2 with France included

Appendix Table A8. Results reported in Table 3 with France included

Appendix Table A9. Results reported in Table 4 with France included

Appendix Table A10. Results reported in Table 2 with 16 Western democracies

Appendix Table A11. Results reported in Table 3 with 16 Western democracies

Appendix Table A12. Results reported in Table 4 with 16 Western democracies

Appendix Table B1. Multinomial logit models of changes in district magnitude

Appendix Table B2. Multinomial logit models of changes in upper tier seats

Appendix Table B3. Multinomial logit models of changes in electoral institutions excluding Italy and New Zealand

Appendix Table B4. Multinomial logit models of changes in district magnitude excluding Italy and New Zealand

Appendix Table B5. Multinomial logit models of changes in upper tier seats excluding Italy and New Zealand

Appendix Table B6. Multinomial logit models of changes in electoral institutions excluding Iceland, Italy and New Zealand

Appendix Table B7. Multinomial logit models of changes in district magnitude excluding Iceland, Italy and New Zealand

Appendix Table B8. Multinomial logit models of changes in upper tier seats excluding Iceland, Italy and New Zealand

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