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Can Electoral Laws Increase Women's Representation?

Andrew Roberts
Faculty Fellow, Institute for Policy Research
Professor of Political Science
Northwestern University

Jason Seawright
Assistant Professor of Political Science
Northwestern University

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Abstract

Numerous studies have found that proportional electoral rules significantly increase women's representation in national parliaments relative to majoritarian and mixed rules. These studies, however, suffer from serious methodological problems including the endogeneity of electoral laws, poor measures of cultural variables, and neglect of time trends. This paper attempts to produce more accurate estimates of the effect of electoral rules on women's representation by using within-country comparisons of electoral rule changes and bicameral systems as well as matching methods. The main finding is that the effect of electoral laws is not as strong as in previous studies and varies across cases. Changes in electoral laws are unlikely to provide a quick and consistent fix to the problem of low women's representation.

One of the most important political developments of the last century has been the increasing representation of women in politics. At the turn of the twentieth century, almost no women held national-level political positions. Today, women are represented to a non-trivial degree in all democratic parliaments.

There are nevertheless significant cross-national differences in the degree of women's representation. While women have achieved near parity with men in some Scandinavian countries, women still play a small role in other democracies. Even within countries, there are large differences in trends. In some countries, women's representation has increased dramatically over a short period of time, in others it has increased at a slow but constant rate, and in yet others it has remained stagnant or even dropped.

What explains these differences? A number of explanations have been advanced in existing works including cultural attitudes towards women, strength of women's organizations, and levels of democracy, but one has stood out as particularly important. Virtually all studies have found that countries with party-based proportional electoral systems elect far more women to parliament than countries with candidate-based plurality systems.

This finding is important because, in contrast to other causes of women's representation, electoral systems can be consciously manipulated. If a country wishes to raise the percentage of women elected to parliament, the electoral rule is one of the few means it has under its direct control. Changes to a country's culture, the societal status of women, or level of democracy are far less susceptible to political engineering.

But how robust is the finding that electoral rules affect women's representation? There are a number of reasons to question existing studies. Four shortcomings are particularly evident. First, researchers typically compare a set of countries at a single point in time, an approach that turns both country-specific and more universal time trends into potentially problematic omitted variables. Second, measurements of the cultural determinants of women's representation are often crude; most studies use dummy variables for region or religion with the potential for serious omitted variable bias. Third, the problem of endogeneity – the fact that women's representation and electoral rules are jointly determined – is usually ignored. Fourth, studies usually assume that the effect of electoral laws is constant across time and space. Some recent work by contrast finds that the effect of electoral laws depends on context.

This paper estimates the effect of institutional change on women's parliamentary representation using a number of different research designs in order to explore the importance of these methodological difficulties. In the first place, we look at changes over time to account for strong time trends in women's representation. Second, we use within country comparisons rather than cross-national comparisons in order to sidestep the difficulties in measuring attitudes towards women. Finally, we employ matching methods as a way of dealing with the potential problems of endogeneity and causal heterogeneity.

The main result of the paper is that the effect of electoral laws is smaller and more variable than existing studies claim. While a switch to a more proportional electoral system may improve women's representation in some cases, the effect is sometimes absent and when present not always large. Indeed, there is evidence that in some cases proportional rules may actually decrease women's representation. We believe these inconsistent results suggest that there is considerable causal heterogeneity at work. Electoral laws may have different effects in different times and places. As a result, the general policy prescription that countries should switch to proportional representation electoral systems in order to increase women's representation is unsupported.

I. Literature

Women's representation has received considerable attention from political scientists and sociologists. The reasons for this interest are clear. In the first place are concerns with justice. Arguments for descriptive representation claim that members of ethnic, religious, or gender groups are uniquely qualified to represent those groups. Due to their distinctive life experiences, they have a better understanding of the needs and desires of members of those groups than others.

There is in fact increasing evidence that female representatives do in fact behave differently than male representatives and better convey the preferences of female citizens to the political arena. Thus, female representatives appear more likely than their male counterparts to see women voters as important constituents, to have distinctive policy priorities, and to write and sponsor bills of greater concern to women (see Paxton and Hughes 2007, chapter 7 for a summary of research).

There are also arguments that women's representation can have wider benefits (Paxton and Hughes 2007: 14-16). It increases the pool of talent available to the political system. It creates more diverse assemblies and thus larger opportunities for deliberation, innovation, and catching mistakes (Page 2007). Finally, female representatives may serve as role models for younger women and inspire them to participate and contribute to politics in new ways.

Given strong normative reasons for being interested in women's representation, how do we explain why there are large differences across countries? Most existing works have assessed the causes of women's representation in roughly similar ways. The standard setup is to compare the percentage of women in the national legislature across a group of countries at a single moment in time. Scholars thus estimate women's representation as a function of a set of covariates, usually using ordinary least squares (for examples, see Kenworthy and Malami 1999, Matland 1998, Norris 2004, Paxton and Kunovich 2003, Reynolds 1999, Rule 1987, Siaroff 2000).[1]

Such regression estimates are obviously common in the social sciences and provide a useful general summary of data. However, for purposes of causal inference, regression

[1] An exception is Paxton, Hughes, and Green (2006) who use hazard models to estimate the dates at which countries attained different thresholds of representation.

estimates involve a wide range of complexities. Of course, there are the well-known problems of omitted variables and choosing a functional form. Additionally, when the causal effect of interest varies from case to case, regression estimates a difficult-to-interpret weighted average of cases' specific effects (Angrist 1998). As will be discussed in more detail below, there is reason to think that the weighted averages produced by application of regression in most studies of women's representation are misleading, or at least they oversimplify.

The independent variables in these studies are typically grouped into three classes: socio-economic, political, and cultural. Socio-economic variables include levels of economic development, the education levels of women, the position of women in the labor force, and the strength of women's movements. Cultural factors encompass attitudes towards women and egalitarianism, but are typically measured by the dominant religion in a country or its geographic region. Recent works, however, have begun to use cross-national opinion polls (Paxton and Kunovich 2005). Finally, political factors include democracy, the representation of right or left parties, and the variable we are interested in, electoral laws.

While the results of these studies are not entirely uniform, the most consistent effects are found for cultural and political variables. Among the cultural variables, a Muslim or Catholic heritage and less accepting attitudes towards women in politics have been shown in numerous studies to be associated with lower levels of women's representation. By contrast, "Measures of social structure are inconsistent predictors of women's representation in national politics" (Paxton and Hughes 2007: 132). Factors like the average educational attainments or occupational positions of women do not typically have large effects.

On political factors, democracy itself has little effect on women's representation, while greater representation of leftist parties has inconsistent effects. But electoral rules emerge as one of the most important causes of the percentage of women in national legislatures. As Paxton and Hughes (2007: 137) put it, "It is generally accepted that women do better in gaining political office under PR electoral systems." The effects are also substantively large. According to Norris (2004), "As a simple rule, women proved almost twice as likely to be elected under proportional than under majoritarian electoral systems." She finds an average of 15.4% women in proportional systems versus 8.5% in plurality ones. The size of the effect of course declines when other controls are entered. The type of PR also appears to matter, with larger district sizes leading to higher percentages of women.[2]

[2] A related finding is that quotas for women – the legal requirement that a certain percentage of candidates or elected officials – increase women's representation. However it is not clear whether quotas are an exogenous cause or an intermediary variable. Since quotas mandate that women must be placed in electable positions, it is almost inevitable that they will increase women's representation if designed correctly. The question is why countries or parties adopt these quotas and the answer may be in the factors cited above (Caul 2001). Because of these results, we take care in the analyses below to consider the introduction of quotas.

II. Methodological Issues

While these studies have accumulated substantial evidence that there is a statistical relationship between electoral rules and women's legislative representation, conditional on a variety of factors, a number of methodological issues complicate interpreting these statistical relationships as causal.

In the first place, there are strong time trends in women's representation. Not only has women's representation been increasing in general over time, but the rates of increase have varied dramatically over countries. Paxton and Hughes (2007) in fact identify five major patterns of changes that they call "flat", "increasing", "big jump", "small gains", and "plateaus" and three subgroups of "high", "medium", and "low" within each pattern. The timing of changes likewise varies across countries. For example, countries that experienced a "big jump" did so at different times.

Given these patterns and the fact that there is no consensus explanation for why time trends vary from country to country, estimating the effects of electoral systems at a single point in time is problematic. There is a good chance that the variation in time trends will be associated with the electoral system variable, confounding causal inference and making electoral systems seem more – or less – important than they are. Better strategies might include modeling the time trend or comparing countries with similar time trends. However, because the causal processes behind countries' time trends are at best dimly understood, both of these possibilities present challenges of their own. Without a clear understanding of the dynamics driving time trends, it is difficult to specify a model that would fully eliminate them from an analysis of institutional change. Partial solutions are, of course, available; one is explored below.

A second problem is omitted variable bias. A consistent result of existing studies is that attitudes towards women are a key determinant of women's representation. But these attitudes are difficult to measure. Most studies rely on dummy variables for religious traditions, but these variables are both crude and constant. Diverse countries are grouped together and attitudes are assumed to be unchanging over time. As a result, there is likely to be considerable measurement error. A recent work by Paxton and Kunovich (2003) has produced a far better measure of attitudes by looking at answers to questions on women in the World Values Survey, but this survey is limited in its temporal and spatial coverage and was not designed to measure the willingness of voters to elect women.

Omitted variable bias arises because these attitudes and electoral systems are correlated. In the first place, it is likely that electoral systems are chosen because of particular cultural characteristics and may influence them in turn. As we describe below, the mechanism through which electoral systems affect women's representation runs in large part through attitudes. Women do worse in plurality systems because voters prefer to elect a man in one-on-one contests, but are more accepting of women if multiple positions are chosen. If attitudes are poorly measured, we can then expect bias in the estimated coefficients on electoral rules.

A third concern is endogeneity. Electoral rules are not randomly assigned to countries. As Persson and Tabellini (2003: 114) write, "It is quite possible that countries self-selected into [electoral systems] on the basis of cultural traits and historical experience, which also shape long-run collective preferences and thus influence policy and performance even today." Indeed, a common purpose in choosing electoral rules is to support or hinder the representation of specific groups, women potentially among them (Rokkan 1970, Boix 1999). It may also happen that women play a role in choosing or altering electoral rules.

Fourth, it may further be the case that the effects of electoral rules differ across time and space. Proportional representation may encourage women's representation in Europe, but not in Africa (see Matland 1998). Several recent works have found that the effect of electoral rules depends on context (Amorim Neto and Cox 1997, Ordeshook and Shvetsova 1994). While such effects could be modeled in the traditional framework – for example, with interaction terms – the relevant factors may not be fully observed and may interact in non-linear ways. It may be better to engage in local comparisons of like with like in order to produce more reliable estimates, or alternatively to adopt methods of analysis that explicitly allow for heterogeneous causal effects.

A final concern that we do not address in this paper is the mechanism through which electoral laws affect women's representation. Several mechanisms have been put forward to explain why PR systems advantage women, but none has been explicitly tested. First, voters may be hesitant to choose women in head to head contests with men. This may lead parties to select fewer female candidates and fewer of the ones chosen to be elected. By contrast, in PR systems, "Rather than having to look for a single candidate who can appeal to a broad range of voters, party gatekeepers think in terms of different candidates appealing to specific subsectors of voters" (Matland 2002: 6).

Second, internal party politics may matter. Parties may be less willing to choose female candidates if it means displacing entrenched males. This may be because these males have power within the party or because they have built up a personal vote in a single-member district which the party is loath to lose.

A third mechanism focuses on nominating processes. In plurality systems, candidates are often chosen at the local level where balancing of men and women is impossible. In proportional systems, candidates are often chosen centrally where balancing is possible. Another mechanism pays attention to incumbency rates. Higher incumbency rates in plurality systems (70% in plurality systems versus 66% in PR systems according to Norris 2004) may lead to fewer free seats in plurality systems though differences between the two systems should decline over time. Finally, PR systems are more conducive to affirmative action strategies like quotas which are harder to introduce in plurality systems.

Few of these mechanisms have been directly tested in existing work. This paper unfortunately also does not provide direct tests. We will point out in the conclusion potential tests for future scholars. It is important to note here that different mechanisms have different implications which should be drawn out more clearly in empirical testing.

III. Changes in Electoral Laws

Two of our main worries about analyzing the causes of women's representation are the strong time trends in the data and the lack of good measures of voters' willingness to vote for women. One way of partially addressing these problems is to look at what happens when countries change their electoral laws. This allows us to deal with the average linear time trend – by comparing women's representation before and after law changes – and also provides a degree of control for cultural factors which presumably remain relatively constant within countries at least over short time spans.[3] An additional benefit of this method is that it gives us a sense of the actual consequences of the policy intervention which existing work recommends.

To draw these conclusions, we identified all substantial electoral law changes in countries that qualified as democratic according to Przeworski et al. (2000). Following Lijphart (1984) a substantial change was defined as a change in the average district magnitude by more than 20% or a change in the electoral formula (for example, from proportional to mixed). We identified these changes in Golder (2004). We coded each change as more restrictive – leading to a more majoritarian system – or less restrictive – leading to a more proportional system.

Our search yielded 35 changes in electoral rules in 24 countries.[4] Table 1 presents the countries, the year of the last election in the old system and the first in the new system, and the nature of the change. A country with more than one electoral system change is listed as two separate cases in Table 1 – e.g., Argentina1, Argentina2. Fifteen changes were more restrictive and twenty were less restrictive.

Table 1 about here

Because of the small number of elections in each country, it is difficult to conduct country by country analyses of the effects of an electoral system change. Instead, we combined all of the countries in a single dataset. We further added to the dataset a number of comparable countries that did not change their electoral systems over a similar time period. These countries were chosen because they provided an approximate match to the change countries on the variables of region and economic development as well as baseline levels of women's representation.[5]

To estimate the effects of electoral system changes, we conducted difference-in-differences estimation. This method effectively subtracts out the average time trend in the data and removes any effect of country-specific factors that do not change along with

[3] Lijphart (1994) uses a similar method to assess the effects of electoral systems, but he does not assess women's representation.

[4] We also still working with this data and may uncover additional cases of electoral rule changes. We urge readers to treat these analyses as preliminary.

[5] The control cases were Belgium, Brazil, Bulgaria, Chile, Finland, Germany, Guatemala, Honduras, Ireland, Luxembourg, Netherlands, Paraguay, Peru, Portugal, Romania, Spain, Switzerland, and Uruguay.

institutions such as culture or the economy. The dependent variable is the difference between the percentage of women elected in the two elections prior to the electoral change and the percentage of women elected in the two elected after the change. For the countries without an electoral system change we used the two elections before and after that country reached its mean level of women's representation over the relevant democratic period. Data on women's representation is drawn from the International Parliamentary Union's Women in Politics database and from Paxton, Hughes, and Green (2006).

The independent variables are whether there was an electoral system change toward more or less restrictive institutions and a dummy variable for countries where there was no change. We also controlled for the initial level of women's representation to allow for floor or ceiling effects.

Table 2 presents the results of these models. The variable representing electoral system changes has a coefficient very close to zero and is very imprecisely estimated.[6] In fact, countries with changes in the more restrictive direction tended to have slightly higher increases in women's representation than countries with changes in a less restrictive direction.[7] Neither group was very different from countries with no electoral system change.

Table 2 about here

Breaking the sample into different groups did not alter this impression.[8] If we consider the Latin American countries separately, we see that countries with an electoral change had a greater increase in women's representation than the control group (by about 5.8%), but most of the change countries in fact adopted more restrictive electoral systems. If we consider Western Europe, countries with an institutional change had an average increase in women's representation that was 5.4% less than for the comparison group. Countries that increased and decreased restrictiveness both fell below the comparison group, though as expected the countries that decreased restrictiveness had larger increases than the group that increased restrictiveness.

It may be worth mentioning in detail some of the more dramatic changes in electoral systems in recent years. Three developed democracies dramatically changed their electoral systems in the early nineties and adopted mixed electoral systems. This might have been expected to increase women's representation in New Zealand where the status quo ante was a plurality system and decrease it in previously proportional Italy. Japan is a

[6] Outlier analysis showed that one of the control cases – Romania – was a considerable outlier. Including a dummy variable for Romania revealed even weaker effects for electoral system change.

[7] There are reasons to believe that focusing solely on the change in electoral system might underestimate the strength of the PR effect. Iversen (2005) argues that less restrictive electoral systems give an advantage to the left which in some studies has a positive effect on women's representation (Reynolds 1999, Siaroff 2000). Since we do not control for this effect of an electoral system change we may be overstating the impact of less restrictive systems.

[8] In the next iteration of this paper, we will divide the sample by particular types of electoral system changes.

trickier case as its previous system, single non-transferable vote (SNTV) – combined the high district magnitude of PR and the candidate-centered elections of plurality systems.

In fact, only one of these cases had an unequivocal effect. Figures 1, 2, and 3 show the trends in women's representation for the three countries with the vertical line representing the last election under the old system. While women's representation did rise in New Zealand, there is little difference in the trend before and after the change. Contrary to expectation, women's representation in Italy increased along with the trend line even as institutions became more restrictive. Only Japan shows a clear change – women's representation rose dramatically after the switch – but this is a difficult case to generalize from because of the unique nature of the status quo ante.[9] Another widely discussed case is France's single election experiment with PR (for most of the post-war period it has used a two-round system) in 1986. As Figure 4 shows, this experiment had exactly no effect on women's representation (here the vertical line represents the single election conducted under PR rules).

Figures 1, 2, 3, and 4 about here

What about recent significant changes in less developed countries? Several of these countries have also switched recently to mixed systems (Shugart and Wattenberg 2001). In Bolvia, there was little deviation from the trend when the country switched away from PR; in the Philippines, women's representation actually declined when the majoritarian system was replaced with a mixed system; Venezuela's switch from PR to mixed and then back to PR seemed to have the expected effect in the first case but the opposite effect in the second.

In general, graphical inspection of all of the country cases confirms the impression from Figures 1-4. In most cases there are large increases in women's representation over time which overwhelm any effects caused by electoral system change.

To summarize, there is little strong evidence that adjusting the restrictiveness of electoral systems affects the representation of women. The dominant impression is of strong secular trends in women's representation that overwhelm whatever effect that electoral laws have. The challenge then is to explain the forces underlying these trends rather than the relatively minor alterations in these trends caused by electoral systems.

IV. Bicameral Systems

While changes over time are one source of within-country leverage, another source is the diversity of electoral rules used within a single country. Since many countries elect numerous offices at a single point in time and use different rules for different offices, one

[9] This result suggests that it may be the candidate-centeredness of elections that matters more than the district magnitude.

can compare women's representation in a fixed cultural and temporal context while varying electoral rules.[10]

The obvious place to conduct such comparisons is in bicameral systems where voters typically elect members to both houses at a single point in time under different electoral rules. Such comparisons minimize worries about time trends, endogeneity, and omitted variable bias, the main problems we identified earlier. Cox (1997) has utilized this natural experiment to compare the effects of electoral rules on the number of parties elected to the legislature and found that a modified version of Duverger's law does predict the differences he finds.

In this section, we conduct a similar analysis, but focus instead on women's representation. We expand Cox's analysis in two ways. First, we look at multiple elections in each country because of the strong time trends in the data. (Cox only considers a single election.) Second, we consider the size of the effect. (Cox only generates and tests directional predictions.)

Specifically, we look at all democratic elections in national bicameral systems around the world from the seventies to the present (the period of the largest expansions in women's representation). We leave out bicameral systems where the majority of one house is appointed or indirectly elected or where elections were not generally free and fair.

Figure 5 presents the percentage of women elected in the upper and lower houses for the 21 countries which meet these conditions.[11] Table 2 presents additional information. It first lists all countries and the dates of democratic elections covered. If a country experienced a significant electoral system change (see above), it is listed as two separate cases (e.g., Japan1, Japan2). The next two columns describe the electoral rule and average district magnitude for the upper and lower house.

Figure 5 about here
Table 3 about here

The "Predicted" column shows the theoretical prediction. Positive signs indicate that the lower house should feature higher percentages of women because it has large district magnitudes or a more proportional electoral rule. Negative signs indicate that the upper house should feature more women. There is no clear prediction for countries that have similar rules for both houses.[12]

[10] These comparisons assume that the two elections do not influence each other. This assumption may not be warranted and we discuss it in more detail below. We would note here that the linkage is probably weaker for women's representation than for other party-system variables which are more commonly studied.
[11] Data on women's representation are taken from the IPU Parline database and Paxton, Hughes, and Green (2006). Electoral system data comes from Golder (2005), Johnson and Wallack (2007), and Nohlen (2005).
[12] One difficulty is in comparing countries that have PR with low district magnitudes in one house and a mix of single member districts and large magnitude PR districts in the other.

The results begin with the average difference between the lower and upper house across all elections. The "Fitting elections" column indicates how many elections fulfilled the directional prediction. The trend column reports whether the difference between the two houses over the last three elections is monotonically moving away from zero (rising) or towards zero (falling).

The final column, "Strength of fit", provides a rough summary measure of how well electoral results fit the predictions. "Strong" fitting countries are ones where virtually all elections fit predictions and the average difference is greater than 5% in the correct direction. "Good" fitting means that most elections fit and the average difference is between 2% and 5% in the correct direction. "Weak" fitting means that around half of elections fit and the average difference is between 0 and 2% in the correct direction. "Poor" fitting means that a majority of elections are contrary to predictions and the average difference is in the opposite direction of the prediction.

Table 4 summarizes the results. Three countries – Australia, Dominican Republic, and Japan1 – are strong fits. Seven countries – Belgium2, Colombia1, Czech Republic, Italy1, Romania, Spain, and Switzerland – are good fits. Seven countries – Bolivia1, Brazil, Mexico, Paraguay, Philippines, Poland, and Venezuela2 – are weak fits. And four countries – Argentina, Belgium1, Colombia2, and Uruguay – are poor fits. In short, the cases are about split between good and bad fits.

Table 4 about here

Some difficulties crop up in these comparisons. One difficulty is fused votes. In these systems, voters can only choose one party for both houses. Fused votes applied to Bolivia1, Dominican Republic, Uruguay (to 1997), and Venezuela1. Eliminating these cases removes one case from each category and thus does not alter the overall results. Another problem is that some upper houses are subordinate to the lower houses – they can be overruled by majorities of the lower house – and may be taken less seriously by voters. The clear cases of subordination are Belgium1, Belgium2, Czech Republic, Poland, and Spain which represent three good fits, one weak fit, and one poor fit. Again relative power does not significantly affect the results.

What if we look at different distinctions between electoral rules? The strongest contrasts are a plurality rule with very small district magnitudes in one house and a PR system with reasonably high district magnitudes in the other. The clearest cases of these contrasts are Australia, Brazil, Czech Republic, Dominican Republic, Japan1, Philippines, Poland, Switzerland, and Venezuela. Three of these cases fit strongly (Australia, Dominican Republic, and Japan1), another three are good fits (Czech Republic, Switzerland, and Venezuela1), and three are weak fits (Brazil, Philippines, and Poland).[13] These results provide the strongest support for existing theory, but are still less than overwhelming.

[13] The Philippines might be excused here because its upper house allows voters to cast 12 votes for 12 candidates to be elected in a nationwide district. The identities of the candidates may thus be more important than in a country where voters choose a party list.

What about cases where both houses use some version of PR with differences in district magnitudes? Here the fits are weaker. Five cases have reasonably large differences in district sizes, but include only one good fit (Romania), two weak fits (Bolivia1 and Paraguay), and two poor fits (Colombia2, Uruguay). Another six cases have smaller differences and include one strong fit (Spain), three good fits (Belgium1, Italy1, and Colombia1), and two poor fits (Argentina and Belgium1). Two countries juxtapose a mixed system and a PR system, but for one (Bolivia2) we do not have a clear prediction and Mexico is a weak fit. For the two juxtapositions of mixed systems (Italy2 and Japan2) we also do not have a clear prediction. Finally, three cases have more or less identical systems (Chile, Italy1, and US) with differences only in the number of districts. All three cases elect more women to the house with the larger number of districts.

What about trends in these results? Three cases with good fits exhibit a falling trend, while one strong case and one weak case show a rising trend. In short, only one case (Brazil) shows growing differences in the correct direction.

The short summary of the results is that while most of the differences occur in the predicted direction, many do not and the effects are not large. About half of the cases have average differences of less than 2% and with less than half of the elections producing directional fits. The effects were strongest for countries with large differences in electoral rules where electoral rules usually have the predicted effect. Smaller differences in electoral rules were more ambiguous.

V. Matching Methods

The various estimates discussed up to this point do not focus directly on problems of selection based on observables. It is possible that countries self-select into electoral systems based on factors that are likely to affect levels of women's representation. Estimates that do not take this possibility into account will tend to misestimate the effect of electoral laws, yet, to the extent that the variables in question can be observed and incorporated into an analysis, solutions are available. An additional problem is that the results presented so far are easiest to interpret if the assumption is maintained that there is a single, uniform, and universal effect of electoral institutions on the proportion of elected legislators that are female. This assumption involves a counterfactual, so that it is neither fully nor directly empirically testable. But if it is not met, then the results of the estimates are problematic.

Some techniques do allow us to both correct for selection on observables and to assess whether the effect in question varies across categories of cases. For this purpose, the analysis below will take advantage of matching methods (see Rubin 2006, Rosenbaum 2002, and Morgan and Winship 2007: 87-121), which allow a comparison of countries whose background conditions suggest they would choose similar electoral laws and allow estimation of a variety of different averages of case-specific effects.[14]

[14] The effects estimated by the application of matching methods to observational data are perhaps more accurately described as conditional differences, rather than as causal effects; matching methods only estimate causal effects if the variance on the treatment conditional on the matched variables is random with

Our aim is to compare the level of women's representation across countries that, based on observed covariates, are expected to have the same electoral institutions but in some cases actually have different institutions. This requires us to condition our comparisons on factors that tend to produce specific electoral laws.

While it is not clear that the literature has fully identified the root causes of electoral laws, we rely here on the work of Persson and Tabellini (2003: 142-48) who have used a similar technique to estimate the economic effects of electoral laws.[15] They condition on a country's income level, proportion of the population over 65, Freedom House democracy score, federal or centralized state structure, status as a former British colony, and location in Latin America. We also borrow their dataset which includes 60 democratic states from around the world during the mid-nineties.[16] We add to their data the percentage of women elected to the lower house of parliament at the same point in time, again using data from IPU and Paxton, Hughes, and Green (2006).

We estimate two different averages of case-specific effects: the average treatment effect for the treated cases (ATET), and the average treatment effect for the control cases (ATEC). The ATET is the average of $Effect_i$, or each case's potentially idiosyncratic causal effect of electoral institutions on women's representation, across all cases i in which the observed value on the independent variable is the treatment, while the ATEC is the average of $Effect_i$ across all cases i in which the observed value on the independent variable is the control. We stipulate that the treatment is majoritarian institutions while the control is proportional-representation electoral rules.[17] The ATET is thus the average case-specific effect of having majoritarian as opposed to proportional-representation electoral rules among countries that actually do have majoritarian rules; the ATEC is the average case-specific effect among countries that, in fact, have proportional-representation elections. For more discussion of these estimands, see Sekhon (2008).[18]

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respect to causal processes surrounding the outcome of interest. Even when a correct collection of conditioning variables can be identified, matching methods may still fail to produce causal estimates if the cases in some categories are sparse or if other technical problems arise. The discussion in the text suppresses these issues because it is not evident how scholars could, at present, definitively resolve the central problem of identifying an appropriate set of conditioning variables, and because that problem is itself sufficient to guarantee that the estimates presented in the text are descriptive conditional differences rather than causal effects. Different sets of conditioning variables can always produce variation in resulting estimates; this is a universal issue in observational studies and will not be pursued further here. However, even if we set aside the issue of selecting an appropriate set of conditioning variables and assume that we have found the correct set, heterogeneity in causal effects may arise across categories of cases.

[15] For a helpful discussion of the criteria that would need to be met in order to make valid causal inferences by conditioning, see Morgan and Winship 2007: 61-86.

[16] Footnote detailing the sources for each variable used.

[17] The choice of which set of rules to call the treatment is substantively empty; reversing the selection would only reverse terminology and the signs of the estimates reported below.

[18] In this discussion, each case's effect is treated as a constant, so the ATET and ATEC are also technically constants. It will be important to bear in mind that, while each case-level effect is constant, the effects are not assumed to be constant across cases. Estimates of the ATET and ATEC may be random variables even though each individual effect is a constant if the sample used to generate the estimate is itself a random

For present purposes, the most important point is that, if there is a constant and universal effect of electoral institutions on women's representation, then the ATET and the ATEC should be identical; sample estimates should differ only by estimation error. After all, if every single case has the same effect, then it is obviously true that the effect for the collection of all treatment cases should be identical to that constant effect; the same is true for the control cases. Hence the ATET and the ATEC must be equal when there is a single constant causal effect.[19]

When turning to the data on electoral institutions and women's legislative representation, then, what do we discover? Table 5 reports a range of matching estimates that can help resolve the question of whether the ATET and the ATEC are similar or divergent. The table reports six different matching estimates of conditional differences related to the effect of electoral institutions on the female share of the legislature. There are two estimates each of the ATET, the ATEC, and the sample average treatment effect. For each of these three estimands, an estimate is provided using the entire available sample and a second is provided using a version of the sample in which cases are trimmed to ensure that all treatment cases fall within the range of propensity scores observed for the control cases. The trimmed estimate is almost certainly the better choice; the two estimates are shown to suggest the degree of divergence in estimates related to technical choices about how to estimate a given parameter – and to show that differences between parameter values are substantially larger for these data than differences between approaches to estimation for a given parameter.

Table 5 about here

The first set of parameter estimates are for the ATET, i.e., the effect of having majoritarian as opposed to proportional-representation electoral rules on women's legislative representation among cases that, in fact, have majoritarian electoral rules. The effects, either for the preferred trimmed sample or for the untrimmed sample are small and positive. That is, the estimates suggest that, for countries that currently have majoritarian electoral rules, the effect of switching to proportional-representation rules would be to *reduce* women's representation in the legislature by about one percent. The standard errors for these two estimates are substantially larger than the estimates themselves, a result that may suggest a note of caution in concluding that the relevant conditional difference for currently-majoritarian countries is in fact positive. If these data were a random sample from a larger population, the results regarding the ATET would not be substantially incompatible with the hypothesis that the true population ATET is zero. Even so, it is worth reiterating that, for these countries, there is no evidence that

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sample from some larger population. That is not the case for the data used here, and so standard errors are difficult to interpret. They are nonetheless reported in order to comply with social-science tradition.

[19] The inverse is, of course, not quite true; it is possible to imagine situations in which effects differ from case to case but in which the average for all treatment cases is nonetheless the same as the average for all control cases. Hence, when ATET and ATEC are essentially identical, it can be the case either that there is a single, constant causal effect or that there is not. When ATET and ATEC differ, though, we may much less ambiguously conclude that there is not a single, constant effect – at least for the sample at hand and given a particular set of conditioning variables.

proportional-representation electoral rules would enhance women's legislative representation, and, indeed, such rules might in fact slightly undermine such representation.

Turning to the ATEC, the second set of estimates suggests that, using the current set of conditioning variables, the conditional difference between majoritarian and proportional-representation countries in the proportion of legislators who are female, when weighted to correspond with the real-world distribution of proportional-representation countries, is negative and quite possibly substantively meaningful. The estimate is large enough relative to the standard error that, if these data were a random sample from a population, we would be statistically able to reject the hypothesis of a zero effect. For countries that currently have proportional-representation electoral rules, the data suggest that the average conditional difference between their current level of women's legislative representation and the level in the most comparable (according to the set of conditioning variables) currently-majoritarian countries shows proportional representation as favorable for women.

Hence, when estimating the average effect for majoritarian cases, we get a result modestly favoring majoritarian electoral rules as promoting women's legislative representation. When estimating the average effect for proportional-representation cases, using the same set of measures and an identical collection of conditioning variables, the result suggests that proportional-representation rules enhance women's share in parliament. This is prima facia evidence that the effect in question, given on this particular specification of conditioning variables, is not constant across countries.

Indeed, if these effects were causal, then the consequences of changing all currently-majoritarian countries' electoral rules to proportional representation would be essentially no overall change, or possibly even a small negative change, in women's legislative representation. Of course, the result of changing all currently-proportional-representation countries' rules in a majoritarian direction would be a reduction in such representation. In any case, because the effect in question seems as if it may vary from country to country, there can be no universal policy recommendation or causal conclusion on this topic. Proportional-representation rules may enhance women's representation in some contexts, but they may be totally irrelevant in others.

When causal effects are heterogeneous, what meaning can be assigned to estimates from regression-type models, like those that have dominated the literature on this topic to date? Such estimates are not meaningless, but they are difficult to interpret and may not be of direct substantive interest. Generally speaking, regression-type models estimate a conditional-variance-weighted average of case-level effects; effects associated with categories of cases for which the conditional variance in a given variable is large, given all the other variables in the model, are given higher weight than effects associated with categories of cases for which this conditional variance is low (Angrist 1998; Angrist and Krueger 1999; see also Morgan and Winship 2007: 142-51).

This is consequential in the current context because the evidence suggests that the effects of interest are heterogeneous, and indeed vary from near-zero or even slightly more favorable on the majoritarian side to substantially more favorable on the proportional-representation side. Different weighting and averaging schemes can thus produce results that vary between these two bounds. A simple matching-based average that weights only according to the proportion of sample cases that have proportional-representation electoral rules is given as the third estimate in Table 5. This estimate more closely approximates the ATEC than the ATET for the simple reason that the sample is composed of one-third majoritarian countries and two-thirds proportional-representation countries. Therefore, the overall average treatment effect is equal to one-third of the ATET plus two-thirds of the ATEC. If the sample were instead two-thirds majoritarian countries and only one-third proportional-representation countries and the ATET and ATEC were the same, the overall average treatment effect would instead be -1.761 — an estimate that is substantively far smaller than the sample average treatment effect, and that would probably lead to far different conclusions in the overall debate.

Moving to regression-type models, a similar averaging results from the choice of a particular sample, obviously, but also from the selection of a specific set of conditioning variables. In general, regression-type models will weight more heavily those categories of cases for which, conditional on whatever set of control variables the analyst has specified, the variance in electoral rules is greatest. Because electoral rules are typically operationalized as a dichotomy in this literature, that means that greater weight is given to categories of cases on the control variables for which roughly half are majoritarian and roughly half are proportional-representation. The farther a category of cases is from this situation, the less weight it will be given.

The analysis above has presented evidence that there is heterogeneity in the effect of electoral rules on women's legislative representation. It is likely, although not definitively demonstrated here, that there is effect heterogeneity within both the set of majoritarian countries and the set of proportional-representation countries. If that is the case, then different conditioning schemes may have the potential to change and even exaggerate the effects of interest – not only because the average conditional effect may differ for a new set of control variables, but also because that new set of control variables may group cases in such a way that cases with larger effects are grouped in such a way that they are about half majoritarian and half proportional-representation for a given combination of scores on the control variables, while cases with smaller or even contradictory effects are grouped more homogeneously. In this way, unmodeled heterogeneity in the effects of interest can produce altogether misleading inferences.

VI. Mixed Electoral Systems

It is worth mentioning here one piece of evidence that is inconsistent with the results presented above. A number of scholars have used mixed electoral systems as a test equivalent to our use of bicameral systems. Since these systems allow voters to choose representatives under both PR and majoritarian systems in a single election, they allow scholars to compare the effects of electoral institutions in a constant temporal and cultural

context (see Moser and Scheiner 2004 for a justification for this approach). Most studies taking this approach have found that considerably more women are represented in the PR portion of mixed systems (Moser 2001, Kostadinova 2007). How do these studies comport with our results?

These comparisons rely on the assumption that the two elements of mixed systems are completely independent of each other. That is, voters' choices and party nomination strategies in the two halves of these systems do not depend on one another. Voters are presumed to ignore the slate in the SMDs when choosing in the PR half and vice versa. Similarly, parties are presumed to treat the incentives of the two systems separately.

Can this assumption be maintained? Recent work by Ferrara, Herron, and Nishikawa (2005) suggests that it cannot. They find considerable evidence of contamination between the two parts of the system.[20] Voters' choices and parties' strategies in each half of the system are influenced by the other half.

Is it possible to determine the extent and direction of these influences in the case of women's representation? While we do not conduct a complete analysis of this question here, we can propose one form of contamination that may overstate the effect of electoral systems. Imagine that parties nominate candidates in the plurality tier based on the strength of their personal vote and that their personal vote in turn depends on seniority. More experienced politicians are more likely to be elected (and therefore nominated) in single member districts because they are better known and have delivered the goods to voters in the past.

Imagine too that there is an increasing trend in women's representation due to cultural changes. At the start of this trend, there are very few women with political experience and many men. Therefore men will be nominated in the plurality half of the system and women in the PR half. Only as women gain more experience and older men exit politics will women begin to emerge as strong candidates in the plurality half of the system. In short, the electoral system is not gender-biased but nevertheless men are more successful in the plurality half, at least for a time.

One piece of evidence in favor of this explanation is the absence of a strong difference between the two halves of the system in new democracies (Moser 2001). If it is seniority within the party that produces the differences, then we should expect smaller differences in younger democracies where personal votes have not yet emerged. This is exactly what Moser (2001) finds.

In future iterations of this paper, we plan to test this explanation more systematically by looking more closely at mixed electoral systems. In particular, we plan to compare the experience of MPs elected in each half of the system to determine whether women are better represented in the proportional part of these systems because of gender discrimination or other factors correlated with their gender.

[20] Technically, this is a violation of the "Stable Unit Treatment Value Assumption."

VII. Conclusion

At the end of their comprehensive text on women and politics, Paxton and Hughes (2007) ask how we get to a world where women are more equally represented in politics. They suggest three pathways: "furthering women's position in the social structure" through education and training, "influencing culture" through international pressure and challenging stereotypes, and "disrupting politics as usual" by altering electoral laws, introducing quotas, and making legislatures more women friendly.

While this paper has not evaluated all of these possibilities, it does suggest that electoral laws may not be the magic bullet for increasing women's representation. Countries that have changed their electoral systems have not typically experienced large changes in women's representation. Similarly, bicameral systems with different electoral laws only show the expected differences in women's representation some of the time. Finally, controlling for endogeneity of electoral rules also produces weak and inconsistent results for hypothesized changes in electoral laws.

The evidence we have presented is more consistent with explanations that see social and cultural changes driving expansions in female representatives. Though we have not tested these explanations and do not have evidence on the effectiveness of specific policy interventions, we suggest that scholars focus more on the sources of changes in these areas perhaps by looking for exogenous changes in social structure or cultural attitudes. One telling work in this area is Hughes's (2004) claim that armed conflicts are often a prelude to large jumps in women's representation. Such conflicts can lead to rapid changes in social and cultural factors.

We would not dismiss, however, all attempts at institutional engineering. A number of recent works have demonstrated that quota laws, when properly designed, can have significant effects on women's representation (Caul 2001). It is not yet clear whether these laws are a consequence of the factors we identified above or are introduced for other reasons.

What we do believe is driving our relatively weak results is causal heterogeneity. Electoral laws may have different effects in different places. While there is a plausible case that PR laws may help women, this may only occur if certain background conditions are met. This conclusion is supported by existing studies showing that electoral laws interact with social structure (Amorim Neto and Cox 1998, Ordeshook and Shvetsova 1994).

We would recommend two paths in future research on the effects of electoral laws on women's representation. First, the heterogeneity of causal effects identified in section V suggests that research should be more alert to the precise mechanisms through which electoral institutions act. In doing this, it may be possible to uncover steps in the causal sequence where contextual variables of one kind or another may reasonably be thought to alter the relationship in question. When such hypotheses are in hand, then empirical research – possibly involving the use of causal-process observations to explore

hypothesized sequences and contextual factors, as well as statistical analysis making serious use of interaction terms – may more productively point toward an understanding of which countries would better represent women under a given set of electoral rules, which would not, and why.

Second, given the difficulty of causal inference in this area, we believe that experimental methods may yield considerable gains. By having subjects vote for hypothetical alternatives under different rules in a laboratory setting, it may be possible to isolate the effect of these rules and even the mechanisms driving them. Given the effects of culture and familiarity with existing rules, conducting these studies in diverse contexts will be particularly important.

Table 1: Electoral Law Changes

Country	*End of old*	*Start of new*	*Old system*	*New system*	*Restrictiveness*
Argentina1	1962	1963	Maj	PR	Less
Argentina2	1983	1985	DM=10.6	DM=5.3	More
Austria	1990	1994	DM=20.3	DM=4.3	More
Benin	1991	1995	DM=10.7	DM=4.7	More
Bolivia	1993	1997	PR	Mixed	More
Colombia	1990	1991	DM=7.7	DM=4.9	More
Croatia	1995	2000	Mixed	PR	More
Denmark	1968	1971	DM=5.9	DM=7.9	Less
Dom. Rep.1	1978	1982	DM=3.4	DM=4.4	Less
Dom. Rep.2	1994	1998	DM=4	DM=5	Less
Ecuador	1996	1998	PR	Mixed	More
France1	1946	1951	PR	Mixed	More
France2	1956	1958	Mixed	Maj	More
France3	1986	1993	Maj=>PR	Maj	Less
Greece	1951	1958	PR=>Maj=>Mixed	PR	More/Less
Iceland	1959	1959	Mixed	PR	Less
Italy1	1953	1958	Mixed	PR	Less
Italy2	1992	1994	PR	Mixed	More
Japan	1993	1996	Maj	Mixed	Less
Macedonia1	1994	1998	Maj	Mixed	Less
Macedonia2	1998	2002	Mixed	PR	Less
Malta	1981	1987	PR	Multi	Less
New Zealand	1993	1996	Maj	Mixed	Less
Nicaragua	1990	1996	DM=10	DM=4.1	More
Norway1	1985	1989	PR	Multi	More
Norway2	2001	2005	Multi	PR	Less
Philippines	1992	1995	Maj	Mixed	Less
Sweden	1968	1970	DM=8.3	DM=11.1	Less
Turkey1	1961	1965	PR=>Multi	PR	Less
Turkey2	1983	1987	PR	Mixed	More
Turkey3	1991	1995	Mixed	PR	Less
Ukraine1	1994	1998	Maj	Mixed	Less
Ukraine2	2002	2006	Mixed	PR	Less
Venezuela1	1988	1993	PR	Mixed	More
Venezuela2	1998	2000	Mixed	PR	Less

Table 2: Effects of Electoral Law Changes

Parameter	*Estimate (Standard Error)*	*P Value*
Intercept	0.125 (0.074)	0.098
No Change in Electoral Institutions	-0.024 (0.044)	0.588
Change Toward More Majoritarian/Restrictive Electoral Institutions	-0.041 (0.055)	0.461
Initial Representation of Women	-0.015 (0.043)	0.720

The R^2 of the regression is 0.0183. There are 37 residual degrees of freedom.

Figure 1: New Zealand

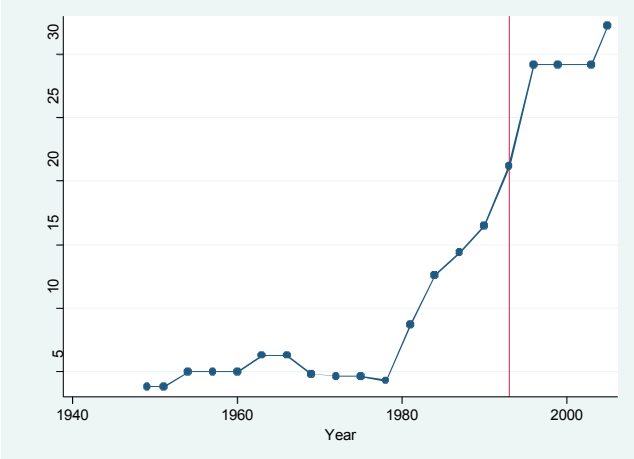

Figure 2: Italy

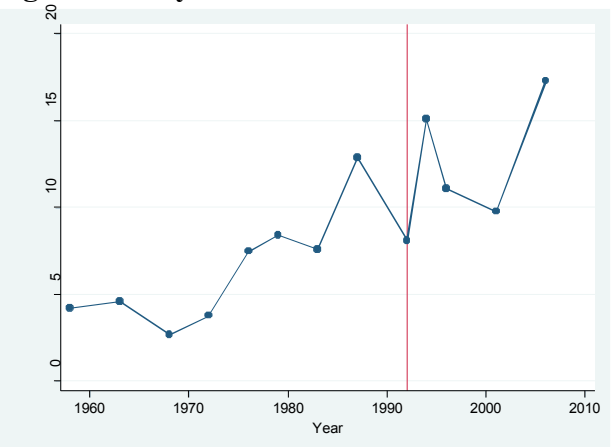

Figure 3: Japan

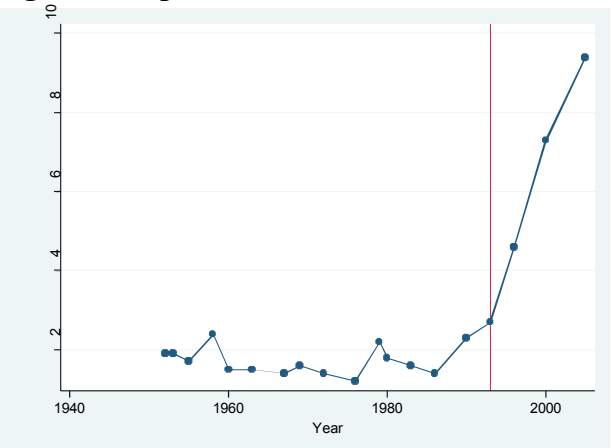

Figure 4: France

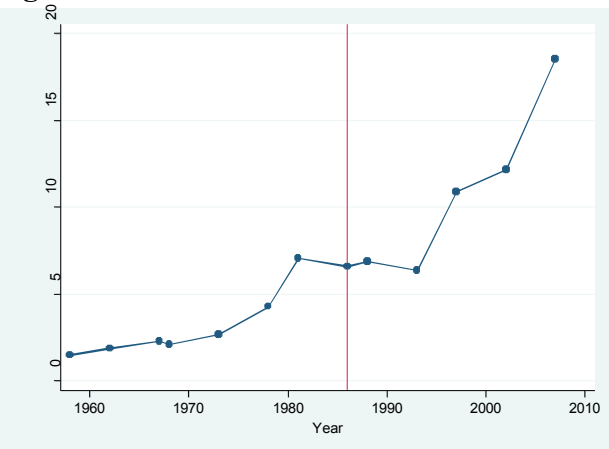

Figure 5: Bicameral Differences

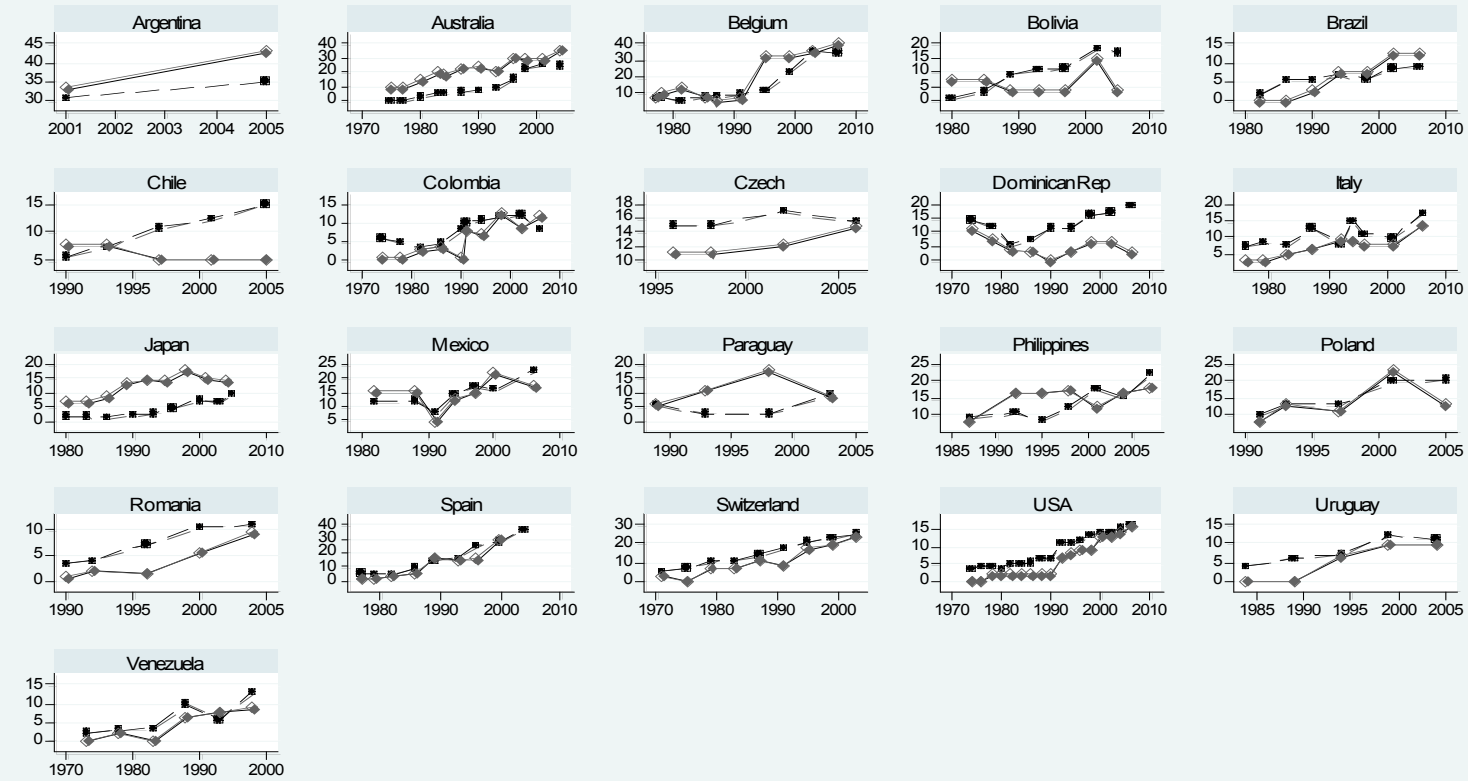

Table 3: Effects of Bicameralism

Country	Years	Lower house rule	Upper house rule	Predicted	Average difference	Fitting elections	Trend	Fit
Argentina	2001-2005	PR, DM=5.5	Partial PR, DM=3	+	-5.35	0/2		Poor
Australia	1975-2004	STV, DM=8, 9.5	STV, DM=1	-	-11.7	12/12		Strong
Belgium1	1977-1987	PR, DM=7.1	PR, DM=5.3	+	-1.6	1/5		Poor
Belgium2	1991-2007	PR, DM=7.5	PR, DM=13.3	-	-6.4	3/5		Good
Bolivia1	1980-1993	PR, DM=14.4	Partial PR, DM=3	+	+0.4	2/4		Weak
Bolivia2	1997-2005	Mixed	Partial PR, DM=3	?	+8.2			
Brazil	1982-2006	PR, DM=19	Plurality, DM=1.5	+	+0.3	3/7	Rising	Weak
Chile	1990-2005	PR, DM=2	PR, DM=2	?	+4.0		Rising	
Colombia1	1974-1990	PR, DM=7.6	PR, DM=4.4	+	+3.7	5/5		Good
Colombia2	1991-2006	PR, DM=4.4	PR, DM=100	-	+1.0	2/5		Poor
Czech	1992-2006	PR, DM=25, 14	TRS, DM=1	+	+3.3	4/4	Falling	Good
Dom. Rep.	1978-2006	PR, DM=3, 6	Plurality, DM=1	+	+8.5	8/8	Rising	Strong
Italy1	1976-1992	PR, DM=20	Plurality/PR	+	+3.3	4/5		Good
Italy2	1994-2005	Mixed	Mixed	?	+3.8			
Japan1	1983-1993	SNTV, DM=4	Mixed	-	-8.9	5/5		Strong
Japan2	1996-2005	Mixed	Mixed	?	-8.2		Falling	
Mexico	1982-2006	Mixed	Partial PR, DM=3	+	+1.4	4/6		Weak
Paraguay	1989-2003	PR, DM=4.4	PR, DM=30, 45	-	-5.8	2/4		Weak
Philippines	1987-2007	Plurality, DM=1	PR, DM=12 (12 votes)	-	-1.4	4/7		Weak
Poland	1991-2005	PR, DM=7, 10	Plurality, DM=2	+	+1.6	4/6		Weak
Romania	1990-2004	PR, DM=8, 9	PR, DM=3	+	+3.5	5/5	Falling	Good
Spain	1977-2004	PR, DM=7	PR, DM=4 (3 votes)	+	+2.4	6/8		Strong
Switzerland	1971-2003	PR, DM=7.7	Plurality, DM=1 or 2	+	+3.4	9/9	Falling	Good
US	1974-2006	Plurality, DM=1	Plurality, DM=1	?	+2.8		Falling	
Uruguay	1984-2004	PR, DM=5	PR, DM=30	-	+2.9	0/5		Poor
Venezuela1	1973-1988	PR, DM=8	PR, DM=2	+	+2.5	4/4		Good
Venezuela2	1993-1998	Mixed	PR, DM=2	+	+1.1	1/2		Weak

Table 4: Strength of Fit

Strength of fit	*All*	*Without fused votes*	*Without subordinate*	*Strong contrasts*	*Only PR systems*
Strong	3	2	3	3	1
Good	7	6	4	3	4
Weak	7	6	6	3	2
Poor	4	3	3	0	4

Table 5: Matching Estimates of the Effect of Electoral Institutions on Women's Legislative Representation

Estimates of ATET		
Estimator	Effect of Majoritarianism	S.E. of Effect Estimate
Nearest-Neighbor Matching, Untrimmed Sample	1.271	3.155
Nearest-Neighbor Matching, Trimmed Sample	0.826	2.726

Estimates of ATEC		
Estimator	Effect of Majoritarianism	S.E. of Effect Estimate
Nearest-Neighbor Matching, Untrimmed Sample	-6.386	3.655
Nearest-Neighbor Matching, Trimmed Sample	-6.935	3.722

Estimates of ATE		
Estimator	Effect of Majoritarianism	S.E. of Effect Estimate
Nearest-Neighbor Matching, Untrimmed Sample	-3.492	2.963
Nearest-Neighbor Matching, Trimmed Sample	-4.348	3.075

Estimates of Average Treatment Effect of Majoritarianism/PR on Women's Representation in Legislatures Using the Persson and Tabellini Model of Exposure to Majoritarianism

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