The Governor's Backyard: A Seat-Vote Model of Electoral Reform for Subnational Multiparty Races

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Evaluating the fairness of electoral reforms is a critical requirement for electoral accountability in any democracy. There is, however, no research measuring the expected seat benefit for incumbent reformers in newly democratized countries. Much of this delay is due to the technical difficulties of generalizing previous seat-vote models to multiparty races, a problem that has limited both subnational and cross-national comparisons of electoral regime change. Using a multilevel Bayesian model we solve this analytical problem and produce comparable estimates of partisan bias and majoritarian bias across the Argentine provinces. Our model estimates the effect of reforms across many electoral regimes and can be applied to comparative analyses of electoral reforms within and across countries. In the particular case of Argentina, we show large seat premiums for incumbent parties initiating electoral reforms.

$\mathbf{I}$n the last 20 years Latin America has undergone remarkable political changes not just to consolidate the rule of law but to change it as well. Electoral reforms have been implemented in most countries of the region, affecting how citizens vote and how politicians get elected. Major electoral reforms led to the elimination of the Electoral College in Argentina; the introduction of mixed-member electoral rules in Bolivia, Mexico, and Venezuela; the use of preferential vote in Brazil and Colombia; and the elimination of *apparentment* rules in Uruguay, to mention some of the most commonly cited examples. As was also the case in Eastern Europe (Benoit 2004; Elster, Offe, and Preuss 1998), the last 20 years constitute the most dynamic period of electoral regime change in Latin America since the introduction of proportional representation (PR) in the early twentieth century.

Within each country, subnational electoral reforms were also frequent and had far reaching distributive effects. The seat benefits obtained by incumbent reformers, however, remain mostly an exercise in political speculation. In this paper, we analyze the seat-vote properties of multiple electoral reforms in 24

Argentine provinces and measure the incumbency biases introduced by partisan reformers.[1] Similar analyses can also be implemented cross-nationally to evaluate the consequences of reforms among newly democratized countries at the national level.

Between 1983 and 2003, 32 constitutional reforms and 34 electoral reforms[2] reshaped the subnational electoral map of Argentina, leading to one of the most diverse and, arguably, complex political systems in the world. By 2003, each Argentine province selected representatives using different electoral rules. The differences were not subtle and included single member, multimember, and mixed member electoral systems; Plurality, D'Hont, and Hare formulas; complex combinations of majority-PR quotas for winners and losers; and a wide variety of electoral thresholds and *lemas* (*apparentement*). This remarkable diversity of subnational political systems contrasted with the stable partisan distribution of seats observed in the provincial legislatures, a majority of which remained under Peronist control since the democratic transition in 1983 (Calvo and Murillo 2004).

Whilst conventional wisdom among researchers is that most reforms were introduced by incumbent parties trying to secure control of their local legislatures, there has been no research measuring the actual effect of reforms on the number of expected seats won by incumbent parties. This lack of estimates is explained by the methodological problems that arise when modeling majoritarian bias[3] and partisan bias across many different electoral regimes, a problem also affecting cross-national comparisons of electoral regime change (King 1990; Taagepera and Shugart 1989).

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[1] There are other important cases of widespread subnational electoral reforms with significant variation across districts. The case that best approximates Argentina is Russia (Jones-Luong 2004; Moraski 2003, 20), although significant subnational variation can be found in many federal countries including Australia, which uses alternatively Mixed-Member, SNTV, or PR for the election of local legislatures; Mexico, where each state uses different combinations of single member and multimember districts (Stolt 2004); and even the United States, although the pace of the reforms occurred over longer periods of time (Engstrom and Kernell 2005). To the best of our knowledge, there is currently no general survey of subnational electoral regimes, although 65% of the countries of the world have subnational electoral regimes with one or more distinct arenas (WDR 1999).

[2] A conservative coding would result in 34 cases if we only include changes in the electoral law or the constitution with regards to the number of districts, district magnitudes, thresholds, or formulas. If we also include the implementation of apparentement laws (*Lemas*) the count increases to 44. Finally, the count of reforms would increase to 52 if we consider the elimination of *Lemas* in eight provinces since 1997. Many of the administrative and procedural reforms introduced by the executive, the legislature, or the courts are not being considered.

[3] In this article we recover the classic term majoritarian bias instead of electoral responsiveness (King 1990) for two reasons: first, because most comparative literature distinguishes between the ideal extremes of majoritarian and proportional representation when describing electoral systems (Lijphart 1994); second, because once the electoral system has more than two parties, increases in the value of the majoritarian parameter ρ do not necessarily mean more electoral responsiveness. As we will show, with more than two parties the relative change in seats depends critically on changes in the number of parties.

From a methodological standpoint, the diversity of electoral designs that characterize the Argentine provinces poses a difficult estimation problem. In order to measure the effect of electoral reforms on the seats won by incumbent parties, we need a model specification that controls for the preceding institutional properties of each electoral regime across many provinces. For this purpose, we propose a multilevel statistical model of seats and votes that allows for proper comparisons over time and across electoral regimes. We implement our proposed solution as a hierarchical Bayesian model of seats and votes which can also be used for comparative analyses of national level electoral reforms.

From a substantive standpoint, the diversity of electoral designs that characterizes the Argentine provinces provides an ideal setting to understand the effect of electoral reforms on subnational party competition. This was previously recognized by Jones (1997) and Ames (1994), who also noted that gubernatorial races in Argentina and Brazil had a more pronounced effect in reducing the number of effective parties than presidential races. The subnational electoral mechanisms that worked to the advantage of the governors, however, were never fully explained. We fill this gap in the literature, showing that reforming the local electoral system allowed incumbents to minimize the risk of electoral defeat, to improve their control over local legislatures, and to escape the negative consequences of more competitive national level races.

Several authors have previously explained the political stability of subnational elites by the access incumbents have to federal resources that are critical to finance their political machines (Gibson and Calvo 2000; Jones et al. 2003; Remmer and Wibels 2000). In this article, we focus on the less studied effect of electoral reforms, which allowed incumbent elites to limit the emergence of local challengers.

The order of presentation of this article is the following: in the first section we review the emerging literature on electoral regime change in newly democratized countries. In the second section we present our model of majoritarian bias and partisan bias for multiparty races. In the third section we describe the institutional trajectories of Argentina's subnational electoral systems and summarize the reforms implemented since 1983. In the fourth section we use a multilevel Bayesian model to estimate the seat-vote properties of the reformed electoral regimes.

Electoral Reforms in New Democracies

In the last decade there has been a renewed interest in the study of electoral regime change. After decades of research studying how parties and voters adapt to existing electoral rules (Cox 1997; Duverger 1986; Lijphart 1994; Sartori 1976), a burgeoning literature is emerging trying to analyze how politicians choose and change electoral regimes.[4] Some of this literature revisited the famil-

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[4] For a survey of this literature, see Benoit 2004.

iar cases of PR reforms in early twentieth-century Europe (Andrews and Jackman 2005; Boix 1999; Colomer 2004); but much of this renewed interest comes from scholars explaining the increased number of electoral reforms taking place in newly democratized countries of Eastern Europe and Latin America (Benoit 2004; Elster, Offe, and Preuss 1998; Jones-Luong 2004; Magar, Rosenblum, and Samuels 1998; Moraski 2003).

A dominant theme of this emerging literature is the importance of seat-maximizing incentives for explaining the endogenous drive to reform (Benoit 2004). Boix (1999), for example, shows that incumbent conservative parties in the early twentieth century changed the rules of the electoral game to minimize the expected seat losses to rising socialist challengers. Benoit and Hayden (2004), Benoit and Schieman (2001), and Molinar Horcasitas (1996) describe the importance of short-term seat-vote calculations in explaining electoral regime change in Poland, Hungary, and Mexico. In contrast with the redistricting literature in the United States, however, there has been little research measuring the consistency between the strategic incentives of the various partisan actors and the resulting allocation of seats (Cox and Katz 2002; Engstrom and Kernell 2005). An important gap in recent literature, therefore, is the absence of a general model of seats and votes for multiparty elections to asses the consistency between electoral design and partisan intent in electoral reforms in recently democratized countries.

Significant change in the rules of the game, however, was not restricted to recently democratized countries. Lijphart (1994), for example, lists 70 electoral regimes in 27 countries in the post-war period. Among these 27 countries, only Canada, New Zealand, Switzerland, and the United States[5] experienced no significant change in electoral rules. In contrast with recent cases in Latin America and Eastern Europe, however, reforms occurred more frequently in countries with PR electoral rules and had a more moderate scope (Lijphart 1994, 79–80).

This emerging literature on electoral reform has also received new impetus from developments in comparative federalism, subnational party politics, and the development of nationalized party systems (Chhibber and Kollman 2004; Gibson 2004a; Jones and Mainwaring 2001; Samuels and Snyder 2001; Stepan 2001). The importance of decentralized subnational electoral reforms has been critical for explaining the recent evolution of party competition in Argentina, Hungary, Italy, Mexico, and Russia.[6] Subnational political systems, as has been noted in this literature, are more likely to be consistently partisan than their national counterparts and often constitute authoritarian reservoirs within the recently democratized national political system (Gibson 2004b), in which party domination is facilitated by legal electoral reforms rather than by open fraud or intimidation. A

[5] New Zealand's implementation of mixed-member electoral rules would take that country off the list of nonreformers. The "redistricting" revolution in the United States (Cox and Katz 2002) also could be interpreted as a change of electoral regime.

[6] See Benoit (2004), Stolt (2004), and Moraski (2003).

study of the political consequences of these electoral regime changes, however, requires a workable model of seats and votes in multiparty settings.

Modeling Majoritarian and Partisan Bias in Multiparty Races

A thin definition of an electoral regime is the set of rules guiding the allocation of seats to parties with different vote shares (or total votes). This relationship is explained by both the mechanical properties of an electoral regime (i.e., formulas, district magnitudes, ballot types) and the political dynamics that regulate party competition (i.e., number of parties, spatial distribution of the vote, and competitiveness of the race).

While there may be an infinite number of potential electoral rules and procedures, almost every electoral regime can be summarily described by three main parameters governing the relationship between seats and votes: the majoritarian bias ρ, the partisan bias b, and the competitiveness parameter c. The majoritarian parameter ρ describes the expected seat premium that any party obtains in excess of its vote share by virtue of winning the election.[7] By contrast, the partisan bias b describes the seat premium obtained by a particular party j beyond that expected by any other party t with a similar vote share. Finally, the competitiveness parameter c captures the changing cut-off point between winners and losers as the number of parties N increases, $N > 2$.

Majoritarian Bias

In Figure 1a we depict the distribution of votes and seats in a two-party race under PR electoral rules (solid line) and under majoritarian rules[8] (dotted line). Under PR rules a party j is expected to win a share of seats, s_j, equal to its vote, v_j. By contrast, under majoritarian electoral rules a winning party obtains more seats than votes, $s_j > v_j$, and a losing party obtains fewer seats than votes, $s_j < v_j$. In the majoritarian line[9] of Figure 1a, a winning party with 55% of the vote is expected to receive 64% of the seat, a 9% premium, while a losing party with 45% of the vote is expected to receive 36% of the seat. This seat premium depends exclusively on the majoritarian properties of the electoral system and any party obtaining a similar vote share would be expected to win the same number of extra seats.[10]

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[7] While critical to most discussions of electoral reform, the normative advantages of proportional and majoritarian electoral rules are not of central concern to us if parties are equally rewarded/punished by sole virtue of their electoral performance.

[8] In Figure 2 the majoritarian bias $\rho = 3$, which describes the majoritarian properties of the cube law.

[9] The majoritarian line in Figure 1 describes the distribution of seats expected by the cube law, the first attempt to capture the aggregate distribution of seats and votes under SP single member districts: $\dfrac{s}{1-s} = \left(\dfrac{v}{1-v}\right)^3$.

[10] The majoritarian bias is symmetric for all parties.

FIGURE 1

(a) Proportional, $\rho = 1$, and Majoritarian, $\rho = 3$, Electoral Systems. (b) Partisan Bias for Party j. (c) Expected Seat-Vote under Increasing Party Competition with Majoritarian Rules, $\rho = 3$. (d) Expected Seat-Vote Slide under Increasing Party Competition with Moderately Majoritarian Rules ($\rho = 1.4$)
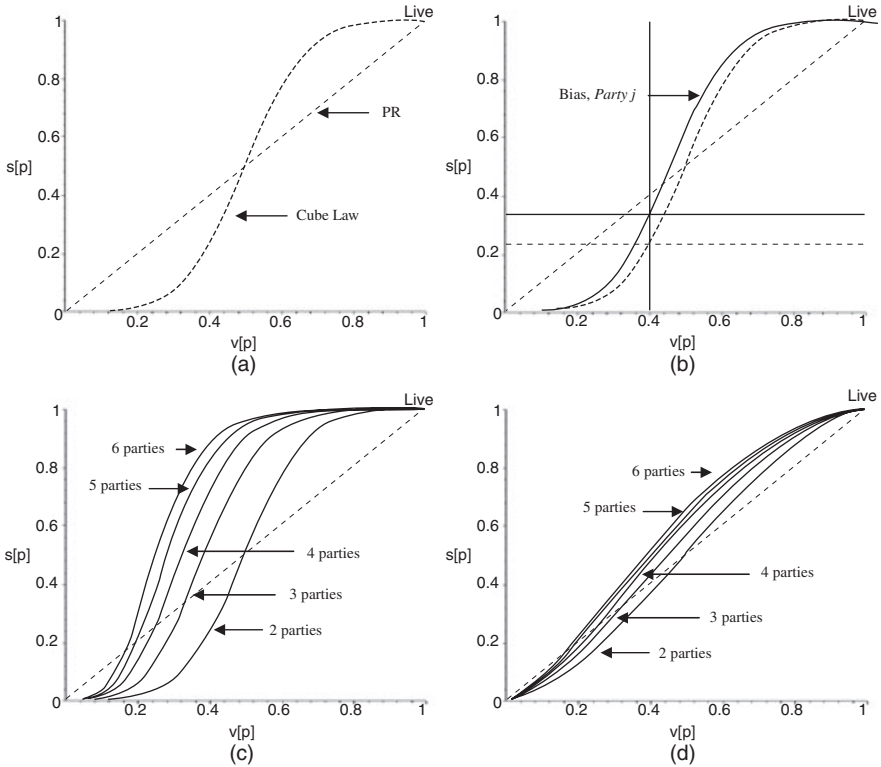
By contrast, partisan bias b_j describes the seat premium won by a particular party j beyond that expected by any other party with a similar vote. For example, as shown in Figure 1b, party's j line (solid) is to the left of party's t (dotted) line. As shown by the horizontal lines in Figure 1b, the exact same vote share, $v_j = .4$, results in party t winning $\approx 10\%$ fewer seats. Unlike majoritarian bias, the partisan bias b_j is not symmetric for every party.

Majoritarian Bias under Increasing Competition

A different majoritarian effect results from increases in the effective number of competitive parties,[11] shifting the winning cut-off point for the plurality winner to the left of 50%—as shown in Figure 1c. A party with 40% of the vote, for example, may still win most districts if there are two parties who split the remaining 60% of the vote.

In a strictly proportional electoral system, the seat-vote line remains unaffected by changes in the number of competitive parties. In nonproportional systems, however, the majoritarian effect of ρ increases together with the effective number of competitive parties.[12] In electoral systems that are moderately majoritarian ($\rho = 1.5$) the seat premium resulting from increasing party competition is small (Figure 1d). By contrast, under stronger majoritarian rules ($\rho = 3$), the effect of increasing competition leads to larger vote-seat swing ratios (Figure 1c). While an explicit estimation of the competitiveness of the race is critical to obtain proper estimates of majoritarian and partisan bias, past research has failed to model such effect correctly.

A Statistical Model of Majoritarian and Partisan Bias

In order to estimate the pro-incumbent bias in the Argentine provinces, a first alternative is to correct King's (1990) multiparty model of majoritarian representation and partisan bias by introducing a competition parameter c capturing the sliding intercept of increasing party competition. A straightforward implementation is a Generalized Linear Model (GLM) for the total number of seats S_{jpe} won by party j in Province p and election e, running separate provincial models with a binomial design and a logistic link:

$$S_{jpe} \sim Bin(\mu_{jpe}, K_{jpe})$$

$$\text{logit}(\mu_{jpe}) = b * I_{jpe} + c * \ln(n_{pe} - 1) + \rho \ln\left(\frac{v_{jpe}}{1 - v_{jpe}}\right) \tag{1}$$

In equation 1, the total number of seats S_{jpe} (given the district magnitude K_{jpe}) won by party j in province p and election e is a function of the party

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[11] A fact first noticed by Taagepera (1986) and Taagepera and Shugart (1989) but never operationalized into a stochastic model of seats and votes. King (1990) dismissed the Taagepera (1986) modeling strategy together with the problem of increasing competition, proposing instead a multinomial model with only majoritarian and partisan bias parameters. King's (1990) multinomial specification produces similar estimates of majoritarian and partisan bias to the binomial model, but fails to model the competitiveness effect directly. More important, partisan biases can only be compared to baseline parties within a given electoral regime, resulting in coefficients that are difficult to interpret and cannot be compared across provinces and races. Alternative code to run a Bayesian version of the King multinomial model may be requested from the authors.

[12] That is, while in a two-party system the expected intercept of the line equals zero, $\alpha = 0$, in multiparty races the intercept of the model changes together with the competitiveness of the race, $\alpha \geq 0$.

vote[13] v_{jpe}, the majoritarian bias ρ, the competitive cut-off point c resulting from changes in the number of parties n_{pe}, and the pro-incumbent partisan bias b. As in King and Browning (1987), the intercept is zero when there are only two parties, $\ln(2-1) = 0$.

A simple extension of the previous model can also be used to estimate the effect of electoral reforms on the incumbent bias parameter b.

$$S_{jpe} \sim Bin(\mu_{jpe}, K_{jpe})$$
$$logit(\mu_{jpe}) = b * I_{jpe} + r * R_{pe} + br * (I_{jpe} * R_{pe}) + c * \ln(n_{pe} - 1)$$
$$+ \rho \ln\left(\frac{v_{jpe}}{1 - v_{jpe}}\right) \tag{2}$$

In equation 2, r measures the effect of provincial reforms R_{pe} and the interaction term br captures the seats won by the incumbent party after the reforms. In this simple model, values of $b > 0$ capture a positive bias for the incumbent party before the reform and $br > 0$ captures the majoritarian bias after the reform. We can also add a second interaction term between votes and the reform variable to capture changes in the seat-vote curve due to reforms.

Given that we are analyzing seats and votes for a large number of electoral regimes that change over time and across provinces, we can pool our data and estimate a population-averaged GLM for cross-sectional data. The model, however, will produce too narrow intervals around the reform estimate r, given that we are repeating the same electoral reform values for every party in a given province and year. More important, values of ρ and b would be averaged across all provinces, providing little information about province level changes in majoritarian bias.

A Multilevel Approach

A more adequate specification is to estimate a multilevel model measuring the effect of reforms on the majoritarian bias ρ and the partisan bias b. Allowing the majoritarian and incumbency parameters to vary by province and election, however, requires the alternative specification:

$$S_{jpe} \sim Bin(\mu_{jpe}, K_{pe})$$
$$logit(\mu_{jpe}) = c_p * \ln(n_{pe} - 1) + b_{pe} * I_{jpe} + \rho_{pe} \ln\left(\frac{v_{jpe}}{1 - v_{jpe}}\right) \tag{3}$$

[13] The log-odds transformation of the vote share allows the estimated coefficient ρ to be readily interpreted in terms of the classic Cube Law, with $\rho = 1$ describing a perfectly proportional allocation of seats and $\rho = 3$ describing the classic cube law majoritarian representation model. Using the log of the number of parties minus one allows the intercept of a two party race to be zero, a generalization of the King and Browning (1987) majoritarian representation model.

$$\left.\begin{aligned}
c_p &\sim N(\lambda_3, \sigma_3) \\
b_{pe} &\sim N(\lambda_1, \sigma_1), \lambda_1 = r_1 * R_{pe} \\
\log(\rho_{pe}) &\sim N(\lambda_2, \sigma_2), \lambda_2 = r_2 * R_{pe} + rc_2 * R_{pe} * \ln(n_{pe} - 1)
\end{aligned}\right\} \quad (4)$$

In this model, the first-level equation (equation 3) measures the main seat-vote parameters, $\theta = \{c_p, b_{pe}, \rho_{pe}, \sigma_1, \sigma_2, \sigma_3\}$. Given these parameters, the total seats S_{jpe} won by a party j is a function of the party vote v_{jpe} and the majoritarian bias ρ_{pe}, its incumbency status I_{jpe} and the partisan bias b_{pe}, and the effective number of competitive parties n_{pe} and c_p, capturing the effect of increasing party competition.[14] Notice that c_p is for all practical purposes a random intercept for the multiparty model.

This time, we also estimate two normally distributed regime-level equations modeling the changes in partisan bias b_{pe} and majoritarian bias ρ_{pe} as a function of the electoral reforms.[15] The second-level (Regime) equation for the *incumbent bias, b_{pe}*, is linear in parameters with a mean of zero. Given that a random intercept is already modeled by c_p in the first-level equation, the second-level equation has no intercept. By contrast, we use a log-linear model for the majoritarian bias parameter ρ_{pe}, given that ρ is exponentially distributed between $0 < \rho < \infty$.

Alternative distributions could be used to estimate the relationship between seats and votes in special circumstances. For example, Cox and Katz (2002) propose that global partisan bias estimates could be inflated by the seat-vote properties of a few districts and recommend using a beta-binomial specification to model district heterogeneity.[16] In the particular case of Argentina, for example, there is some evidence that La Rioja, Santa Cruz, and Santiago del Estero have allocations of seats that are considerably more biased than the average province. Our estimates of both models, however, did not vary significantly and, for presentation purposes, we use the simpler logistic specifications in this paper.

Finally, although the multilevel approach presented in equations 3 and 4 has been adapted to analyze the effect of multiple reforms across many provinces, it can also be used with small modifications to analyze the evolution of a single electoral regime in one country over time. It can also be used to analyze the seat-vote properties of a single electoral reform, provided that we have sufficient observations (allocations of seats and votes) in consecutive elections before and after the reform.[17]

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[14] As in the previous model, the baseline model has no intercept, $\alpha = 0$. Changes in the intercept as a function of the number of parties are captured by the parameter c_p.

[15] Estimation of this model was performed in WinBugs 1.4. To simplify the presentation of our substantive results, all estimation details (priors, parameters, R code, and WinBugs code) can be found in the appendix.

[16] The authors also mention that a beta-binomial strategy could also capture some correlation in the probability across districts, but there is little evidence of such effects. That is, while votes for a party can go consistently up or down across districts as a result of some national level process, changes in allocation of seats can only be a function of the mechanical properties of the electoral system.

[17] We have tested the model in two single-case studies (national elections in Belgium and Argentina), obtaining reasonable estimates with just over 10 elections and close to 100 observations.

Analyzing Electoral Reforms in the Argentine Provinces

Argentina established a federal republic with a presidential executive and a bicameral legislature in its 1853 constitution.[18] Until 1995 the president was elected by an electoral college voted in each provincial district. After the 1994 constitutional reform, he was elected directly by nationwide popular vote. Representatives to the national lower house were elected in at-large electoral districts—the provinces—by simple plurality (SP-block-vote multimember) until 1912, by incomplete list until 1962, and by PR with variable district magnitudes thereafter. National senators, on the other hand, were elected indirectly by the local legislatures until 2001 and directly by the people of the provinces thereafter, using a fixed majority-minority formula.

The constitution, however, was silent regarding the electoral rules and political institutions in the provinces. In consequence, over a period of 120 years, each provincial electoral system and governing bodies followed independent institutional trajectories. The earliest electoral systems in the metropolitan provinces were usually local hybrids of the SP multimember district that regulated the Lower House national elections until 1912.

A national electoral reform in 1912 spurred a wave of provincial reforms adopting the "incomplete list" formulae, allocating a fixed number of seats to the winner (usually two-thirds) and to the runner-up (usually one-third). While these reforms where initially meant to protect the old conservative factions of the *Partido Autonomista Nacional* in the metropolitan areas and diffuse the federal crises brought about by the emergence of the Radical Party, majority-minority rules still survive today in the provinces of Chubut, Entre Rios, Santa Fe, and Santiago del Estero.[19]

Before Argentina could jump into the wave of PR reforms that characterized most emerging democracies in the first half of the twentieth century, a series of military coups beginning in 1930 shocked the political system. It would take 30 years and the emergence of a strong popular party in the electoral arena, the Peronists, to convince the military and most non-Peronist parties that strictly majoritarian systems were a political liability. In 1962, the electoral formula to elect national representatives became PR-D'Hont, a reform that would also be used in almost half of the provinces. Still, while most newly federalized provinces incorporate PR electoral rules, a majority of the old provinces held on to SP or incomplete list electoral rules.

Lastly, a new wave of reforms since the 1983 democratic transition completed the current institutional map.[20] In a context of economic crisis and increasing

The subscript *p* will be dropped from equations 3 and 4. Code for such models can be requested from the authors.

[18] See Botana (1993) for a description of Argentina's constitutional origins and Mustapic (1990) for a description of the multimember SP electoral rules of the early twentieth century.

[19] In most cases the minority seats are now allocated through PR, a mechanism that increased representation to a few third parties by redistributing seats from the runner-up.

[20] For a detailed description of the reforms see Calvo and Escolar (2005).

national political fragmentation, newly elected governors set their priorities in two objectives: reelection and legislative supermajorities. Multiterm reelection clauses were introduced in 17 of 24 provinces, allowing governors multiple opportunities for reelection. La Rioja, Santa Cruz, and San Luis, home to Menem, Kirchner, and Rodriguez Saa, the three most powerful Peronist candidates of the 2003 presidential election, were among four provinces which had reformed their constitutions to allow for the indefinite reelection of the Governor.

A second problem was the increasing fragmentation of the party system. The electoral defeat of the Peronists in the 1983 election led that party into an internal restructuring process with two competing factions, the *Orthodox* and the *Renovadores*. To avoid costly electoral defeats, Peronist governors introduced *apparentment* rules (*Lemas*) allowing different lists of congressional candidates to compete with each other while proposing the same gubernatorial candidate. Together with higher thresholds, redistricting, administering coattails, and introducing new administrative procedures to minimize the emergence of opposition parties, governors progressively isolated their political environment from the more competitive national level races. As PR electoral rules became a political liability, a new electoral system became fashionable—Mixed Member Electoral System—allowing candidates to partition at-large districts and modifying the fine print of the democratic contract.[21]

By 2003, each province displayed traces of the past electoral legacies we have described. Buenos Aires and Mendoza use similar districts and medium-sized magnitudes from the early twentieth century but introduced PR formulas while overrepresenting their own provincial peripheries. Cordoba traded its Senate for a single chamber legislature with a majoritarian mixed-member electoral system, preserving many of the geographic districts used to elect senators for the last 100 years. Majoritarian mixed-member electoral systems, together with districting plans that favored the incumbent governors, were implemented in Santa Cruz, San Juan, Santiago del Estero, and Rio Negro. Salta and La Rioja maintained a large number of single-member districts favoring the Peronists and the PRS, also overrepresenting rural districts against the more competitive Capital districts.

Out of 24 provinces, including the Autonomous City of Buenos Aires, only five use PR formulas in at-large districts with a 3% threshold, while most provinces raised the nominal threshold well above the 3% used for other national races. Three provinces increased the nominal threshold to 5%, Buenos Aires intro-

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[21] Mixed-Member Majoritarian (MMM) with no proportionality adjustment provided elites with a mechanism to introduce justifiable majoritarian and partisan bias into the provinces. Arguing that single-member districts (lower tier) facilitated a tighter control over representatives, and multimember PR districts (upper tier) maintained a proportional allocation of seats, majoritarian mixed-member electoral systems became extremely popular among incumbent reformers. Today, five provinces have MMM and several projects are being discussed in a number of provinces including Capital Federal and the province of Buenos Aires.

duced new seat quotas to elevate the threshold beyond 6%, and Río Negro chose a fixed 22% threshold in each electoral *sección*.[22] Another reform limiting the number of entrants in the electoral arena and reducing intraparty factionalism was the enactment of *Lemas*, which allowed internal factions to pool their votes in the general elections, reducing the likelihood that candidates would run outside the official party lists.[23]

An Example of Electoral Reform with Distinctive Majoritarian and Partisan Goals: La Rioja 1987

In 1987 Governor Carlos Saul Menem initiated an electoral reform process with the objectives of isolating the opposition *Union Civica Radical* in the Capital District and consolidating the *Renovadores* faction within the Peronist Party (PJ). The existing low-district magnitudes and a majority-minority formula constituted a political liability for Menem, limiting the total number of seats the Peronists could obtain in the capital district and guaranteeing a seat premium to the opposition in medium-size precincts (*departamentos*). The Peronist proposal significantly increased the number of seats distributed in the rural districts of the province (1985) while shifting to a PR-D'Hont formula (1987). The only truly competitive district, the provincial capital, became heavily underrepresented while the use of a PR formula led to an electoral regime that was both less majoritarian and severely biased in favor of the Peronists.

Estimating the Pro-Incumbent Bias of Electoral Reforms in Argentina

The Data

To estimate the effect of the reforms on the expected seats won by incumbent parties we compiled a complete data set with 1893 observations in 204 subnational elections that took place between 1983 and 2003. The data set includes each party seat and vote by election and province. It also includes a dummy variable indicating whether party j was the incumbent party, an ordinal electoral reform variable taking the value of zero if no reforms were implemented and increasing by one every time an election takes place after a reform,[24] and a variable n_{pe} measuring the effective number of electoral parties by province p and election e.

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[22] As turnout declined, the effective threshold also increased significantly. With turnout rates falling below 60% of registered voters, the effective threshold has increased well beyond 3% for congressional and legislative elections. Chaco and the city of Buenos Aires, this last one through a 1996 Federal Court ruling, provide the only examples in which nominal thresholds were eliminated. Since that court decision, the effective number of competitive parties in the City of Buenos Aires increased from less than 4 to more than 10!

[23] Provinces that introduced *Lemas* for at least some elections during the last 20 years include La Rioja, Misiones, Chubut, Salta, Santa Cruz, Santa Fe, Santiago del Estero, and Tucuman.

[24] This variable identifies electoral regimes by reform, with a [0:4] range.

As in King (1990), $\rho = 1$ describes a strictly proportional electoral system, $0 < \rho < 1$ describes a submajoritarian electoral system,[25] and values larger than one, $\rho > 1$, indicate majoritarian biases. A $c_p = 0$ is expected in two-party races, while $c_p > 0$ describe the magnitude of the intercept slide as the effective number of parties increases. Values of $b_{pe} > 0$ indicate a pro-incumbent bias and $b_{pe} < 0$ indicate anti-incumbent biases. Finally, $r_1 > 0$ indicates positive incumbent biases introduced by the reforms, while $r_2 > 0$ indicates positive majoritarian biases introduced by the reforms.

The Results

For comparative purposes, Table 1 displays the results of the two population-averaged general linear models. Both models provide roughly similar estimates of the majoritarian bias, $\rho \approx 1.44$. In both models, the slide due to increasing competition fits our theoretical expectations, reducing the number of votes required by the plurality winner to obtain a majority of seats. The incumbent bias is positive and significant, both statistically and substantively, providing close to 5% more seats to an incumbent party holding all other variables to their means.

Contrasting models 1 and 2, however, provides an interesting insight into the importance of the reforms to boost the incumbency bias b. A more intuitive understanding of the results is provided in Figure 2, which shows the fitted lines for the seats (vertical axis) and votes (horizontal axis) equation. The dotted line in Figure 2a describes a strictly proportional allocation of seats, while the solid line describes the mean of the seat-vote equation for the Argentine provinces with a mean of 3.3 competitive parties (shifting the winning cut-off point from 50% to ≈30%). Figure 2b shows that a winning incumbent party obtains approximately ≈5% more seats than a winning nonincumbent party, a bias explained by the post-1983 electoral reforms as indicated by Model 2 in Table 1.

Table 2 presents the results of two multilevel Bayesian models. The models were run using WinBUGS 1.4 (Spiegelhalter et al. 2003) and R2WinBUGS code (Sturtz, Ligges, and Gelman 2004). Uninformative priors were used for all hyper parameters which converged rapidly.[26] In the first model, we only measured the effect of the electoral reform on the partisan bias variable. Controlling for province-specific party competition also leads to more significant majoritarian bias estimates ($\rho = 1.61$) than those estimated by the standard GLM.

In Models 3 and 4, the incumbent bias from reforming the province electoral system is .16 and .13, which in the critical area near the 50% cut-off point would lead to a ≈ 8% seat premium for each reform. It is worth reminding the reader that some provinces held up to four different reforms.

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[25] There were no electoral systems with $\rho <= 1$. All electoral systems are majoritarian to different degrees.

[26] See details in the appendix.

TABLE 1

Majoritarian and Partisan Biases in Provincial Elections, Population
Averaged GLM (Binomial, Logit)

	Expected Seats General Linear Model Population Averaged Model (Family Binomial, Link Logit) Model 1	Expected Seats General Linear Model, Population Averaged Model (Family Binomial, Link Logit) Model 2
Adjusted Majoritarian Bias (ρ')	1.445***	1.443***
	(.025)	(.025)
Incumbent Bias	.12***	.0003
	(.037)	(.049)
Competition (c) (vote weighted)	.527***	.56***
	(.035)	(.04)
Electoral Reform	—	−.046***
		(.019)
Incumbent*Reform	—	.133***
		(.034)
Wald Chi^2	5,168	5,276
Groups	24	24
N	1,893	1,893

Note: Population-averaged General Linear Model (binomial, Logit). Standard errors in parenthesis. * Significant at the .1 level, ** Significant at the .05 level, *** Significant at the .01 level.

FIGURE 2

Majoritarian and Partisan Biases for Provincial Elections
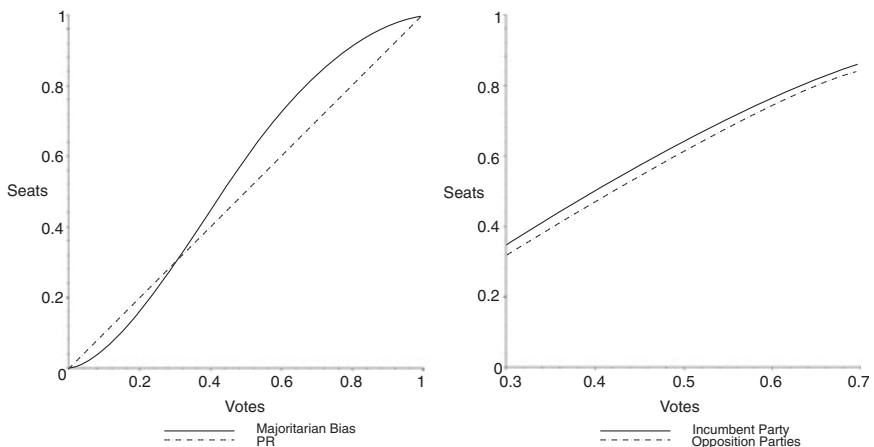(Model 1, Table 1)

TABLE 2

Majoritarian and Partisan Biases in Provincial Elections, Multi-Level
Bayesian Models

	Hierarchical Specification, Model 3	Hierarchical Specification, Model 4
First Level		
Majoritarian Bias (ρ)	1.398 [1.21, 1.52]	1.61 [1.33, 1.71]
Incumbent Bias (b)	.149 [.001, .17]	.106 [.001, .133]
Competition (c)	.405 [.282, .521]	.491 [.363, .566]
Second Level		
r_1 – Incumbent Bias*Reform	.162 [.14, .19]	.133 [.113, .15]
r_2 – Majoritarian Bias*Reform	—	−.313 [−.47, −.15]
rc_2 – Majoritarian Bias*Reform*c	—	.004 [−.03, .032]
N-First Level	1,893	1,893
N-Second Level	204	204

Note: See Appendix for estimation details. First and third quartiles in brackets.

One of the most interesting features of our modeling strategy is the possibility of visualizing incumbency bias changes in each province. The results show how sensitive the model is in capturing the pro-incumbent bias from electoral reforms. Figure 3 shows incumbency biases in six Argentine provinces[27] with solid vertical lines indicating elections immediately after an electoral reform. Buenos Aires, a province in which no reform took place, is the only case among the six selected provinces in which the incumbency bias remained close to 0 for the entire period.

Among the 24 provinces studied, there are almost no cases with declining incumbency bias after the reforms. This a testament to the efficacy of the reforms, contrary to the perception that reforms generally do not lead to the expected results.

It is worth noticing that in Salta, the 1993 reform led to a large incumbency bias in 1991 and a decline in 1993. As we pointed out in an earlier section, the 1993 reform was introduced by the *Partido Renovador Salteno* (PRS) after defeating a divided Peronist Party in 1991. The reform led to substantive partisan biases both in favor of the PRS, with the Peronists as a minority partner, against the UCR. The decline of the PRS after 1995 increased the pro-Peronist partisan bias resulting from the districting strategies of the early 1990s, which can be noted in the 1997–2001 data.

Finally, Santa Cruz, Santiago del Estero, and La Rioja had Peronist-dominated electoral reforms that systematically benefited the incumbent Party. In the cases

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[27] Step-plots for all provinces can be found in the appendix. Notice that the other provinces with flat incumbency biases are Mendoza, Entre Rios, and La Pampa (which did not introduce reforms in the last 20 years), Chaco and Corrientes (which introduced countermajoritarian reforms).

FIGURE 3

Mean Incumbent Bias in Selected Provinces
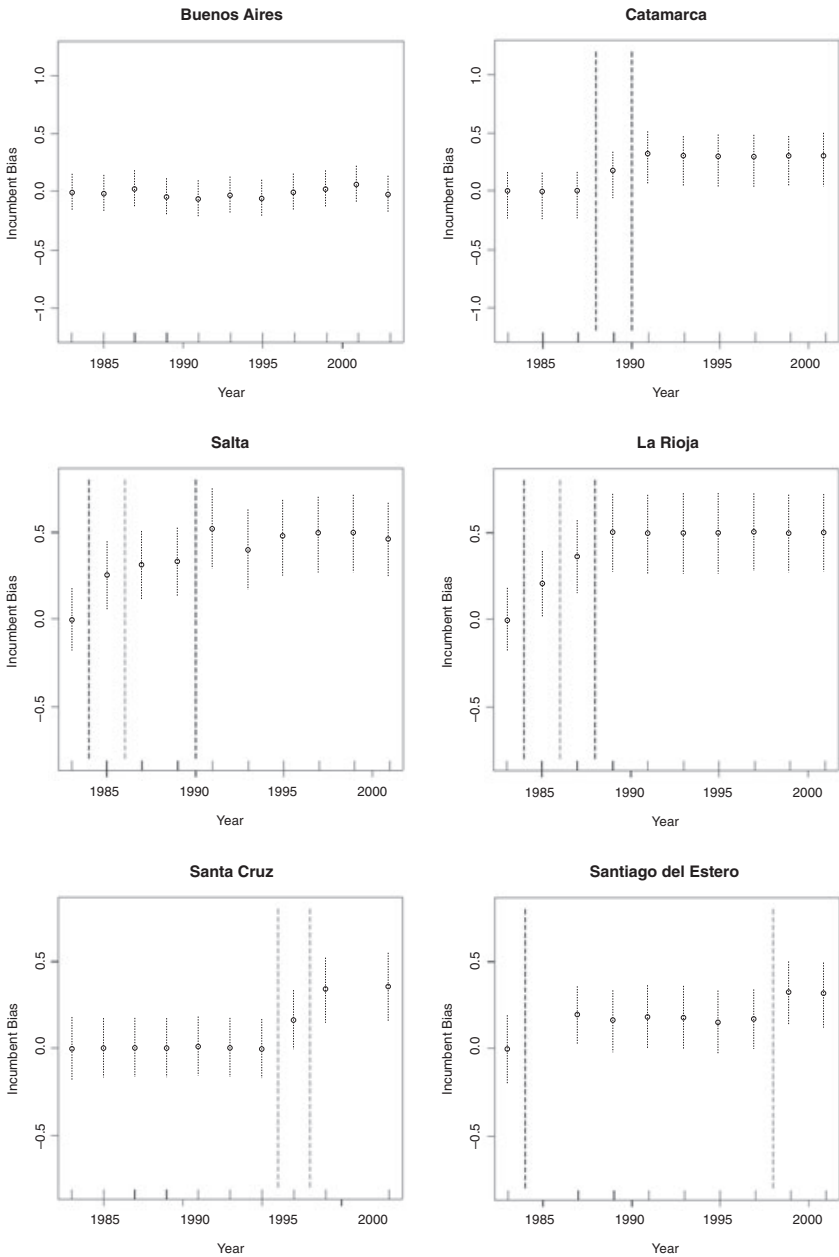
Note: Vertical dash lines indicate electoral reforms: b_{pe} estimates by province and year, first model of Table 3.

of Santa Cruz and Santiago del Estero these reforms were critical to strengthen the power of Kirchner and Juarez, who faced competitive districts and an unruly Peronist interna.

Comparing the incumbency and the majoritarian bias estimates also provides some interesting information. First, it is worth noticing that the electoral reforms were not systematically beneficial to the majority party if they occurred with incumbency bias. As shown in Figure 4, it is not uncommon to find that reforms both increased the incumbency bias and reduced the majoritarian bias.[28] That is, reforms that benefited the incumbent reformer provided a larger number of seats even as their vote declined.

A conclusion to be drawn from comparing the two groups of estimates is that incumbents have been more successful in predicting the seat benefits from biased electoral reforms than the benefits to be obtained by majoritarian reforms whose benefits rest on expectations about winning future elections. Risk-averse politicians may often be better off by minimizing the seat costs of losing their majority status while maximizing the unconditioned benefits of pro-incumbent reform strategies.

Concluding Remarks

Post-democratization politics in Eastern Europe and Latin America have often been accompanied by extensive national and subnational electoral reforms. These reforms have attempted both to eliminate the authoritarian legacies which preceded the democratization processes and to consolidate the power of incumbent reformers on a first-come first-served basis. In this context, evaluating the fairness of electoral reforms is a critical requirement of electoral accountability in new democracies. The complexity and diversity of electoral regimes and electoral regime changes in multiparty settings, however, has prevented researchers from properly evaluating the partisan consequences of national and subnational level reforms. In this article we provide a general framework to model institutional change across many different electoral regimes.

This research provides a novel methodology to model seats and votes as well as to measure the majoritarian and partisan effects of increasing competition. First, we show the importance of controlling for the competitiveness of the election to adjust for deviations from the "no-intercept" model usual in two-party races. Second, we show the advantage of using a multilevel strategy to model electoral regime changes introduced by the reforms. Our modeling strategy also provides new information, by electoral regime and election, allowing for dynamic comparative analyses of institutional change.

In the particular case of Argentina, estimation of the seat-vote properties of the electoral systems shows that incumbent parties controlling the electoral

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[28] Incumbency bias is the premium seats obtained by the party that won the previous election. Reforms that introduce more proportional formulas but heavily redistrict in favor of the incumbent, as in La Rioja and Santiago del Estero, are a sure bet to reformers.

FIGURE 4

Majoritarian Bias in Selected Provinces
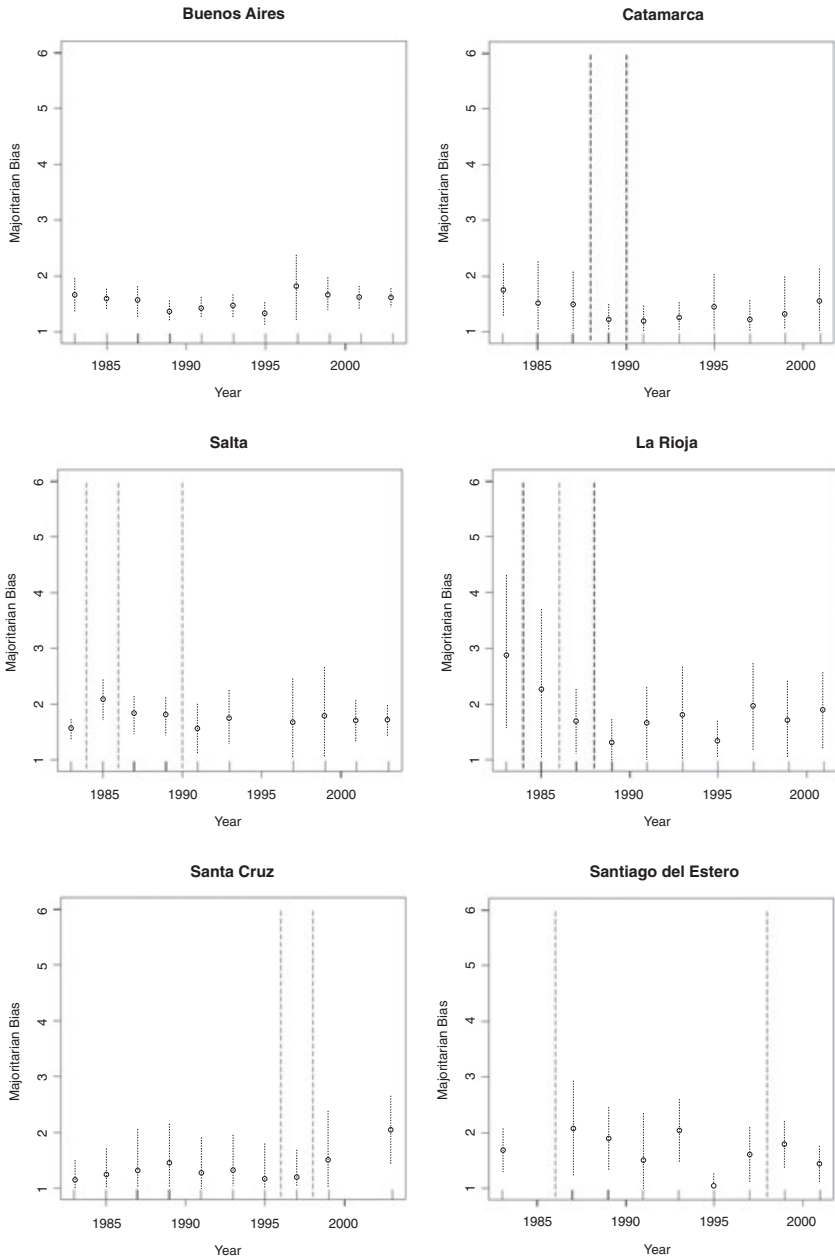
Note: Vertical lines indicate an electoral reform: ρ_{pe} estimates by province and year, first model of Table 3.

reform processes won close to 8% more seats than those expected by any other party with comparable vote shares. This pattern of pro-incumbent reforms explains the apparent paradox of having multiple electoral reforms together with high incumbent stability.

Not all relevant information about the electoral reform process, however, is summarized by an adequate model specification. Some of the most interesting features of the reforms are in the political processes that write the fine print of the democratic contract. A broader understanding of electoral reforms, therefore, requires future research to integrate the mechanics of the electoral regime with recent models of endogenous electoral change (Benoit 2004).

Appendix

Estimation of the Multilevel Bayesian Model

In this appendix we present the estimation details of the multilevel model described by equations 3 and 4. Multilevel MCMC Bayesian models provide a mechanism to incorporate prior knowledge into the estimation process and to combine different types of information. For a full derivation of the joint posterior distribution of the binomial-logistic model we refer the reader to Gelman et al. (2000, 291–97). Data and code to replicate the results can be requested from the authors.

Model

We begin by describing the expected allocation of seats for a given party j in one province and election. The stochastic model presumes a binomial distribution with a logistic link, although alternative distributions can be used (Cox and Katz 2002).[29] Each election in a province and year is treated as a different experiment with p number of parties. We can write the first level probability model (sampling distribution) of equation 3 as:

$$p(\pi|S_j) \propto \prod_{j=1}^{J} \frac{K_j!}{s_j!(K_j - S_j)!}[\pi_j]S_j[1 - \pi_j]K_j - S_j$$

$$\log\left(\frac{\pi_j}{1 - \pi_j}\right) = c * \ln(n - 1) + b * I_j + \rho \ln\left(\frac{v_j}{1 - v_j}\right)$$

The total number of seats S_j won by a party j is the product of the estimated probability of winning a seat and the district magnitude K. The individual probabilities π_j are explained by an inverse logistic function of the log-odds ratio of the total votes obtained by a party v_j, its incumbency status I_j, and the number of

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[29] See Gelman et al. (2000; Chapter 12) for a Bayesian alternative to the Cox and Katz (2002) model.

competitive parties n. We use Laakso and Taagepera's (1979) effective number of parties to estimate the sliding intercept of an increase in the number of parties. The natural log of the number of parties minus one guarantees that this more general model reduces to King (1990) when there are only two competitive parties, $ln(n-1) = 0$. We can also extend this model to all provinces p and elections e and estimate iteratively the following model by maximum likelihood.

$$p(\pi|S_{jpe}) \propto$$

$$\prod_{j=1}^{J}\prod_{p=1}^{P}\prod_{e=1}^{E}\frac{K_{jpe}!}{S_{jpe}!(K_{jpe}-S_{jpe})!}[\pi_{jpe}]S_{jpe}[1-\pi_{jpe}]K_{jpe}-S_{jpe}$$

$$\log\left(\frac{\pi_{jpe}}{1-\pi_{jpe}}\right) = c_p * \ln(n_{pe}-1) + b_{pe} * I_{jpe} + \rho_{pe}\ln\left(\frac{v_{jpe}}{1-v_{jpe}}\right)$$

Most variation in the parameters of interest, however, is left unexplained. In the Bayesian framework, information about the parameters of interest can be incorporated as priors or analyzed as a function of second level variables.

Hierarchical Hyperpriors

This prior information may take the form of subjective appreciations about the social process that generated the data or modeled as a function of "objective" information at the aggregate level. In the case of a hierarchical binomial-logistic model, *any normal prior distribution of the first level parameters in equation A.1 is conjugate to the normal approximation to the likelihood* (Gelman et al. 2000, 391).[30] Therefore, we can use *noninformative normal priors* in the model to sample from the joint posterior distribution. Alternatively, we can also use *informative normal* priors. For simplicity, we write the joint posterior distribution of the hierarchical Model 1 with informative priors on the incumbency bias parameter, $b_{pe} \sim N(\lambda, \sigma^2) = r * R_{pe}$.

Because the first-level model specifies a random intercept (c_p), we can write the linear second-level normal model without a constant.[31] For notation purposes, we describe with b_{pe} the partisan bias observed in each of the 204 elections and with capital subscripts b_{PE} the partisan bias of the *current* first-level election. The joint posterior distribution of the multilevel model can be expressed as:

$$p(c, b, \rho, \lambda|S) \propto \prod_{p=1}^{P}\prod_{e=1}^{E}Bin(S_{pe}|K_{pe}, \text{logit}^{-1}(b_{pe}))\prod_{p=1}^{P}\prod_{e=1}^{E}N(b_{pe}|\lambda, \sigma^2)$$

$$\times \prod_{j=1}^{J}Bin\left(S_j|K_j, \text{logit}^{-1}\left(c * \ln(n_j-1) + b_{PE} * I_j + \rho\ln\left(\frac{v_j}{1-v_j}\right)\right)\right),$$

---

[30] Given that ρ_{pe} is exponentially distributed, prior information has to be used on log transformed values of ρ (Gelman et al. 2000, 392).

[31] A linear model with a constant could be used to estimate some extra random variation in the second-level model.

where the term b_{PE} describes the mean incumbent bias during the current election. The mean of the partisan bias is normally distributed, λ, and is linearly dependent on the reform variable R_{pe}, $\lambda = r*R$. The second-level normal term provides new information to estimate the aggregate-level parameter of interest. We need, however, to specify distributions for the hyperparameters $\phi \equiv \{r, \sigma^2, \lambda\}$ of the second-level equations. In our case, we use independent noninformative priors for the mean parameters $r_1, \lambda \sim N(0,1000)$ and the variance parameters $\sigma^2 \sim inv.gamma(.0001, .0001)$.

Computation

We estimate this model via Bayesian simulation (Markov chain Monte Carlo simulations), using WinBUGS 1.4 (Spielgelhalter et al. 2003) and R 2.0.0. The observations are stacked by party, province, and election, generating a data set of 1893 cases in 204 elections, with an average of 9.2 parties by election and province. We run two Monte Carlo chains with 20.000 MCMC iterations and a 15.000 burnin in 16.2 minutes (17.5 minutes for Model 2) in a Pentium 4, 2.2 Ghz with 1000 GB of RAM. All estimated parameters converged rapidly and Gelman's R-hat scores for convergence were under 1.05 (convergence is achieved below $\approx$1.2). The computational requirements of the model are moderate and most data sets should run without problem using the code provided by the authors at http://calvo.polsci.uh.edu/.

Annotated R 2.0.0 Code: Model 1 of Table 2

```
#call libraries
library(R2WinBUGS)
library(foreign)

#Read First Level Data
data = read.dta("partydata.dta")
attach(data)

#Read Second Level Data
regime = read.dta("regime.dta")
attach(regime)

#Create index for the first level (N) and second level (K) data
N = nrow(data)
K = nrow(regime)

#Generate the WinBugs dataset object data.data = list(N=N, K=K, s=dps,
M=kdp, lnvdp=lnvdp, encp=encpdp,refelec=grefelec, regimenum=regimenum,
prov=provi,incumb=incumb)
```

```
# Generate Initial values for each MCMC chains data.inits = function()
{list(r.b=rnorm(1,0,1),  c=rnorm(24,0,1),b=rnorm(204,0,1),  rho=runif(204,1,6)
)}

# Set the parameters
data.parameters = c("rho", "c", "b", "r.b", "sigma.b",)

# Run WinBUGS
jop.sim = bugs(data.data, data.inits, data.parameters,"jop_mod.txt", n.chains=2,
n.thin=1, n.burnin=15000,n.iter=20000, debug=T)
```

Annotated WinBUGS 1.4 Code: Model 1 of Table 2

```
model
{
#First Level Likelihood Model
for (i in 1:N) {
 s[i] ~ dbin(g[i], K[i])
 logit(g[i]) <- c[prov[i]]*log(encp[i]-1)+b[regimenum[i]]*incumb[i]
+rho[regimenum[i]]*lnvdp[i]
}

#Second-Level estimation of _ and b for each of the 204 elections
for (k in 1:K) {
 rho[k]~dexp(mu.rho[k])
        log(mu.rho[k]) <- mu.rho.b
 b[k]~dnorm(mu.b[k],tau.b)
        mu.b[k] <- r.b*refelec[k]
}

# Second-Level Model for the Competitiveness Parameter c for each of the 24
provinces
for (j in 1:24) {
        c[j] ~ dnorm(0,tau.c)
}

#Definitions
 r.b ~ dnorm(0,.001)
 mu.rho.b ~ dnorm(0,.001)
 tau.b ~ dgamma(.0001,.0001)
 tau.c ~ dgamma(.0001,.0001)
}
```

Acknowledgments

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