Electoral Systems and the Sheriff of Nottingham: Determinants of Disproportionality in New and Established Democracies[1]

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Abstract

Using Gallagher's least squares index, we examine the determinants of disproportionality in 656 elections held in 59 new and established democracies between 1945 and 2010. We aim at understanding the fluctuations of the indices of disproportionality in countries *with* and *without* electoral reform; in this draft of the paper, however, we will only address the former case. Our findings show substantial evidence of the impact of institutional engineering on electoral disproportionality. After a permissive change in the rules of the game, the levels of deviation from perfect proportionality will tend toward zero. In contrast, in cases where a restrictive electoral reform is introduced, levels of disproportionality will likely increase. We also aim to review the conditions under which the impact of reforms on electoral disproportionality is larger and tends to vanish over time.

[1] Most of the analyses of this draft paper are likely to be included in Chapter 6 of the first author's doctoral dissertation. Comments are welcomed.

Disproportionality is of course one of the main features of electoral systems taken as independent variables. As such, it has been at the core of an increasing literature which has measured it, has distinguished its outcomes depending upon the components of the electoral system, and has discussed its consequences for different political institutions as party systems, parliaments, or governments. In the last century, Douglas W. Rae (1971: 86), arguably one of the founding fathers of the science of electoral systems, emphasized the relevance of disproportionality as the main consequence of electoral systems, graphically depicting it as the Sheriff of Nottingham, "apt to steal from the poor and give to the rich: strong parties usually obtain more than their proportionate share of legislative seats while weak parties receive less than their proportionate share of seats. (…) And many weak parties get *no* seats in return for their vote totals, even under PR systems". As he argues later (Rae 1971: Chapter 9), while most electoral systems share the same *directional* pattern of redistribution, there are still very important differences in the *strength* or *degree* of this pattern.

In most of the literature on electoral systems, indices of disproportionality have been expressed as averages of a given number of elections; those averages are then implicitly or explicitly located in a comparative continuum running from low to high. Instead, the longitudinal evolution of disproportionality from one election to the other has been utterly ignored. Its fluctuations, however, are all but negligible in countries which have both maintained stable their electoral systems or have reformed at least some of their components. In the former case, the indices of disproportionality in Canada since 1949 (Massicotte 2008: 104) and France between 1958 and 1986 (Elgie 2008: 132) have been zigzagging in almost every election. Countries with proportional representation (PR) systems, like Luxembourg and Switzerland, show similar patterns. Neither the trends present a clear picture. The indices seem to be decreasing in some countries, like Ireland (Gallagher 2008: 521) and Spain (Hopkin 2008: 382; Montero and Riera 2010: 262), but also increasing in others, like France since 1988 and the United Kingdom (Mitchell 2008: 168). Adapting to disproportionality Michael Gallagher's (2008: 551) reaction to the impact of electoral systems upon party systems, there is indeed "a striking amount of variation over time in countries where electoral systems remain the same". How can these fluctuations be explained? What factors do determine those "endogenous" variations in the levels

of disproportionality at the short and medium-term when the characteristics of the electoral system remain constant?

Our systematic knowledge about disproportionality in countries which have been successful in reforming their electoral systems is not much better. For instance, in the 1996 New Zealand general election disproportionality reached a historical minimum by dropping from the 18.19 percent level in the previous 1993 contest down to 3.43 percent. This drastic reduction was largely caused by the adoption that same year of a mixed-member proportional (MMP) electoral system (Vowles 2008: 296). The most striking contrasting case is the 1991 Polish parliamentary election. With 29 parties having won seats in the Parliament after the first fully democratic election and a quite remarkable effective number of almost 11 legislative parties, in early 1993 the ruling centre-right parties passed a new electoral law that sought to decrease its overall proportionality (Benoit and Hayden 2004; Birch et al 2002; Sanford 2002). As a result, disproportionality in the 1993 election reached a considerable 17.81 percent, around 14 percentage points higher than in the previous election. Do politicians always achieve the goals they pursue when they reform the interparty dimension of the rules of the game? While most electoral reforms might likely produce some consequences for disproportionality, under which circumstances do electoral reforms have larger effects? Are there any contexts that increase or decrease the potential impact of electoral reforms?

In spite of the theoretical soundness of the statement that links permissiveness of the electoral system to disproportionality of the electoral outcomes, the empirical evidence supporting it is remarkably weak.[2] In this very preliminary draft of the paper, we have decided to address only the cases in which levels of disproportionality are linked to processes of electoral reform. We aim to identify which type of institutional and competitive setting is most likely to produce changes in the levels of disproportionality after an electoral reform is adopted. As we

[2] For instance, Lijphart (1994: Chapter 6) is not able to explain about one third of the variation in electoral disproportionality when he tries to do it by using electoral system variables.

will show below, the status of established democracies is particularly critical to shaping voters' level of information about the functioning of the electoral systems and the candidates' viability; in new democracies, the lack of such factors may produce a formidable obstacle to strategic behavior. Furthermore, we also hope to demonstrate that the size of the electoral system change and the number of elections conducted after the reform do also reinforce the impact assigned to episodes of institutional change. This paper is thus an attempt to fill those gaps by considering evidence in 59 democracies with a total of 656 elections carried under diverse rules. By dwelling on a long and diverse sample of countries and elections, the paper presents also the advantage of moving beyond country-specific explanations. Some years ago, Arend Lijphart (1994: Chapter 5) and Dag Anckar (1997) did analyze the determinants of disproportionality with a mixture of interesting and problematic results (see for instance Penadés 1997). Our paper will extend the research design undertaken by those scholars by adding new observations and covariates. In addition, it will examine electoral disproportionality with accurate econometric tests and under different institutional set ups in order to incorporate variability in the sample.

The paper is structured as follows. We discuss in the next section the analytical literature that defines, measures, and explains variations in electoral disproportionality. We then elaborate a series of working hypotheses that describe the conditions under which the impact of electoral reforms on the levels of disproportionality are more likely to occur. In the fourth and fifth section, we present our research design and conduct the corresponding empirical tests on electoral data from a variety of countries. Finally, section six concludes.

Concepts, measures, and determinants

Disproportionality has been defined by Lijphart as "the deviation of parties' seat shares from their vote shares, [a] (…) prima facie (…) simple and straightforward concept".[3] In other words, and following now Gallagher (2008: 602), "unless every party and independent candidate wins exactly the same share of the seats as they won of the votes –which of course never happens in

[3] In the same vein, you can see Taagepera and Shugart (1989: 104).

the real life—there exists a degree of disproportionality". In contrast, Gary W. Cox and Matthew S. Shugart (1991: 350) stress a quite different point, and argue that electoral disproportionality is related to "the extent to which different methods of PR favor large parties over small".[4]

The number of indices used for measuring electoral disproportionality has been remarkably high in comparative research. Most of them share similar conceptual traits despite the quite different ways in which deviations have been operationalized. This abundance has converted the measurement of disproportionality in more difficult and controversial an issue than other standard political indicators, including those which entail conceptually divergent proposals (Lijphart 1994: 57).[5] In any case, the canonical index in the literature is that of least squares.[6] Created by Gallagher (1991) some time ago, it is the one which better measures the disproportionality of election results. According to Gallagher and Mitchell (2008: 602), "the rationale of the least square index is that it takes account not only of the total amount of vote-seat disparity but also of the way in which that disparity came about, regarding one large disparity (say, 8 per cent) as more significant than several small ones (e.g. four each of 2 per cent)". It is the index preferred by Lijphart (1994: 62) for its sensitiveness and faithful reflection of the deviation of votes and seats in the electoral results. And it is also the index which scored first in the evaluation of 19 measures of electoral disproportionality that Taagepera and Grofman (2003) performed according to 12 criteria.[7] Since many measures of seat allocation generate their own

[4] See Benoit (2000: 382) against this conceptualization.

[5] Incidentally, all measures employ the term *dis*proportionality, rather than the contrary, because the values of the indices increase with increasing disproportionality (Lijphart 1994: 58).

[6] This measure is calculated according to the following formula:

$$\textit{Disproportionality Index} = [\tfrac{1}{2} \Sigma (V_i^2 - S_i^2)]^{1/2},$$

where V_i is the percentage of vote obtained by party i and S_i is the percentage of seats obtained by party i. This index has a range from 0 to 100 (Gallagher 1991).

[7] The two most commonly used indexes of disproportionality in the past were those proposed by Rae (1971: 8) and Loosemore and Hanby (1971). In spite of being widely employed before the 1990s, their over-sensitivity to the presence of small parties and the number of parties participating in an election made researchers reluctant to use them after the invention of the least squares index (Lijphart 1985: 10).

measure of disproportionality (Gallagher 1991: 38), a definitive answer to the question about which index should be taken as the best one will finally hinge on which method is under scrutiny. But the fact that the least squares index takes into account both the total amount of vote-seat disparity and its size, as it were, together with our concern with how different electoral systems affect the distribution of seats amongst parties (Borisyuk et al. 2004: 60), lead us to choose it over the *zoo* of the rest of indexes (Van Puyenbroeck 2008: 498).

What factors do determine disproportionality? As it should be expected, the permissiveness of the electoral system emerges as the most potentially important predictor among them. It is well established that electoral systems have an impact on the number of parties that get into the Parliament (Cox 1997; Duverger 1954; Lijphart 1994; Rae 1971; Sartori 1968; Taagepera and Shugart 1989), the candidates' incentives to cultivate a personal vote (Carey and Shugart 1995), the incumbents' opportunities to engage in corrupt behavior (Kunicová and Rose-Ackerman 2005), the government's motivations to increase public expenditure or run budget deficits (Persson and Tabellini 2003), and the achievement of some sort of geographical (Latner and McGann 2005) or gender-balanced (Iversen and Rosenbluth 2008) representation. Surprisingly enough, the number of studies examining the impact of the rules of the game on electoral disproportionality is not very high.[8] Lijphart's contribution (1994) constitutes one remarkable exception to this pattern as he found that presidentialism, categorical ballots, explicit or implied *apparentement* provisions, proportional formulas, and large assemblies decrease disproportionality. However, and above all, he argues that the levels of electoral disproportionality respond very sensitively to the variations in the effective threshold. Likewise, district magnitude is recognized as the decisive factor by Rein Taagepera and Matthew S. Shugart (1989: 124) and John M.Carey and Simon Hix (2011: 395). In contrast, Ken Benoit (2000: 382) finds evidence for a strong effect of the electoral formula. And Anckar's (1996) empirical analyses (1997) reveal that the Gallagher's index of disproportionality is mainly

[8] For instance, Gallagher (1991: 43) limited himself to make an elementary list including the formula, the district magnitude, the malapportionment, the threshold, and the distribution of voters among parties; and in their listing Cox and Shugart (1991: 350) gave more relevance to additional seats, thresholds, malapportionments and the geographical distribution of party support.

affected by district magnitude and effective threshold. These findings are by no means surprising if we take into account the fact that the former concept gives rise to the latter indicator (Gallagher and Mitchell 2008: 607).[9]

Working hypotheses

Building on these contributions, our expectation is that episodes of institutional change will have an impact on levels of disproportionality. Evidence on the existence of this kind of relationship is not negligible (e.g., Anckar 1997; Lijphart 1994), but it is primarily focused on consolidated democracies. In this section, we will very briefly develop the main theoretical arguments on which the hypotheses we seek to test are grounded.

As it is well known, at least since Duverger's (1954) seminal contribution, the negative consequences of restrictive electoral rules on party system fragmentation are understood as a matter of two types of mechanisms. By the *mechanical* effect (or *proximal*, according to Rae [1971: 67]), minor parties are typically awarded a much smaller share of seats than the share of votes they receive. Its outcomes create incentives for electoral coordination. As defined by Cox (2000: 49), electoral coordination "refers to a variety of processes by which groups of voters and politicians coordinate their electoral actions in order to win more legislative seats or executive portfolios". [10] Therefore, we expect electoral restrictiveness to decrease the number of parties by generating incentives for strategic entry or withdrawal on the part of political entrepreneurs and for tactical voting on the part of voters (Cox 1997). Duverger coined the term *psychological* (and Rae [1971: 68] that of *distal*) for these behavioral consequences of non-permissive electoral laws on the party system size.

[9] Firstly introduced by Taagepera and Shugart (1989: 126-141) and elaborated in Lijphart (1994: 25-29), a formal magnitude has more or less the equivalent effect to a certain legal threshold that it is label as the "effective threshold", and can be calculated using the following formula:

$$t = 75\%/(m + 1),$$

where t refers to the effective threshold and m to the district magnitude.

[10] See also Riker (1982).

The relationship between the number of parties and the levels of electoral disproportionality constitute the basis for our first hypothesis. Following Duverger, we will argue that electoral reforms may provoke changes in the levels of disproportionality because they operate on party system fragmentation at the electoral and the legislative level through different means and, most importantly, at diverse points in time. The mechanical effect of electoral systems would decrease (increase) the effective number of parliamentary parties just after a restrictive (permissive) reform through the direct application of the change in the rules to convert votes into seats. In addition, the psychological effect may also come from the reactions of political actors to the expected consequences of the change in the electoral rules. What we suggest is that this latter effect is at least slower and at most smaller than the former one. To sum up, we posit that *levels of disproportionality will get higher (lower) in countries where a restrictive (permissive) electoral reform is adopted* (H_1).[11] Part of this impact could stem from the greater elasticity of the party system fragmentation at the legislative level.

The second feature that is predicted to affect the levels of disproportionality is the size of the electoral reform. Consistent with the literature on electoral systems, we expect major changes in the rules of the game to exercise a larger impact than minor transformations on the amount of deviation from perfect proportionality. It is well known that major reforms of national electoral systems remain quite rare (Katz 2008; Nohlen 1984; Norris 1995). If one takes into account the fact that only major reforms can change the whole format of the party system, as we argue here, and that this type of institutional change needs for occur the approval of the party or coalition of parties in power, it is then understandable that they are far from common. In contrast, mere fine-tuning of the components of the electoral system would give a smaller possibility to politicians to change the levels of disproportionality even if they changed a decisive factor such as the district

[11] In the next section we will more precise about what permissive and restrictive reforms are.

magnitude. In short, we hypothesize *that the effect of electoral reforms on the levels of disproportionality will be higher in case of major changes of the electoral system* (H_2).[12]

Thirdly, we expect the impact of institutional change on electoral disproportionality to be mitigated over time. On the one hand, and this is the core of the paper, political actors (i.e., elites and voters) should not respond to electoral reforms with exactly the same behavior than before. On the other hand, voting in a given election is on its own self-reinforcing (Dinas 2010: 13). By repeating the act of voting, as Cees van der Ejk and Mark Franklin put it (2009: 179), citizens get locked into particular voting patterns. This idea of habit formation (Franklin 2004) may constrain the mechanical or proximal effects of electoral reforms. And, in its turn, it may also explain why they would likely have consequences for the fluctuations in disproportionality well beyond the first contest after a new electoral system change is adopted.

Yet the argument may continue to presume the existence of a learning process based on experience and information over time. As Margit Tavits and Taavi Annus (2006) have demonstrated, time and more particularly the length of democratic experience matter. As a result, the uncertainties regarding the consequences of electoral rules may decline with the years until one point in time in which a new equilibrium level of deviation from proportionality is restored (Taagepera and Shugart 1989: 123; Taagepera 2007: 68). After all, not every single change in the levels of disproportionality provoked by an electoral reform occurs overnight; and, in fact, the reasoning Duverger offers is a dynamic story in which voters over time gradually abandon an unpopular party in larger numbers until no support remains (Fey 1997: 142).[13] In short, voters need time above all for incorporating into their calculus the information about strategic voting and the reductive effects of electoral systems (Queralt 2009). Bearing in mind all these

[12] The next section discusses the definitions of major and minor reforms.

[13] The analytical narrative about the "rescue" of the Belgian Liberal party after the adoption of proportional representation in that country at the beginning of the twentieth century is also portrayed by Duverger (1954: 248) in two stages: first of all, its under-representation decreases; then, a psychological effect starts to play a role.

considerations, we put forward the hypothesis that *the impact of electoral reforms on the levels of disproportionality will get lower over time* (H_3).

Finally, substantial differences between established and young democracies are expected, and not only with regard to the levels of disproportionality but also to the impact of electoral reforms. Students on this field have argued that the critical element in observing political consequences of electoral laws is the availability of good information about the operation of the system; and this kind of information is arguably worse in less consolidated democracies (Cox 1997). Thus, the ability of citizens to recognize and act upon situations where voting for one's sincere preference leads to a less desirable outcome – wasting their vote – heavily depends on the age of democracy (Horowitz and Browne 2005; Queralt 2009). However, this voters' (and elites') inexperience with both the operation of the rules and the youth of party systems could also explain the difficulties of the psychological effect for working in new democracies and the extent to which levels of disproportionality behave differently after an electoral reform (Benoit 2002 and 2006). But we also suggest that this situation in recently-democratized countries may erode over time (Dawisha and Deets 2006; Duch and Palmer 2002; Kostadinova 2006; Tavits and Annus 2006).

Let's imagine, for example, two countries that adopt a more permissive electoral system. Country *A* is a new democracy, while country *B* is a consolidated one. As a consequence of the straightforward application of the new electoral rules to convert votes into seats, some parties – almost always the largest ones – will be less "over-represented" than they were, receiving a smaller proportion of seats than they did before the reform; and the opposite will hold for the smallest ones. This result will be common to both countries. But we expect that the dynamics at the electoral level will diverge to some extent in the two countries. While political leaders (and voters) in both types of democracies will realize that the new rules provide incentives to small parties to run alone and still get a more than less proportional parliamentary representation, the time needed to elapse before they fully understand those new rules may be shorter in established democracies. That is why we expect a quicker adjustment of the behavior of all political actors to

the new electoral arrangements in old democracies and, as a result, a smaller impact of institutional change on the levels of disproportionality. Summing up, we hypothesize that *the impact of electoral reforms on the levels of disproportionality in new democracies will get lower as time passes by* (H_4).

Research design: variables, data, and technique

Our dependent variable is the change in the Gallagher's index of disproportionality.[14] And our main independent variable is the existence (or absence) of an electoral reform, and its different types. We define an electoral reform as a change in the electoral system or group of laws "which govern the processes by which electoral preferences are articulated as votes and by which these votes are translated into distribution of governmental authority (typically parliamentary seats) among the competing political parties" (Rae 1971: 14; see also Massicotte et al. 2004).[15] In other words, by electoral reform we mean a significant change of at least one of the following elements: the electoral formula, the number of districts, the assembly size, the electoral threshold, the presence (or absence) of a ban on pre-electoral coalitions and linked lists, the number of electoral tiers, and the ballot structure.[16] As you have probably noticed, this is a slightly amended version of Lijphart's (1994) concept. However, the identification of a case of electoral reform without specifying the direction in which the rules of the game change is clearly insufficient. That's why we deem it necessary to distinguish between *permissive* and *restrictive*

[14] The source of the data is Michael Gallagher's dataset (www.tcd.ie/Political_Science/Staff/Michael.Gallagher/ElSystems/index.php), and Armingeon et al. (2010) and Armingeon and Careja (2010). We have followed Gallagher and Mitchell's (2008: 605) recommendations to calculate the value of the least squares index when a number of parties are lumped together as "others". Therefore, we did (1) apply Taagepera's least components approach; (ii) disregard others; and (iii) and take the average of (i) and (ii).

[15] Thus, we do not take as electoral *reform* the following list of modifications in the electoral laws: first, the suffrage restrictions or extensions; second, a change of the registration requirements; third, the ease of voter and party access to the electoral process; fourth, changes in the special features of the ballot format; fifth, changes in the campaign financing and timing rules; sixth, changes in the degree of "bundling" of elections; and seventh, the implementation or elimination of term limits. We have not either coded changes in the levels of malapportionment as electoral reforms because they barely change over time.

[16] On this list, see, among others, Birch et al. (2002), Colomer (2004), Golder (2005), Payne (2007), Remmer (2008), Shvetsova (1999), and Otero and Pérez-Liñán (2005).

electoral reforms, which respectively decrease and increase the deviation from proportionality (Taagepera and Shugart 1989).

An electoral reform is coded as permissive (restrictive) in the following cases: first, the replacement of the formula by one that is supposed to create less (more) deviation of seat shares of parties from their vote shares; second, a reduction (rise) of the number of districts; third, a rise (reduction) of the assembly size; fourth, a reduction (rise) of the electoral threshold; fifth, the implementation (suppression) of an additional tier to allocate seats in PR systems; sixth, the rise (reduction) in the percentage of seats that are allocated in the PR tier in mixed systems; and seventh, the introduction (suppression) of linkage between tiers in multi-tier or mixed systems.

Morover, we have used Richard Katz's (2008: 58) stringent rules to limit the meaning of "'major reforms of national electoral systems' to the wholesale replacement of the electoral formula through which a strong president, or the chamber of parliament to which the national government is responsible, is elected".[17] Accordingly, we will consider *major* reforms those that concern the adoption of proportional, mixed member, or majoritarian systems when the electoral rules that were in use before the change belonged to the other two big families. Otherwise, we will code the reform as *minor*. As was pointed out above, major reforms are expected to exacerbate the negative (positive) impact on electoral disproportionality of permissive (restrictive) reforms. In order to test this effect, we will introduce two interactions, *PermissiveReform*MajorReform* and *RestrictiveReform*MajorReform*. The coefficient for the first of them should be negative, whereas for the second should be positive.

We have also created the variable *InstitutionalStability*, which is equal to the number of years since the last electoral reform;[18] and *DemocraticAge*, which is equal to the number of years

[17] If we focus only on established democracies, the list of major reforms since 1950 keeping up with his criterion includes only 14 cases.

[18] See again the works cited in footnote 15.

since the transition to democracy.[19] We do not have any clear expectation about the sign of these coefficients because they correspond to the effect of these variables when there is *no* reform.[20] Finally, we have also included four interaction terms in the regression models, *PermissiveReform*InstitutionalStability*, *RestrictiveReform*InstitutionalStability*, *PermissiveReform*DemocraticAge*, and *RestrictiveReform*DemocraticAge*, in order to test the third and fourth hypotheses.[21] The hypotheses discussed above indicate that reforms will have a larger effect on electoral disproportionality in new democracies. Thus, the coefficients for the first of these interactions should be positive, whereas for the second should be negative. Likewise, we expect a positive and a negative coefficient, respectively, for the third and the fourth of these interaction terms since we predict that a permissive (restrictive) reform will lead to a smaller negative (positive) effect on electoral disproportionality as the democracy matures.

The data set includes over 650 observations in 59 countries between 1945 and 2010, with more than ten elections on average per country. The sample only includes democracies according to Przeworski et al's (2000) definition,[22] but, as Table 1 illustrates, the cases analyzed vary widely in the number of contests conducted, the number of electoral reforms adopted, and the amount of variation that needs to be explained. Specifically, the number of elections examined ranges from 32 in the United States (from 1946 to 2008) to 2 in Panama (1994 and 1999). It should be also noted that, although we only include American and European countries, our sample is made up of a number of quite heterogeneous democracies in terms of the stability of their electoral institutions: countries with stable rules are for instance Canada and Argentina (20 and 10 elections, respectively), whereas unstable countries include Greece (four changes in 16 elections) and Denmark (four changes in 24 elections). For what corresponds to the mean and the

[19] The source is Przeworski et al (2000).

[20] We take the natural logarithm because we expect the relationship between them and our dependent variable to be non-linear.

[21] Alternatively, we also test the effect of the level of democratic consolidation by including a dummy variable, *EstablishedDemocracy,* which is coded as "1" for those countries that have remained democratic since the end of World War II and "0" otherwise. Results are not shown, but are available upon request.

[22] According to these authors' definition, "democracy is a system in which parties lose elections"; the most important feature of their coding is the use of a dichotomous measure.

standard deviation of the levels of disproportionality in each country, we combine democracies in which disproportionality is high (like France or United Kingdom) with countries in which it is low (like Uruguay or the Netherlands), as well as democracies where disproportionality varies a lot (like in Albania or Cyprus) with countries where it keeps practically constant (like Chile or Albania). And while the levels are basically explained by the type of electoral system, the standard deviation is a function of three factors: the mean, the number of elections, and the frequency of electoral reforms. Finally, there is an overall positive trend in electoral disproportionality. In other words, in most of the countries the levels of disproportionality registered in the last election are above the mean.

[Table 1 about here]

As far as the estimation technique is concerned, we prefer to avoid employing panel corrected standard errors (PCSEs). If we implemented them, we would implicitly assume that the observations are correlated *across* units, which seems inappropriate given the dependent variable we are considering: why would electoral disproportionality be correlated across countries? For this reason, we assume that electoral disproportionality is correlated *within* countries. Accordingly, the models are estimated using fixed and random effects models.[23]

There is a second technical reason to circumvent the use of PCSEs, and it relates to the asymptotic behavior of the generalized least squares (GLSs) estimators. As is probably known, the use of PCSEs entails that the elements in the variances-covariances matrix are estimated

[23] We do this in order to model unit heterogeneity. Random-effects models assume that $Cov(x_{it}, \mu_i) = 0$; that is, there is no correlation between the unobserved heterogeneity and the explanatory variables. The Hausman test confirmed this condition was fulfilled in all the models but the first in every table. In such a case, random-intercepts models were implemented because they provided more efficient estimators than fixed effects, without losing consistency.

across panels for each point in time.[24] Therefore, they become efficient only as the repeated observations in time approach infinity. Nathaniel Beck and Jonathan N. Katz (1995) consider $T > 15$ as the minimum acceptable threshold to achieve such properties. Unfortunately, the number of elections held since the abandonment of dictatorial rule is still small in new democracies. In contrast, the maximum-likelihood estimators used here achieve their asymptotic behavior as the number of panels approach infinity. In this sample, $J = 59$. This fact implies that there are sufficient units to achieve the desired behavior (Gelman and Hill 2007), and that PCSEs with GLSs estimators will be outperformed.

Finally, to estimate models with such a structure requires specific attention to time-series dependencies – i.e. autocorrelation – and possible processes of unit root. In order to account for the first problem, we have followed the strategy advocated by Beck and Katz (1995 and 1996) and added a lagged dependent variable to the right-hand side of the equation. With regard to the latter, we refrain from using any solution because the plot of the data suggests a process of unit root does not exist, and, moreover, we are already using a differentiated variable as dependent variable.

Results

The institutional determinants of electoral disproportionality

Table 2 includes the descriptive statistics of the variables used. And Table 3 lists the results of seven econometric models displayed. Almost all our theoretical expectations bear out. First of all, as should be expected the coefficient on the lagged dependent variable is negative and statistically significant. In other words, positive changes in the levels of disproportionality in the previous election lead to negative fluctuations in the current one. Indeed, holding all the other variables constant, the results suggest that an increase of 1 point of the levels of disproportionality in the previous elections will produce a decrease of about 0.4 points in the current one. In addition, we find clear evidence for the first hypothesis in the case of permissive

[24] In this case, by each point in time we refer to a new national election.

reforms but not when a more restrictive electoral system is adopted. In other words, the coefficient on *Permissive Reform* is negative and statistically significant, indicating that the values of the least squares index after one of these institutional changes will tend to decrease; but the opposite is in general not true for *Restrictive Reforms*.

[Tables 2 and 3 about here]

Data of Model 4 also support the second hypothesis, that of the size in the case of permissive reforms. This hypothesis suggested that the effect of electoral system changes will be bigger if the size of the reform is large. In this sense, the coefficient on *Permissive*Major* is negative and statistically significant, and when combined with the coefficients on *Permissive Reform* we get an effect of more than 6 points.[25] In contrast, neither the constitutive nor the interactive term is statistically significant in the case of restrictive reforms. Hence, we find initial evidence about the lack of universal impact of electoral engineering on levels of disproportionality. In short, like in Shugart's (2008) work on electoral reforms, we find that the impact of a switch from majoritarian to proportional is greater than the impact of a switch in the opposite direction.

We also find evidence for the third, learning over time hypothesis. This theoretical expectation suggested that the effect of reforms will be higher in the first election held a new electoral system, but this impact will vanish over time. Indeed, the coefficients on *Permissive* and *Restrictive Reform* are negative and positive, respectively, indicating lower and higher values of the least squares index after one electoral system change of such characteristics. At first glance, this third hypothesis bears out as both interaction terms are statistically significant.

[25] Following Brambor et al. (2006), we have calculated substantively meaningful marginal effects and standard errors in order to see if this effect is statistically significant. We come up with a standard error of 1.95 and a t-value of 3.09. Hence, the marginal effect of the interaction term is statistically significant at the 0.01 level.

However, these in principle favorable results will have to be confirmed below by calculating substantively meaningful marginal effects and standard errors (Brambor et al. 2006).

In a similar vein, clear differences between institutionalized and non-institutionalized democracies emerge. However, simply breaking down the sampled countries in these two groups is not enough to demonstrate the impact of democratic age on the levels of disproportionality. In this sense, the coefficient on *DemocraticAge* is positive and statistically significant. This is surprising because it means that consolidated democracies by themselves do not create more opportunities for electoral proportionality once we control for electoral system change and continuity. The absence of conditions favorable to electoral proportionality in new democracies (like a high number of lists) might be either overridden by the presence of permissive reforms or concealed by the high correlation between democratic age and the emergence of new small parties. In addition, the coefficient of *Permissive*Democracy* is positive and statistically significant in Model 7 ($p<0.01$), indicating that the negative effect of a permissive reform on electoral disproportionality tends towards zero as the democracy matures. In other words, these results imply that permissive reforms in contexts of consolidated democracies have relatively weak effects on electoral disproportionality.

A similar pattern emerges in Tables 4 and 5. As is apparent in the first three models of the latter, permissive reforms heavily affects the fluctuations in the values taken by the least squares index in new democracies. In contrast, the coefficient of *Permissive Reforms* is almost always smaller in established democracies. However, this situation tends to get reversed in the case of restrictive reforms. This second finding is probably well explained by the low number of observations that come from non-consolidated democracies. In addition, as far as consolidated democracies are concerned, permissive major reforms seem to be the only electoral system change that affects the levels of disproportionality once we take into account the size of the institutional change; and the effects of both restrictive and permissive reforms tend towards zero over time.

[Tables 4 and 5 about here]

Finally, we plot in Figures 1 to 3 the conditional effect of the different types of reforms on the levels of disproportionality for a reasonable range of values of the modifying variables (the number of elections after the reform and the length of democratic rule when the reform is adopted, respectively). According to Brambor et al. (2006) and Kam and Franzese (2007), the effect of an interaction term cannot be evaluated through the *p*-value shown in the regression table. Thus, it is necessary to graphically illustrate the marginal effect of our main independent variable (that is, electoral reform) on the levels of disproportionality over time.[26] As predicted in the hypotheses section, the presence of a permissive reform has a strong reductive effect on electoral disproportionality just after the adoption of the new rules. However, figure 1 also shows this impact stop having a statistically significant effect once about five elections have taken place under the new system. Hence, the results presented here clearly indicate that permissive reforms only can be expected to have a constraining impact on electoral disproportionality when the number of elections since the last electoral system change is low enough. Likewise, we can see in Figure 2 that, when we take into account this temporal dependency, restrictive reforms seem to have a tiny positive effect on the levels of disproportionality (of around one point) in the first election right after the new system is adopted. Nevertheless, this impact disappears quite quickly and is not statistically distinguishable from zero from the second election onwards. Finally, as Figure 3 indicates, the expected marginal effect of a permissive reform in a recently-democratized country (that is, when the years of democracy are equal to zero) is huge (more than seven points).[27] However, this effect, as hypothesized, tends to drop towards zero as democracy

[26] To carry out the simulations, we will represent in the vertical axis of a graph the magnitude of the marginal effect of the reform, and on the horizontal axis, the different values of the modifying variable. The continuous line represents the changes of such effect as contextual conditions are modified. The discontinuous lines represent the confidence intervals that will indicate when is the marginal effect statistically significant ($p<0.01$); this will be the case when the two confidence intervals are simultaneously above or below 0. We are grateful to Matt Golder for kindly providing in his *web* page the STATA codes to graph the simulations of the multiplicative models used in Brambor et al. (2006).

[27] We recognize that this situation is a bit unrealistic because it assumes that two elections take place in the first democratic year, and a more permissive system is adopted in the meantime.

matures, and does not produce any statistically significant change in the levels of disproportionality after 50 years of democracy.[28]

[Figures 1 to 3 about here]

Testing the mechanisms

How can we explain these tiny fluctuations in the levels of disproportionality after an electoral reform? In order to answer this question, we present some additional models in Table 6 in which the dependent variable is the change in the difference between the effective number of electoral parties and the effective number of legislative parties.[29] The results of these regressions should be interpreted as follows. Given that a permissive (restrictive) electoral system change is expected to have a positive (negative) impact on party system fragmentation at both levels, a non-significant coefficient of the reform variables would strongly support the existence of two effects of similar magnitude. On the contrary, a significant coefficient would strongly support the existence of a difference in the change of party system fragmentation between the electoral and the legislative arenas.

[Table 6 about here]

[28] Keep in mind that both modifying variables have been logged. So, in order to get interpretable results, we have to re-exponentiate them.

[29] Hence, the dependent variable is calculated according to the following formula:

$$DV = [1/\Sigma\, v_i^{\,2} - 1/\Sigma\, s_i^{\,2}]_{t+1} - [1/\Sigma\, v_i^{\,2} - 1/\Sigma\, s_i^{\,2}]_t,$$

where v_i is the percentage of vote obtained by party *i* and s_i is the percentage of seats obtained by party *i*.

The coefficients on *Permissive Reform* are statistically significant at the 0.01 level and have the expected negative sign indicating that an electoral system change of this type is associated with a smaller gap between the party system fragmentation at the electoral and the legislative level. Further, every restrictive reform widens the difference between the effective numbers of electoral and legislative parties by 0.2-0.4. Moreover, we also find evidence here of two interaction effects. First, the number of elections after the reform attenuates the positive effect of the restrictive reforms on the gap between the party system fragmentation at the electoral and the legislative level. And second, the number of years under democracy diminishes the negative effect of the permissive reforms on the gap between the party system fragmentation at the electoral and the legislative level. In other words, a quicker correction of the deviation in the difference between levels of party system fragmentation seems to take place in established democracies. In sum, the regression estimates in this last table strongly supports our expectations by suggesting that the higher sensitivity of the effective number of legislative parties to reforms provokes the fluctuations in the levels of disproportionality.

Conclusions

Although the variables explaining party system fragmentation have been investigated extensively, considerably less is known about the determinants of electoral disproportionality (Grofman 1999; Lijphart 1985; Shugart 2008). And this gap is particularly surprising giving the ubiquity of this phenomenon across different electoral systems. In fact, the effects of electoral laws upon the parliamentary representation of political parties comport with the Matthew's Principle, producing a persistent bias in favor of strong parties as against their weaker competitors (Rae 1971: 134).[30]

Because of the relatively wide spread of electoral reforms during the last decades, and their huge heterogeneity in terms of the components of the systems that were modified and the

[30] Rae (1971: 134) himself includes Mathew 13:12: "For whosoever hath, to him shall be given, and he shall have more abundance: but whosoever hath not, from him shall be taken away even that he hath".

countries in which the reforms were adopted, we have argued in this paper that changes in the institutional features of the electoral systems generate fluctuations in the disproportionality of electoral outcomes. How much does the instability of the rules of the game matter in predicting changes in electoral disproportionality? To what degree does the size of the electoral reform, the number of contests after the institutional change, or the length of the current democratic rule modify the impact of these episodes of electoral engineering?

The results of this study support the proposition that electoral reforms generate levels of disproportionality that differ from those generally observed in scenarios of institutional continuity. In particular, permissive electoral system changes decrease disproportionality in electoral outcomes; and, likewise, restrictive reforms increase it. In general, the former have a stronger effect than the latter. Moreover, this study also shows the modifying effect of the size of the electoral reform, the number of elections that take place after it, and the democratic age. Therefore, our paper questions the validity of analyses that treat the effect of reforms as essentially linear. Specifically, major electoral reforms are more strongly related to the different changes in the levels of disproportionality; and the effects of reforms are likely to be bigger in the elections just after the rules change. Our analysis suggests as well that, rather than assuming deterministic effects of the electoral systems, it takes several years (or even decades) with the same electoral system before its overall impact on levels of disproportionality can be evaluated (Taagepera and Shugart 1989: 236; Taagepera 2007: 273).

One of the main results of the paper lies in the interaction between electoral reforms and democratic age. When electoral reforms are adopted in young democracies, the combination of the lack of information about the exact working of the new rules and the relative weakness of parties render voters less likely to electorally react to new incentives generated by them. However, this pattern considerably changes over time. For example, in countries which have been democratic for over 50 years, when a permissive reform is adopted, citizens, elites or both immediately update their behavior and subsequently minimize the effect of the electoral system change.

The findings presented in this article are not in and of themselves sufficient to provide a robust theory of the causes of changes in electoral disproportionality. For instance, we know that voter coordination is more difficult when more parties contest elections (Cox 1997), so that what looks like erratic behavior on the part of voters may really be driven by the actions of parties (Tavits and Annus 2006). In this sense, what we have not identified yet is the causal effect of overcrowded ballots on electoral disproportionality. Additionally, without a way to randomly assign electoral reform, its effect cannot be distinguished from the potential – if any – impact of other variables leading to its adoption. Thus, future comparative studies are necessary in order to address this potential problem of causality and clearly specify the causal path between electoral reforms and consequences on disproportionality. And similarly future analyses should be conducted on the effects of reforms in the intraparty dimension of electoral systems.

The relevance of those problems seems to contradict those who claim, as Shugart (2008: 51) did, "that the agenda of proportionality and number of parties is largely closed (…)" and that it should only be room for some fine-tuning. There are still many research questions which need to be addressed in the field of disproportionality, still suffering from low levels of both comparatively systematic empirical analyses and integrated theorization on causal mechanisms among the main variables. Besides its intrinsic paramount relevance for the field of electoral systems, the establishment of the conditions that affect electoral disproportionality has important practical implications. For instance, and just mentioning a few of them, the emergence of inaccuracies in the transformation of votes into seat shares can entail the election of legislators that lack ideological congruence with their constituents (Blais and Godet 2006; Golder and Stramski 2010; Powell 2000). Further, if rules repeatedly fail to produce a close correspondence between the amounts of votes and seats that obtain each party, considerable segments of citizens may increase their distance from the political system and stop participating in electoral politics (Blais 2006; Cox 1999; Franklin 2004), feel less politically efficacious (Banducci and Karp 2009: 127), or simply experience less satisfaction with the democratic process (Listhaug et al.

2009).[31] And there is also the stream of arguments which have been used in debating the advantages and disadvantages of electoral disproportionality in a more normative fashion. In this sense, while some of them consider that proportionality is a major goal of electoral systems and a major criterion by which they should be judged because of its direct impact in minority representation (Lijphart 1994: 140), others have been traditionally emphasizing the convenience of hampering it (Hermens 1941).

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[31] In the same vein, Golder (2006 and 2005) and Persson and Tabellini (2003) examine the impact of electoral disproportionality on the likelihood of pre-electoral coalitions and fiscal policies, respectively.

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Table 1. Levels of electoral disproportionality (least squares index) in 657 elections and 59 countries, 1945-2010

Country[a]	Number Elections	Number Electoral Reforms[b]	Mean Disprop.	Standard Deviation Disprop.	Last Election Disprop[c]	Country[a]	Number Elections	Number Electoral Reforms[b]	Mean Disprop.	Standard Deviation Disprop.	Last Election Disprop[c]
Albania	3	2	15.3	12.9	7.6	Italy	16	3	4.05	2.35	5.73
Argentina	10	0	7.1	2.33	10	Japan	20	0	6.88	3.07	15.1
Australia	25	2	9.06	2.68	10.3	Latvia	5	2	5.2	1.21	4.77
Austria	19	1	2.49	1.25	2.92	Lithuania	5	3	10.3	3.62	11.1
Belgium	21	2	3.35	0.78	3.77	Luxembourg	14	0	3.33	1.24	4.22
Bolivia	7	2	5.06	1.81	3.76	Macedonia	4	2	16.1	13	5.16
Brazil	6	0	4.69	1.45	3	Malta	17	2	3.37	2.99	1.44
Bulgaria	7	2	6.91	2.96	7	Mexico	4	0	8.68	5.79	10.5
Canada	20	0	11.7	5.05	10.1	Moldova	5	3	9.54	4.79	2.94
Chile	5	0	6.63	0.88	6.87	Netherlands	19	1	1.26	0.28	0.81
Colombia	16	4	3.35	1.94	3.97	N. Zealand	22	1	9.2	5.43	3.84
Costa Rica	14	1	5.06	2.18	7.53	Nicaragua	3	1	3.41	1.42	3.18
Croatia	3	0	8.03	1.39	7.58	Norway	16	3	4.29	1.57	3.01
Cyprus	8	3	6.78	9.46	2.42	Panama	2	0	13.9	1.92	12.5
Czech R.	5	1	6.87	1.63	8.76	Peru	5	1	9.57	3.86	14
Denmark	24	4	1.73	0.91	0.72	Poland	6	3	8.33	5.22	4.67
Dominican R.	6	2	8.03	5.39	4.99	Portugal	12	0	4.64	1.06	5.63
Ecuador	9	1	9.08	4.25	4.59	Romania	6	2	4.94	2.79	3.32
El Salvador	9	1	4.92	2.39	3.35	Russia	4	1	8.59	4.52	4.33
Estonia	5	1	5.21	1.94	3.43	Slovakia	5	2	5.76	1.77	7.46
Finland	17	0	3	0.8	3.2	Slovenia	5	1	3.81	1.46	3.89
France	12	4	12.1	7.09	13.6	Spain	9	0	6.93	2.13	4.49
Germany	17	2	2.76	1.54	3.4	Sweden	19	1	2.05	0.73	3.02
Greece	12	4	7.23	2.64	7.29	Switzerland	16	0	2.58	0.86	2.56
Guatemala	2	1	11.5	2.12	9.95	Ukraine	5	2	8.76	4.1	3.59
Honduras	6	0	2.55	0.91	4.08	U. Kingdom	17	0	11.7	4.97	15.1
Hungary	6	1	10.8	4.06	11.7	U. States	32	0	4.77	2.62	4.01
Iceland	20	1	3.84	2.96	2.58	Uruguay	5	0	0.85	0.34	1.1
Ireland	18	0	4.02	1.6	5.85	Venezuela	9	3	5.61	1.7	8.34
Israel	18	5	1.88	0.81	1.61	Total	657	84	5.57	4.46	5.85

[a] There are two ways in which we calculate disproportionality in mixed member systems. First, the figures can be based on total votes (sum of list and nominal votes) and total seats like in Japan from 1996 onwards, or Lithuania between 1992 and 2000. Second, the measures in all the rest of countries that use one of these electoral systems are based on list votes and total seats. Finally, figures in France are based on first-round votes.
[b] Reforms that either are not expected to change the overall disproportionality of the electoral system, or whose effect in the interparty dimension is undetermined are not considered.
[c] In the last column, the displayed data come from the following elections: Albania 2009, Argentina 2001, Australia 2007, Austria 2008, Belgium 2010, Bolivia 2009, Brazil 2006, Bulgaria 2009, Canada 2008, Chile 2009, Colombia 2002, Costa Rica 2006, Croatia 2007, Cyprus 2006, Czech Republic 2010, Denmark 2007, Dominican Republic 2002, Ecuador 1998, El Salvador 2009, Estonia 2007, Finland 2007, France 2007, Germany 2009, Greece 2009, Guatemala 2003, Honduras 2005, Hungary 2010, Iceland 2009, Ireland 2007, Israel 2009, Italy 2008, Japan 2009, Latvia 2006, Lithuania 2008, Luxembourg 2009, Macedonia 2006, Malta 2008, Mexico 2009, Moldova 2009, Netherlands 2010, New Zealand 2008, Nicaragua 2001, Norway 2009, Panama 1999, Peru 2006, Poland 2007, Portugal 2009, Romania 2008, Russia 2007, Slovakia 2010, Slovenia 2008, Spain 2008, Sweden 2006, Switzerland 2007, Ukraine 2007, U. Kingdom 2010, U. States 2008, Uruguay 2009, and Venezuela 2000.

Source: Michael Gallagher's dataset (www.tcd.ie/Political_Science/Staff/Michael.Gallagher/ElSystems/index.php), and Armingeon et al. (2010) and Armingeon and Careja (2010).

Table 2. Descriptive Statistics

Variable	Mean	Std. Dev.	N
Δ Disprop.	-0.14	3.65	596
Permissive Reform	0.07	0.26	707
Restrictive Reform	0.05	0.23	707
Major Reform	0.03	0.17	707
# Elections after Reform (logged)	1.45	0.91	648
Years of Democracy (logged)	3.26	0.96	688

Table 3. Determinants of changes in electoral disproportionality, new and established democracies (1945-2010)

VARIABLES	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Δ Disprop. (t-1)	-0.404***	-0.397***	-0.386***	-0.418***	-0.419***	-0.401***	-0.408***
	(0.0379)	(0.0352)	(0.0353)	(0.0361)	(0.0358)	(0.0357)	(0.0358)
Permissive Reform	-2.654***	-2.833***	-2.176***	-0.974***	-2.072***	-3.293***	-7.523***
	(0.574)	(0.571)	(0.612)	(0.471)	(0.826)	(0.541)	(2.222)
Restrictive Reform	0.81	1.320***	0.679	0.871*	1.299*	0.755	-1.522
	(0.673)	(0.663)	(0.723)	(0.591)	(0.926)	(0.636)	(2.415)
Major Reform		-2.498***	-1.173				
		(0.803)	(1.665)				
Permissive*Major			-3.880**				
			(2.053)				
Restrictive*Major			1.132				
			(2.148)				
# Elections(logged)				0.598***	0.301		
				(0.201)	(0.343)		
Permissive*# Elections					0.777**		
					(0.437)		
Restrictive*# Elections					-1.333**		
					(0.739)		
Democratic Age(logged)						0.484***	0.358**
						(0.199)	(0.209)
Permissive*Democracy							1.366***
							(0.696)
Restrictive*Democracy							0.731
							(0.757)
Constant	-0.0633	-0.117	-0.114	-1.102**	-0.502	-1.719**	-1.284**
	(0.131)	(0.209)	(0.211)	(0.541)	(0.737)	(0.674)	(0.711)
N (Observations)	535	535	535	535	535	529	529
J (Countries)	57	57	57	57	57	57	57
Adjusted R^2	0.223	0.228	0.235	0.21	0.218	0.225	0.228

Note: The dependent variable is the change in the Gallagher's Index of Electoral Disproportionality; all models are random effects except for Model 1, which is estimated with fixed effects; standard errors are given in parentheses; *** p<0.01, ** p<0.05, * p<0.1 (one-tailed tests).

Table 4. Determinants of changes in electoral disproportionality, established democracies (1945-2010)

VARIABLES	(1)	(2)	(3)	(4)	(5)
Δ Disprop. (t-1)	-0.427***	-0.417***	-0.409***	-0.433***	-0.435***
	(0.0479)	(0.0463)	(0.046)	(0.0472)	(0.0468)
Permissive Reform	-2.274***	-1.547**	-0.515	-0.371	-1.703**
	(0.769)	(0.781)	(0.847)	(0.326)	(0.907)
Restrictive Reform	1.147	1.921**	0.813	0.924	1.692*
	(1.00)	(0.961)	(1.087)	(0.615)	(1.101)
Major Reform		-2.472***	-0.701		
		(1.019)	(1.872)		
Permissive*Major			-5.363**		
			(2.436)		
Restrictive*Major			1.605		
			(2.651)		
# Elections(logged)				0.325*	0.028
				(0.208)	(0.326)
Permissive*# Elections					0.710**
					(0.43)
Restrictive*# Elections					-1.661**
					(0.942)
Constant	0.149	0.163	0.152	-0.461	0.195
	(0.15)	(0.145)	(0.144)	(0.501)	(0.749)
N (Observations)	361	361	361	358	358
J (Countries)	22	22	22	21	21
Adjusted R^2	0.218	0.235	0.254	0.210	0.231

Note: The dependent variable is the change in the Gallagher's Index of Electoral Disproportionality; all models are random effects except for Model 1, which is estimated with fixed effects; standard errors are given in parentheses; *** p<0.01, ** p<0.05, * p<0.1 (one-tailed tests).

Table 5. Determinants of changes in electoral disproportionality, new democracies (1966-2010)

VARIABLES	(1)	(2)	(3)	(4)	(5)
Δ Disprop. (t-1)	-0.375***	-0.379***	-0.370***	-0.393***	-0.391***
	(0.0613)	(0.0541)	(0.0547)	(0.0583)	(0.0581
Permissive Reform	-3.018***	-3.753***	-3.372***	-0.225	-2.339
	(0.874)	(0.84)	(0.892)	(0.961)	(1.957)
Restrictive Reform	0.527	1.012	0.669	1.784*	1.195
	(0.932)	(0.919)	(0.984)	(1.086)	(2.019)
Major Reform		-2.388**	-1.404		
		(1.26)	(3.141)		
Permissive*Major			-2.634		
			(3.649)		
Restrictive*Major			0.649		
			(3.751)		
# Elections(logged)				1.169***	0.418
				(0.481)	(1.06)
Permissive*# Elections					1.667*
					(1.233)
Restrictive*# Elections					-0.703
					(1.458)
Constant	-0.431*	-0.401	-0.388	-2.568**	-1.181
	(0.245)	(0.339)	(0.348)	(1.081)	(1.834)
N (Observations)	189	189	189	177	177
J (Countries)	37	37	37	36	36
Adjusted R^2	0.239	0.229	0.226	0.213	0.212

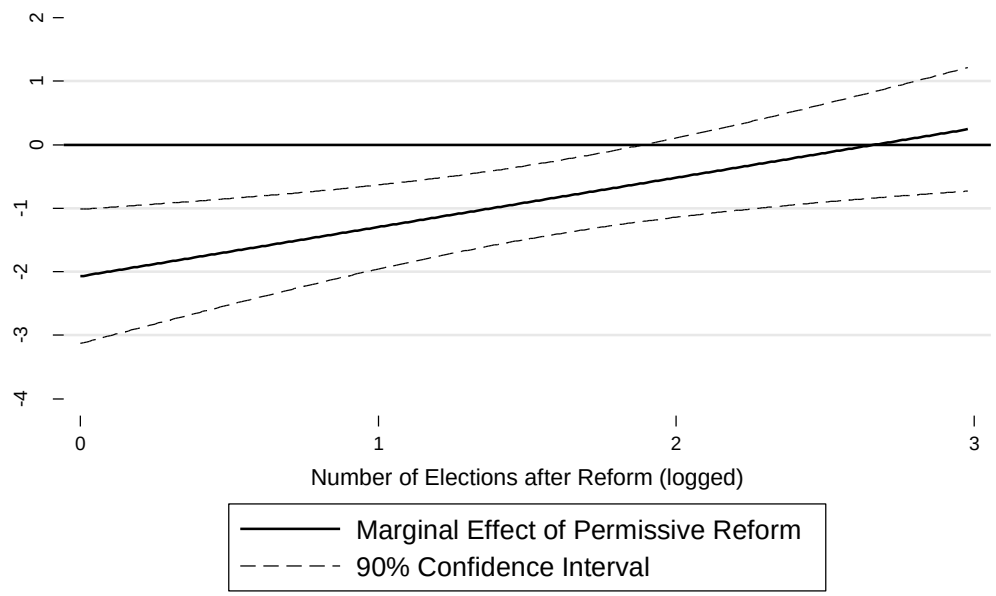
Note: The dependent variable is the change in the Gallagher's Index of Electoral Disproportionality; all models are random effects except for Model 1, which is estimated with fixed effects; standard errors are given in parentheses; *** p<0.01, ** p<0.05, * p<0.1 (one-tailed tests).

Table 6. Determinants of changes in the difference between the effective number of electoral parties and the effective number of legislative parties, new and established democracies (1945-2010)

VARIABLES	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Δ ENEP-ENPP (t-1)	-0.440***	-0.307***	-0.302***	-0.339***	-0.339***	-0.325***	-0.327***
	(0.0405)	(0.038)	(0.0385)	(0.0385)	(0.0383)	(0.0381)	(0.038)
Permissive Reform	-0.425***	-0.362***	-0.324***	-0.04	-0.158	-0.447***	-1.141***
	(0.115)	(0.115)	(0.122)	(0.0902)	(0.174)	(0.112)	(0.378)
Restrictive Reform	0.333***	0.427***	0.426***	0.208**	0.423**	0.300**	0.834*
	(0.135)	(0.136)	(0.148)	(0.116)	(0.193)	(0.132)	(0.51)
Major Reform		-0.589***	-0.264				
		(0.171)	(0.358)				
Permissive*Major			-0.498				
			(0.441)				
Restrictive*Major			-0.315				
			(0.459)				
# Elections(logged)				0.0898**	0.0725		
				(0.042)	(0.0727)		
Permissive*# Elections					0.0893		
					(0.0919)		
Restrictive*# Elections					-0.375***		
					(0.156)		
Democratic Age(logged)						0.0824**	0.0673*
						(0.0418)	(0.0446)
Permissive*Democracy							0.236**
							(0.122)
Restrictive*Democracy							-0.178
							(0.161)
Constant	-0.00631	-0.0283	-0.0297	-0.210**	-0.175	-0.301**	-0.249*
	(0.0274)	(0.0483)	(0.0485)	(0.104)	(0.154)	(0.142)	(0.152)
N (Observations)	544	544	544	544	544	537	537
J (Countries)	58	58	58	58	58	58	58
Adjusted R^2	0.24	0.246	0.247	0.229	0.237	0.229	0.241

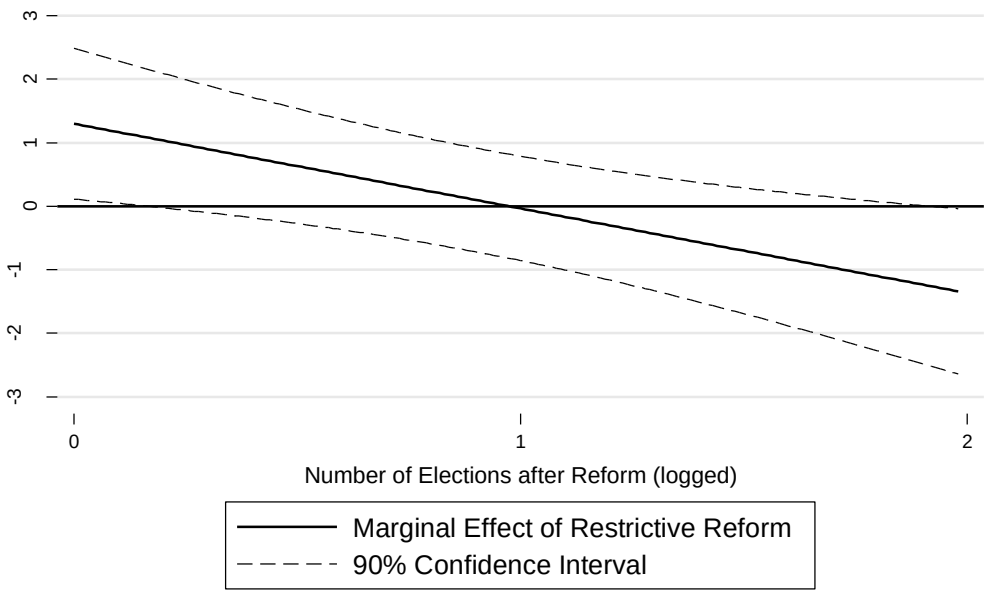
Note: The dependent variable is the change in the difference between the Laakso and Taagepera's effective numbers of electoral and legislative parties; all models are random effects except for Model 1, which is estimated with fixed effects; standard errors are given in parentheses; *** p<0.01, ** p<0.05, * p<0.1 (one-tailed tests).

Figure 1. Marginal Effect of Permissive Reform on Disproportionality Over Time



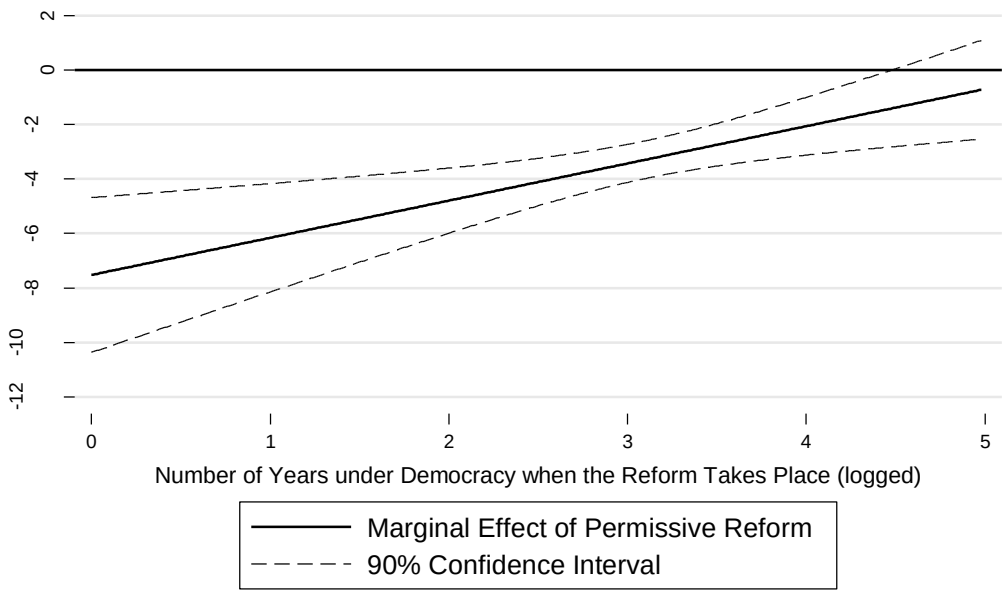
Note: Results are derived from Table 4, Model 5.

Figure 2. Marginal Effect of Restrictive Reform on Disproportionality Over Time



Note: Results are derived from Table 4, Model 5.

Figure 3. Marginal Effect of Permissive Reform on Disproportionality Over Time



Note: Results are derived from Table 4, Model 7.