

Voter Transitions, Vote Wasting, and Strategic Behavior in Legislative Elections in Argentina

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Abstract

In this paper I study vote wasting and strategic voting behavior in the Argentine Senate election for the City of Buenos Aires in 2013. I estimate and analyze the voter transition matrix between the primary and general elections using a Bayesian hierarchical model for ecological inference, from a rich data set of ballot-box data. The results show that strategic behavior is not widespread amongst the electorate in Buenos Aires. In particular, at least 75% of voters who had the opportunity to avoid vote wasting by behaving strategically did not. The results suggest that this electorate might be composed of a mixture of voters with strategic and expressive motivations, where the expressive faction dominates.

I. INTRODUCTION

In general, we think of voters as striving to achieve a goal that provides them with some benefit. The range of goals, or motivations, is large, but they have been grouped into two opposing categories in the literature on elections. The first, expressive voting, views voters as obtaining benefits directly from the choice they make, rather than from the outcome of the election. Social scientists have provided many different motivations for expressive behavior: identification with a group of individuals, a party, a candidate, or a political position (Schuessler, 2000; Brennan and Hamlin, 1998; Schnakenberg, 2014), moral or desirable characteristics (Brennan and Hamlin, 1999), social pressure (Kuran, 1995), among others. See Hamlin and Jennings (2011) for a review of the foundations of expressive voting behavior.

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The second, strategic voting, rests on the assumption that voters are concerned about the outcome of the election. Voters have underlying preferences on policy outcomes or candidate characteristics, and make their choices to maximize the expected value derived from the winning candidate or legislature. This type of behavior has been of interest to researchers since Duverger (1954) and Downs (1957).

In elections with only two competing candidates, the only possible strategic behavior is deciding whether to vote or not, as voters do not have a third alternative they can support in order to affect the outcome of the election.¹ Therefore, strategic and expressive behavior are not distinguishable in these cases, as they are observationally equivalent. McKelvey and Ordeshook (1972)'s extension to models of multiparty elections gave the theoretical foundations for strategic voting in the choice, rather than only on participation. Voters motivated by the outcome of the election would consider the possibility that their vote could affect the outcome. They would, therefore, think twice before wasting their vote on a candidate that has no chance of being elected, even if that candidate is their favorite one. In those situations, voters behaving strategically would lend their support to their second (or maybe third) most preferred candidate, assuming he has a reasonable chance of succeeding.

The primary goal of this paper is to determine the extent to which voters engage in strategic behavior. In particular, I focus on vote wasting, defined as casting a vote for a party that is unlikely to get elected. If voters behaved strategically, vote wasting should remain at minimal levels. To do this, I estimate the voter transition matrix between primary and general elections for the 2013 Senate race in the City of Buenos Aires, Argentina. The new Argentine primaries, instituted in 2009, provide an interesting laboratory for strategic voting. Their general lack of internal competition, together with their open and mandatory character, implies they provide very accurate and useful information on where the general electorate stands, and on which parties are likely to gain seats in Congress or conquer the presidency. This information should play a powerful role in the decision-making process of voters who care about the outcome of the election and might behave strategically in the general election. Importantly, this information is available to voters at the time of making their decision. Thus, the two-stage nature of this election is useful as voters can observe the outcome of the primary and then adjust their behavior in the general election. This paper's focus on Argentina fills a gap in a literature that has been largely concentrated in studying strategic behavior in the United States and the United Kingdom, with

¹There is a large literature dealing with voter turnout and its determinants. See, for example, Gerber et al. (*forthcoming*), Gerber et al. (2013), Gerber and Green (2000), Geys (2006), Ashworth and Clinton (2007).

very few exceptions.^{2,3}

To estimate the voter transition matrix between the primary and general elections, I use a version of King (1997)'s Ecological Inference (EI) method for large dimension tables. The large dimensional EI models are little-used in political science, and have been rarely used to study strategic behavior. By applying an ecological inference model on actual election results at the ballot-box level (the most disaggregated data legally obtainable) I avoid survey data, and its potential biases, that a large part of the literature relies on. Furthermore, by using the outcome of primaries with poor intra-party competition as a measure of party viability, I avoid the issue of inferring strategic behavior from measures of viability (or election closeness) based on the election's outcome itself, which is a widespread problem in the literature.

The rest of the paper is organized as follows. In the next section I describe the senatorial electoral system in Argentina and the new primary election system. I also present the hypotheses derived from the theoretical literature on strategic voting. In section III, I describe the different ways in which the empirical literature has estimated strategic voting behavior, the shortcomings present in the methods used, and explain how ecological inference techniques for the estimation of voter transition matrices can help avoid those shortcomings. Then, in Section IV, I describe the data and particular method used in this paper. Section V presents the results and discussions. Finally, Section VI concludes.

II. THE ARGENTINE SENATORIAL ELECTORAL SYSTEM AND HYPOTHESIS

Senators in Argentina are elected to six-year terms by popular vote on a provincial basis. Argentina uses a one voter one vote, closed-list, fixed-ratio electoral system. The party that attains the most votes in the election is awarded two seats, and the runner up is awarded one.

Since the 2011 elections, primaries called *PASO* (*Primarias Abiertas, Simultaneas y Obligatorias*) take place two months before the general election. The *PASO* allow voters to cast a vote for any party they want, irrespective of party affiliation; they are simultaneous; and compulsory for both parties and voters. Voters cast one vote for each category, but they are allowed to vote in different primaries for different categories. Thus, the new electoral system closely resembles a two-round

²For analyses of strategic behavior in the United States and United Kingdom see, for example, Johnston and Pattie (1991), Heath et al. (1991), Cain (1978), Blais and Nadeau (1996), Alvarez and Nagler (2000), Alvarez et al. (2006), Myatt (2007), Kiewiet (2013).

³Kawai and Watanabe (2013) study strategic behavior in Japan. Cox and Shugart (1996) study their model's predictions on the ratio of the vote won by the 'second loser' to that of the 'first losers' for Colombia and Japan. Moser and Scheiner (2009) apply the latter methodology to another 10 countries. Katz and Levin (2011) study voters' electoral coordination to behave strategically.

electoral system, rather than a traditional primary-and-general election system. This resemblance is accentuated by the general lack of internal competition. Because of it, the *PASO* have been dubbed "national opinion polls", as they tend to be non-contested, or non competitive, and are seen as a prediction of the outcome of the general election.

The overall lack of internal competition in the primaries might seem to render them useless because the pool of viable candidates does not change much between the primaries and the general election.⁴ But the primaries provide very accurate and useful information on where the electorate stands, and on which parties are likely to gain seats in Congress or conquer the presidency. The *PASO* are actually the best of polls because (1) they reflect actual rather than reported or intended voting behavior, and (2) they have no error margin, since their results depends on the population of voters, rather than a sample.⁵ This makes the electoral system in Argentina an interesting laboratory for the study of strategic voting behavior, as voters can use the outcome of the primaries to inform their decision in the general election.

For the 2013 Senate election in the city of Buenos Aires, three major parties participated in the primaries. Two of them (right-wing PRO and left-wing FPV) had uncontested primaries. For the third party, UNEN, four lists competed for the nomination. Another ten minor parties (most of them to the far-left) competed in the primaries, and only one of them had a contested primary. In order to keep the voter transition matrix manageable for estimation purposes, I aggregated some of the categories. I considered the winner of the UNEN primary (the centre-left UNEN-CS) separately, and grouped the other three lists in this primary (UNEN-Others, of which the largest, UNEN-SM is centre-right). I also grouped all the minor parties together ("Others").⁶ Finally, the category "No Vote" includes individuals registered to vote, but whose votes were blank, void, null, or did not turn out to vote.⁷

The main focus of this paper is to determine the extent to which voters engage in vote wasting. If voters behaved strategically, vote wasting should be zero. Cox (1997)'s theoretical model of

⁴Parties that achieve less than 1.5% of the total positive votes during the primaries cannot participate in the general election.

⁵It is possible, though, that voters make mistakes when casting their ballots.

⁶The ideological position of PRO comes from Calvo and Murillo (2005). The alliance UNEN includes also the core of the UCR, labeled as centre-right in Calvo and Murillo (2005). But, as the leader of UNEN-CS, Pino Solanas, comes from a left-wing background, I assigned UNEN-CS a centre-left position. As the leader of UNEN-SM is a former core member of the UCR, I placed UNEN-Others in a centre-right position. I placed the FPV to the left, based on Saiegh (2015). In addition to the ideological positions, one can classify the main parties in terms of government and opposition. FPV is the party in the National Government, while PRO leads the City Government. The alliance UNEN is then in double-opposition in the City of Buenos Aires.

⁷All voting age citizens in Argentina are automatically registered to vote when they turn 18 years old. Those between 16 and 17 years old can chose to register.

strategic voting predicts that the number of parties that receive positive vote shares is at most equal to the number of parties that can obtain a seat, plus one if there is a tie (or near tie) for the parties with the least vote shares that can obtain a seat. Thus, for the election considered in this paper, I expect that at most three parties get positive vote shares in the general election, because the parties that came out second and third (UNEN-CS and FPV) had similar vote shares. Taking the results of the primaries as a starting point, this implies the minor parties should receive no votes in the general. This hypothesis is represented in Table 1 by setting the column "Others" to zero. Moreover, their supporters should switch their vote to one of the major parties. Since most of the minor parties are left-leaning, it is reasonable to expect the FPV to benefit the most (row "Others" in Table 1).

Table 1: *Illustration with no vote wasting*

		<i>Choice in General Election</i>					
		FPV	UNEN	PRO	Others	No Vote	<i>% of Voters</i>
<i>Choice in Primary Election</i>	FPV	100%	0%	0%	0%	0%	14.2%
	UNEN-CS	0%	100%	0%	0%	0%	12.9%
	UNEN-Others	Low	High	Medium	0%	0%	13.7%
	PRO	0%	0%	100%	0%	0%	20.6%
	Others	Medium	Low	Low	0%	0%	12.1%
	No Vote	0%	0%	0%	0%	100%	26.4%
	<i>% of Voters</i>	16.6%	19.8%	28.0%	7.0%	28.6%	

All voters who supported major parties in the primaries should support them again in the general election, since there is enough evidence that they are viable (rows UNEN-CS, FPV, and PRO in Table 1). Supporters of the losers of the UNEN primary (UNEN-Others) should be more likely to support UNEN-CS in the general election because of ideological proximity. But some of them could switch to another major party, especially PRO, because of ideological proximity (row UNEN-Others in Table 1)

Finally, I expect that most voters who voted blank or did not turn out to vote would do the same in the general election. But, if some of these voters participate in the general election, they should support one of the major parties (row "No Vote" in Table 1).

III. ESTIMATION OF STRATEGIC VOTING BEHAVIOR

Scholars have used three approaches to measure strategic voting behavior. The first approach, direct measurement, examines the difference between stated choice and the preference ranking of the voters. One of the most common practices is to obtain rankings through feeling thermometers (see, for example, Cain, 1978; Abramson et al., 1992; Blais and Nadeau, 1996; among others). The problem with feeling thermometers is that warm feelings do not necessarily translate into preferences.⁸ Alvarez and Nagler (2000) and Alvarez et al. (2006) use a variation of direct measuring, by implementing voter choices through a random utility model that incorporates the distance between the voter and each party on several issues. This approach represents an improvement on other measurement methods, but it is susceptible to model misspecification. Alvarez and Kiewiet (2009) take a more direct approach by asking survey respondents to make pair-wise comparisons between candidates, and derive each respondent's ranking under the assumption of transitivity of preferences. This approach is perhaps the most appropriate for measuring voters' preference rankings as it tackles the question directly, without resorting to proxies.

The second approach, the self-reporting methodology, uses survey questions to ask respondents to state the motivations for casting their ballots (Heath et al., 1991; Niemi et al., 1992; Heath and Evans, 1994). But this approach suffers from biases in survey responses, that leads to overestimation of strategic behavior. In particular, studies have shown that survey respondents tend to report voting for the winner of the election.⁹ Moreover, Alvarez and Nagler (2000) show that the self-reported measure of strategic voting increases the further from election day a survey is conducted.

The third approach uses aggregate election results. Most models grouped under this methodology rely on some measure of closeness of the election to estimate strategic behavior. Cain (1978) uses the closeness of the 1970 U.K. General election outcome in each constituency. The problem with this approach is that it uses the outcome of the election itself to determine if voters behaved strategically, introducing endogeneity in the model. Others, like Johnston and Pattie (1991) use closeness of the previous general election and analyze the flow of the vote between the two election. But the relevant issues, party positions, and voters preferences in the two general elections are likely to be different as they are years apart. Kiewiet (2013) follows a similar approach, but enriches this model with demographic and other constituency-level data to capture the "normal vote," that is, the counterfactual vote shares that would have been observed in the absence of strategic

⁸See, for example, Weisberg and Miller (1980).

⁹See, Benewick et al. (1969), Himmelweit et al. (1978)

behavior. This approach is an improvement from previous methodologies, but it is difficult to establish the validity of the counterfactual.

The approach I use in this paper is connected to the third one described above, but with significant innovations. While I also make use of flow-of-the-vote matrices (or voter transition matrices), the flow is between primary and general elections that take place within two months of each other. This makes the relevant political issues, candidates, and voters (almost) the same in both elections. Moreover, the lack of intra-party competition in the 2013 Senatorial primaries for the city of Buenos Aires, makes them resemble the general election even more.

The method I use in this paper was developed by Rosen et al. (2001) and is an extension of King (1997)'s Ecological Inference method. This method combines the deterministic bounds of the quantities of interest from aggregate data (Duncan and Davis, 1953) with statistical approaches. This combination makes the statistical portion of the model less sensitive to assumptions than previous statistical methods (Goodman, 1953, 1959) that exclude information from the bounds (King et al., 2004). Ecological inference methods have been used to disentangle the composition of the Nazi vote (King, Rosen, Tanner, and Wagner, 2008), ticket-split voting (Burden and Kimball, 1998; Benoit, Giannetti, and Laver, 2000), electoral turnout by race (King, 1997; Gay, 2001), residual vote rates (Herron and Sekhon, 2005), the relationship between center-right vote and turnout (Calvo and Escolar, 2003), among others.

Other methods have been proposed to estimate voter transitions between two consecutive elections. McCarthy and Ryan (1977) support a quadratic programming solution that provides feasible estimates, but Upton (1978) demonstrated their figures tend to overestimate the percentage of voters who remain loyal to their previous vote. Johnston and Hay (1983) introduce a solution using an entropy maximizing approach that has been shown to provide accurate estimates (See Johnston and Pattie, 2000). But this method requires, as an input, an estimate of the aggregate voter transition matrix. In many instances, such as with historical data, this matrix is not readily available. In other cases it can be estimated from exit polls with retrospective questions about previous elections. But research has shown that voters tend to misreport their previous choices to appear consistent with their current one or report voting for the winner (Benewick et al., 1969; Himmelweit et al., 1978; Eckstein and Shachar, 2007). Thus, I find King's approach more appropriate to estimating the voter transition matrix for the 2013 Senatorial election in the city of Buenos Aires.

IV. METHODS AND DATA

I. Data

The data come from official provisional vote counts for the 2013 Primary and General elections in the city of Buenos Aires. The data consist of the number of votes obtained by each party, along with the number of blank, null, and void votes for 5890 individual ballot-boxes in the city. Each ballot box consists of approximately 350 votes.¹⁰ Since the data is a provisional count, it does not include all the ballot boxes in the city. Primary election data contains 80.5% of all ballot boxes, whereas General election data contains 81.1%. For estimation purposes, only ballot boxes with data available for both primary and general elections are considered, covering 80.2% of the total number of ballot boxes and voters. Importantly, the people voting in each ballot box are almost the same across primary and general elections. Small discrepancies, typically less than two voters, exist because of deaths and people who turn 18 between elections.

It is important to note that even though the data is aggregate, the level of aggregation is low. Moreover, vote choices aggregated at the ballot-box level is the lowest level of aggregation of actual (as opposed to stated) vote choice data legally obtainable, as voting is secret. Each unit of observation, a ballot box, consists of 350 voters out of around 2 million voters in the city. To the best of my knowledge, papers estimating voter transitions from aggregate data use data aggregated at the county, department, or state level, each of which can have thousands of voters.¹¹ This large degree of aggregation not only makes the number of observations smaller, but all the potential problems of aggregate data increase considerable, especially aggregation bias. The level of specificity in the data I use, implies that voters within each unit of analysis can be extremely homogeneous in demographic terms, as voters in each ballot box come from the same neighborhood, and even from the same city block.¹²

II. Estimation Model

The method employed in this paper is a Bayesian hierarchical model estimated via Markov Chain Monte Carlo methods, following Rosen et al. (2001).

The data consists of the marginals for 6x5 tables for each ballot box. That is, for each ballot box i I observe the number of people who voted for each specific party (or groups of parties) in

¹⁰The average in the sample is 346.76 votes per ballot box

¹¹For example, Andreadis and Chadjipadelis (2009) analyze the French Presidential first- and second-round elections of 2007 using data from 96 departments in metropolitan France, the smallest of them having a population of 77 thousand, and the largest 2.5 million

¹²Some people do not change their legal addresses, therefore voting in places other than where they live.

the primary (X_{1i}, \dots, X_{6i}), and the general election ($\mathbf{T}_i = (T_{1i}, \dots, T_{5i})$). The unobserved quantities of interest are the fractions of people who voted for the party in row r in the primary and chose party in column c in the general (β_{rc}^i).

This hierarchical model combines two ways of extracting information on the parameters of interest. The first one comes from the natural bounds imposed by the format of the problem. Since for each row the sum of the proportions β_{rc}^i must be one, the problem reduces the possible values of the β coefficients from a C -dimensional hypercube, to a $C-1$ hyperplane in that same space. The second way in which the model extracts information about the parameters of interest in each ballot box i is by borrowing strength from other ballot boxes. This is the statistical portion of the model. It is akin to superimposing the hyperplanes for the different ballot boxes and estimating a density over the intersections, assigning a higher probability to areas where more hyperplanes intersect. The estimates of the coefficients of interest for ballot box i , β^i , are the values with the highest value of the estimated density over the hyperplane for ballot box i .

The validity of the estimates derived from this method rely on three assumptions. The first is that the quantities of interest β_{rc}^i must fall in a single cluster across the different units of observations, although they can be widely dispersed. In terms of the application in this paper, this assumption implies that there cannot be a subset of ballot boxes that are systematically different from the rest. That is, there cannot be a subset of ballot boxes where voters of party A in the primary switch predominantly to party B in the general, and another subset where the primary voters of party A predominantly vote for it again in the general. A violation of this kind seems unlikely in my data, since that would imply that supporters of one party in some ballot boxes are considerably different to those belonging to others. Considering that the candidates and issues under consideration for the voters in each ballot box are the same, a violation of this kind seems far fetched. Nonetheless, as a robustness check, I present results where I relax this assumption by allowing each of the city's 15 *comunas* to have a separate cluster.

The second assumption, and by far the most critical, is that the vector (X_{1i}, \dots, X_{6i}) is independent of the elements in β_r^i . That is, the model requires that the data do not present aggregation bias. In the context of this paper, aggregation bias would imply that the way voters switch their votes between the primary and general election in each ballot box is related to the level of support that the party they chose in the primary had in that ballot box. While it is true that, at the aggregate city level, voters behaving strategically will switch their votes based on the level of support that the party they voted for in the primary got, this is unlikely to be true at the ballot box level. The reason for this is that voters do not care about how the party they voted for fared in the primary in their own ballot box, as election results are determined at the city level.

The third assumption is that, conditional on \mathbf{X} , \mathbf{T}_i and \mathbf{T}_j are mean-independent. Calvo and Escobar note that ecological inference methods will produce biased estimates in the presence of extreme spatial heterogeneity (2003). In the context of this paper, this would imply that the way voters choose in the general election present extreme spatial correlation, after controlling for the outcome of the primary election. While it is reasonable to expect a strong spatial correlation pattern in votes because similar voters tend to live in certain areas, it is unlikely that this spatial correlation in the general election vote shares will be large after controlling for the outcome of the primary election. Furthermore, the robustness checks that allow for separate clusters used to relax the first assumption, also work as robustness checks for the third assumption. the presence of extreme spatial autocorrelation should be captured by these geographically based clusters.

Formally, the model assumes that, at the first step of the hierarchy, \mathbf{T}_i follows a multinomial distribution with parameter vector $\theta_i = (\theta_{1i}, \dots, \theta_{5i})$ and count N_i , where θ_{ci} equals $\sum_{r=1}^6 \beta_{rc}^i X_{ri}$, under the constraint that $\sum_{c=1}^5 \theta_{ci} = 1$

Table 2: Notation for Ballot Box i

		Choice in General Election					No. of Voters
		FPV	UNEN	PRO	Other	No Vote	
Choice in Primary Election	FPV	β_{11}^i	β_{12}^i	β_{13}^i	β_{13}^i	$1 - \sum_{c=1}^4 \beta_{1c}^i$	X_{1i}
	UNEN-CS	β_{21}^i	β_{22}^i	β_{23}^i	β_{23}^i	$1 - \sum_{c=1}^4 \beta_{2c}^i$	X_{2i}
	UNEN-Others	β_{31}^i	β_{32}^i	β_{33}^i	β_{33}^i	$1 - \sum_{c=1}^4 \beta_{3c}^i$	X_{3i}
	PRO	β_{41}^i	β_{42}^i	β_{43}^i	β_{43}^i	$1 - \sum_{c=1}^4 \beta_{4c}^i$	X_{4i}
	Others	β_{51}^i	β_{52}^i	β_{53}^i	β_{53}^i	$1 - \sum_{c=1}^4 \beta_{5c}^i$	X_{5i}
	No Vote	β_{61}^i	β_{62}^i	β_{63}^i	β_{63}^i	$1 - \sum_{c=1}^4 \beta_{6c}^i$	X_{6i}
	No. of Voters	T_{1i}	T_{2i}	T_{3i}	T_{4i}	$1 - \sum_{c=1}^4 T_{ci}^i$	N_i

At the second stage of the hierarchy, the model assumes that the vectors $\beta_r^i = (\beta_{r1}^i, \beta_{r2}^i, \dots, \beta_{r5}^i)^t$ follow independent Dirichlet distributions with parameters $(d_r \exp(\gamma_{r1} + \delta_{r1} Z_i), \dots, d_r \exp(\gamma_{r5} + \delta_{r5} Z_i), d_r)$, where Z_i are covariates. Thus, the second-stage means of the β_{rc}^i 's are:

$$\frac{\exp(\gamma_{rc} + \delta_{rc} Z_i)}{1 + \sum_{j=1}^5 \exp(\gamma_{rj} + \delta_{rj} Z_i)}$$

which implies that:

$$\log \frac{E(\beta_{rc}^i)}{E(\beta_{r5}^i)} = \gamma_{rc} + \delta_{rc} Z_i$$

In other words, the log odds depend linearly on the covariate(s) Z_i .

At a third and final stage, the regression parameters (γ_{rc} 's and δ_{rc} 's) are taken to be a priori independent, putting a flat prior on these parameters. The parameters d_r are assumed to follow exponential distributions with means $\frac{1}{\lambda}$.

III. Estimation Procedure

By Bayes' theorem, the posterior distribution is proportional to the product of the likelihood and the prior. Thus, given this three-stage model, it follows that the posterior distribution for the parameters of interest is proportional to:

$$P(\text{data}|\beta_i, i = 1, \dots, p) \times P(\beta_i, i = 1, \dots, p|\delta)P(\delta) \quad (1)$$

$$= \prod_{i=1}^p \prod_{c=1}^C \theta_{ci}^{T'_{ci}} \times \prod_{i=1}^p \prod_{r=1}^R \quad (2)$$

$$\times \left[\frac{\Gamma(d_r \sum_{c=1}^C \exp(\gamma_{rc} + \delta_{rc} Z_i))}{\prod_{c=1}^C \Gamma(d_r \exp(\gamma_{rc} + \delta_{rc} Z_i))} \prod_{c=1}^C \beta_{rc}^{d_r \exp(\gamma_{rc} + \delta_{rc} Z_i) - 1} \right] \quad (3)$$

$$\times \exp\left(-\lambda \sum_{r=1}^R d_r\right) \quad (4)$$

where β_i denotes all the β_{rc}^i 's in unit i , and $\delta = (\gamma_{rc}, \delta_{rc}, d_r)_{r,c=1,1}^{R,C-1}$. Obtaining the marginals of this posterior distribution using high-dimensional numerical integration is infeasible, but it can be achieved using the Gibbs sampler (Tanner, 1996). To implement the Gibbs sampler it is necessary to obtain the distribution of each unknown parameter conditional on the full set of remaining parameters.

$$P(\beta_{rc}^i | \{\beta_{jk}^i\}_{j \neq r, k \neq c}, d_r, \gamma_{rc}, \delta_{rc}) \propto \theta_{ci}^{T'_{ci}} \times \theta_{Ci}^{T'_{Ci}} \times \beta_{rc}^{d_r \exp(\gamma_{rc} + \delta_{rc} Z_i)} \times \beta_{rc}^{d_r - 1} \quad (5)$$

$$P(\gamma_{rc} | \{\beta_{rc}^i\}_{i=1}^p, d_r, \{\delta_{rc}\}_{c=1}^{C-1}, \{\gamma_{rj}\}_{j \neq c}) \propto \prod_{i=1}^p \frac{\Gamma(d_r \sum_{c=1}^C \exp(\gamma_{rc} + \delta_{rc} Z_i))}{\Gamma(d_r \exp(\gamma_{rc} + \delta_{rc} Z_i))} \beta_{rc}^{d_r \exp(\gamma_{rc} + \delta_{rc} Z_i)} \quad (6)$$

$$P(\delta_{rc} | \{\beta_{rc}^i\}_{i=1}^p, d_r, \{\delta_{rj}\}_{j \neq c}, \{\gamma_{rc}\}_{c=1}^{C-1}) \propto \prod_{i=1}^p \frac{\Gamma(d_r \sum_{c=1}^C \exp(\gamma_{rc} + \delta_{rc} Z_i))}{\Gamma(d_r \exp(\gamma_{rc} + \delta_{rc} Z_i))} \beta_{rc}^{d_r \exp(\gamma_{rc} + \delta_{rc} Z_i)} \quad (7)$$

$$P(d_r | \{\{\beta_{rc}^i\}_{i=1}^p, \{\gamma_{rc}\}, \{\delta_{rc}\}\}_{c=1}^{C-1}) \propto \prod_{i=1}^p \frac{\Gamma(d_r \sum_{c=1}^C \exp(\gamma_{rc} + \delta_{rc} Z_i))}{\Gamma(d_r \exp(\gamma_{rc} + \delta_{rc} Z_i))} \beta_{rc}^{d_r \exp(\gamma_{rc} + \delta_{rc} Z_i)} e^{(-\lambda d_r)} \quad (8)$$

To generate the Gibbs sampler (Markov) chain, one draws a random deviate from each of these full conditionals, in turn of updating the values of the variable after each draw. Unfortunately none of these distributions are standard distributions for which prewritten sampling subroutines are available. For this reason, I use the Metropolis algorithm (Metropolis et al., 1953) to sample from each of these distributions. Thus, to sample a value for γ_{rc}, δ_{rc} or d_r , a candidate value for the next point in the Metropolis chain is drawn from the univariate normal distribution with mean equal to the current sample value and variance sufficiently large to allow for variation around the sample value. To sample a value for β_{rc}^i , a candidate value for the next point in the Metropolis chain is drawn from the uniform distribution. Note that since $\sum_{c=1}^C \beta_{rc}^i = 1$ for each r , a value β_{rc}^i is sampled from a uniform distribution over the interval $[0, 1 - \sum_{j \neq c} \beta_{rj}^i]$. The candidate value is then accepted or rejected according to the Metropolis scheme of evaluating $\pi(y^*)/\pi(y)$, the ratio of the full conditional at the candidate evaluated at the current point in the chain. With probability $\alpha(y, y^*) = \min\{\pi(y^*)/\pi(y), 1\}$ the candidate value is accepted; otherwise it is rejected (Tanner, 1996). The Metropolis algorithm is iterated, and the final value in this chain is treated as a deviate from the full conditional distribution.

V. RESULTS

In this section I present three sets of results. First, I show that voters participating in the primary and general elections are generally the same. Second, I present the estimated voter transition matrix at the city level and analyze the implications for strategic voting. Finally, as a robustness check, I present the estimates of the voter transition matrix when allowing each *comuna* to be a different cluster.

To show that the voters participating in the primary and general elections are generally the same, I analyze voter turnout in the primary and general election using a reduced 2x2 version of the Bayesian model presented earlier. The row and column labeled "Voted" represent those voters who turned out to vote, including those who voted blank, and those whose votes were nullified or voided. The other row and column represent those voters who did not show up to vote at all. The estimation was produced using the R routine "eiPack" developed by Lau et al. (2007), based on Rosen et al. (2001), with 100,000 iterations, saving 1 out of 80 draws, and discarding the first half of the Markov chain. Geweke convergence statistics suggest that the estimates converged to their stable posterior distribution.

To present the results, I produce the city-wide weighted average of the estimates for each ballot box. These estimates, presented in Table 3, show that for the city as a whole, 99% of the people who voted in the primary election also voted in the general election. Furthermore, only 6.5% of

Table 3: *City-wide estimates of turnout across elections*

		<i>General Election</i>		
		Voted	Didn't Vote	
<i>Primary</i>	Voted	99.83%	0.17%	76.01%
	Didn't Vote	6.56%	93.44%	23.99%
		77.40%	22.60%	

The estimates were produced with 100,000 draws, saving 1 out of 80 draws, and discarding the first 50,000 draws.

the voters who did not show up in the primary did so for the general election, which is equivalent to 1.6% if the total eligible voters. These estimates imply that the individuals attending to the precincts on election day for both election do not differ significantly. This is an important initial result, since it means that the estimates of the voter transition matrix that follow will reflect mainly changes on the choices of voters between the primary and general elections, rather than being a reflection of different individuals turning out to vote in each election.

Next, I estimate the voter transition matrix. As mentioned before, I considered the winner of the UNEN primary (UNEN-CS) separately, and grouped the losers into UNEN-Others. All minor parties were grouped into the category Others. Individuals registered to vote but who did not turn out or who voted blank, null, or void, were grouped into the category "No Vote."¹³ These aggregations were conducted in order to keep the tables manageable for estimation purposes. None of the minor parties has a reasonable chance of obtaining a seat. Therefore, for determining vote wasting behavior they are all equivalent. Considering them separately would not enrich the results in a significant way.

Table 4 shows the city-wide average of the estimates for each ballot box, thus representing the city-wide transition matrix. The city-wide average was calculated by weighting each ballot-box by the number of voters registered in it. The first thing to notice is that the column "Others" does not consist of zeros, as strategic behavior would predict. Based on aggregate election results, the minor parties grouped in "Others" were supported in the general election by 7% of the electorate. This means that at least 7% of the electorate is wasting their votes, as their party of choice had no reasonable chance of becoming elected.

While a 7% rate of vote wasting behavior does not seem to be a big proportion, one should look

¹³All voting age citizens in Argentina are automatically registered to vote when they turn 18 years old. Those between 16 and 17 years of age need to register to vote.

at the percentage of people who engage in vote wasting, out of those who had the opportunity to avoid it, as proposed by Alvarez et al. (2006) in their study of strategic voting behavior. Supporters of minor parties in the primary where the group of voters who had this opportunity, since those parties had not chance of obtaining a seat in the Senate. The behavior of these voters (row "Others" in Table 4) shows that around 50% of them supported minor parties again in the general election, a behavior consistent with expressive rather than strategic behavior. Another 25% of these voters did not turn out to vote in the general election (or voted blank). These voters are most likely supporters of the minor parties that did not achieve the 1.5% of votes required to qualify for the general election. This behavior is consistent with expressive considerations, rather than strategic behavior. The other 25% of supporters of minor parties in the primary switched their vote to one of the main parties, particularly the FPV. While this vote switching is most likely ideologically motivated, as most minor parties are left-wing as is the FPV, the information provided by the voter transition matrix alone is not sufficient to rule it as either expressive or strategic behavior. Some of these voters could be switching solely because their most preferred party did not qualify for the general election, while others, whose party of choice in the primary did qualify could have changed their vote for strategic considerations. These results together imply that at most 25% of voters who had the opportunity to behave strategically to avoid vote wasting did so (those that switched from a minor to a major party). In turn, this means that at least 75% of these voters engaged in expressive voting.

Table 4: *City-wide voter transition matrix*

		<i>Choice in General Election</i>					<i>% of Voters</i>
		FPV	UNEN	PRO	Others	No Vote	
<i>Choice in Primary Election</i>	FPV	94.93%	1.17%	1.17%	1.20%	1.52%	14.2%
	UNEN-CS	0.33%	89.35%	0.71%	6.28%	3.34%	12.9%
	UNEN-Others	1.01%	68.52%	23.85%	2.75%	3.87%	13.7%
	PRO	1.00%	1.43%	95.20%	1.06%	1.32%	20.6%
	Others	17.00%	5.19%	6.62%	47.26%	23.93%	12.1%
	No Vote	1.29%	1.60%	6.10%	1.27%	89.74%	26.4%
	<i>% of Voters</i>	16.6%	19.8%	28.0%	7.0%	28.6%	

The estimates were produced with 200,000 draws, saving 1 in 80, and discarding the first half of the chain.

The second hypothesis presented in Table 1, that the voters of the winner of the UNEN primary,

the PRO, and the PFV should exhibit a high degree of voter loyalty, is confirmed by the results presented in Table 4. Indeed, since these parties were contenders with reasonable chances of obtaining a seat in the Senate, supporting them again in the general election is optimal, not only from an expressive point of view, but also from a strategic one. As the estimates show, 94.5% of voters who chose the FPV in the primary election voted for that party again in the general; 95% of PRO voters chose the party again in the general. Despite the high degree of loyalty for these parties, there are some defections. Considering that the primaries take place two months before the general elections, it is not unreasonable that a small number of voters might change their support from one major party to another, as their preferences or their views about the candidates could have changed.

The voters of UNEN show a lower degree of loyalty than the other two major parties: while 90% of those who voted for the more left-wing primary winner voted for it again in the general election, only 68% of those who voted for the primary losers remained loyal to the alliance. Among the voters who chose the losing UNEN candidates in the primary election, 24.5% of them voted for PRO in the general election. While it is not possible to draw conclusions about their motivations from the voter transition matrix alone, there are two competing explanations for the behavior of these voters. First, they could be behaving expressively, by switching their vote from a right-leaning primary loser to a right-wing party in the general election. The second alternative, is that these voters might have been supporters of PRO all along. By voting for the UNEN-Other in the primary election they could have been trying to prevent a left-wing candidate from winning that primary, thus diminishing the chances that a left-wing senator is elected.

The last observation from Table 4 is that not only supporters of minor parties in the general engage in vote wasting, but that supporters of major parties do so as well. As the column "Others" show, 2.69% of UNEN-CS and 3.72% of UNEN-Others primary supporters voted for a minor party in the general election. A possible explanation for this behavior is that those voters first behaved strategically to try to influence the outcome of the UNEN primary, but then reverted to expressive behavior in the general election. It is also possible that those voters (along with the 1.31% and 1.09% of FPV and PRO supporters who switched to a minor party) simply had a change of mind and behaved expressively in both elections. But, irrespective of the motivations behind these voters' actions, they engage in vote wasting in the general election anyway.

At a second level of analysis, I average the estimates for the ballot boxes for each of the city's 15 *comunas*.¹⁴ The results show that even though the total votes for different parties in the primary and general elections have considerable variation across the different *comunas*, the estimates for

¹⁴See Appendix A.

the voter transitions remain almost constant. This suggests that voting behavior, conditional on the voter’s choice in the primary, is independent of the *comuna* where that voter lives and votes, despite that fact the different areas of the city have very different socio-economic composition. These results suggest that voters of a particular party tend to behave the same, regardless of the area of the city in which they reside and their surrounding environment.

The homogeneity in the results across *comunas* could be a by-product of the estimation procedure, caused by the fact that all *comunas* are assumed to be in the same cluster. To explore this possibility, I estimated the same quantities of interest, but including dummies for each *comuna* as a covariate, effectively allowing each of them to be a different cluster. This procedure produces results that are very similar across *comunas*, reinforcing the observation that voters of a particular party tend to behave similarly, irrespective of the *comuna* in which they live and vote.¹⁵ Table 5 presents the estimates from this procedure, aggregated at the city level. The estimates are largely consistent with those obtained without the covariate, except for the choices of UNEN-CS deserters. In this case, the results show that deserters of the UNEN primary winner moved primarily towards the minor parties competing in the election, and at a higher rate than that obtained in the initial model.

Table 5: *City-wide voter transition matrix with covariate*

		<i>Choice in General Election</i>					
		FPV	UNEN	PRO	Others	No Vote	% of Voters
<i>Choice in Primary Election</i>	FPV	94.93%	1.17%	1.17%	1.20%	1.52%	14.2%
	UNEN-CS	0.33%	89.35%	0.71%	6.28%	3.34%	12.9%
	UNEN-Others	1.01%	68.52%	23.85%	2.75%	3.87%	13.7%
	PRO	1.00%	1.43%	95.20%	1.06%	1.32%	20.6%
	Others	17.00%	5.19%	6.62%	47.26%	23.93%	12.1%
	No Vote	1.29%	1.60%	6.10%	1.27%	89.74%	26.4%
	% of Voters	16.6%	19.8%	28.0%	7.0%	28.6%	

The estimates were produced with 200,000 draws, saving 1 in 80, and discarding the first half of the chain.

The estimated behavior of the UNEN-CS deserters in the general election presented in Table 5 lends more support to the inference that these voters behaved strategically in the primary but sincerely in the general election. By supporting the left-wing UNEN-CS primary candidate, they

¹⁵See Appendix B for estimates by *comuna*.

increase the chances of another left-wing candidate from contesting the election (or preventing another right-wing candidate from doing so). Switching to their preferred smaller party in the general election can then be seen as a way of showing their preference, possibly to avoid the party from becoming irrelevant or disappearing.

VI. CONCLUSION

The theoretical literature on elections provides the rational foundations for two types of behavior: expressive and strategic voting. One implication of strategic voting is that voters behaving in this way would not waste their votes on nonviable candidates. In this paper I look at vote wasting and strategic behavior in the city of Buenos Aires 2013 Senate elections. The results obtained suggest that strategic voting behavior is not widespread amongst the electorate in the city of Buenos Aires. In particular, at least 75% of the voters who had the opportunity to behave strategically to avoid vote wasting (the supporters of minor parties in the primary election) engage in the practice anyway. What is more, a non-trivial percentage of the supporters of major parties in the general election also engage in the practice. These results imply that the debate between strategic and expressive behavior does not seem to have a black or white answer. As the results show, the electorate can be thought of as composed of two groups of voters: those whose choices are consistent with strategic behavior, and those whose choices are consistent with expressive behavior, but where the expressive faction dominates the strategic one.

This research fills two gaps in the empirical literature on strategic voting. First, this paper is one of the few to study the extent of strategic voting behavior outside of the United States and United Kingdom, and especially in developing countries. Second, while most papers analyze strategic voting in first-past-the-post electoral systems, this paper provides an extension to the literature by considering a fixed-ratio, closed-list system that allows two parties to obtain seats in the same district.

Contrary to most of the literature using election results, I estimate strategic behavior without resorting to multiple races. I also avoid several common problems in the empirical literature on strategic voting. First, by working with electoral results, my estimates are not tainted by the usual concerns about response bias that plague empirical research conducted with survey data. Second, while papers using aggregate data can also obtain the extent of vote wasting, the voter transition matrix allows me to go beyond that and estimate the proportion of voters who engage in vote wasting from amongst those who had the opportunity to avoid it. Third, by exploiting the particularities of the new Argentine primaries system, I can measure closeness in the election, as well as other opportunities for strategic behavior, with information that is available to all voters at

the moment of voting in the general election. This avoids a problematic practice in the literature, that usually uses the outcome of the election itself as a measure of closeness.

Finally, it is possible that the low degree of strategic behavior between primary and general elections in Argentina is related to the novelty of the new primary system. As such, voters might not be sufficiently familiar with it to use the primary results to inform their choices in the general election. Greater experience with the new system might change this. Applying this approach to future elections can help determine if voters learn with time.

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APPENDIX A: ESTIMATES BY *Comuna*

Table 6: *Transition matrix for comuna 1*

		<i>Choice in General Election</i>					
		FPV	UNEN	PRO	Others	No Vote	% of Voters
<i>Choice in Primary Election</i>	FPV	94.30%	1.23%	1.28%	1.22%	1.97%	14.50%
	UNEN-CS	1.84%	90.70%	2.25%	2.51%	2.70%	8.23%
	UNEN-Others	1.01%	68.50%	24.39%	3.19%	2.92%	11.20%
	PRO	1.04%	1.50%	94.86%	0.96%	1.65%	22.10%
	Others	16.46%	4.52%	4.90%	48.94%	25.18%	7.72%
	No Vote	1.18%	1.51%	5.57%	1.04%	90.70%	36.25%
	% of Voters	16.32%	16.72%	26.31%	5.84%	34.81%	

Table 7: *Transition matrix for comuna 2*

		<i>Choice in General Election</i>					
		FPV	UNEN	PRO	Others	No Vote	% of Voters
<i>Choice in Primary Election</i>	FPV	94.41%	1.36%	1.40%	1.29%	1.54%	8.33%
	UNEN-CS	1.72%	91.15%	2.17%	2.34%	2.61%	9.05%
	UNEN-Others	0.96%	68.91%	24.31%	3.05%	2.77%	18.07%
	PRO	0.92%	1.52%	95.49%	0.84%	1.24%	27.73%
	Others	16.31%	4.56%	4.96%	49.09%	25.09%	5.58%
	No Vote	1.00%	1.60%	5.84%	0.88%	90.68%	31.25%
	% of Voters	9.61%	22.46%	33.47%	4.41%	30.05%	

Table 8: Transition matrix for comuna 3

		<i>Choice in General Election</i>					
		FPV	UNEN	PRO	Others	No Vote	% of Voters
<i>Choice in Primary Election</i>	FPV	94.18%	1.27%	1.34%	1.35%	1.87%	15.65%
	UNEN-CS	1.87%	90.44%	2.26%	2.80%	2.63%	9.60%
	UNEN-Others	1.05%	67.68%	24.86%	3.61%	2.80%	11.57%
	PRO	1.10%	1.45%	95.02%	1.16%	1.27%	19.98%
	Others	16.12%	4.44%	4.88%	49.67%	24.89%	9.64%
	No Vote	1.12%	1.50%	5.65%	1.09%	90.63%	33.56%
	% of Voters	17.55%	17.77%	24.56%	7.56%	32.57%	

Table 9: Transition matrix for comuna 4

		<i>Choice in General Election</i>					
		FPV	UNEN	PRO	Others	No Vote	% of Voters
<i>Choice in Primary Election</i>	FPV	94.77%	1.15%	1.27%	1.17%	1.65%	18.63%
	UNEN-CS	1.93%	90.41%	2.28%	2.66%	2.72%	8.47%
	UNEN-Others	1.06%	68.03%	24.62%	3.50%	2.79%	9.45%
	PRO	1.11%	1.43%	94.98%	1.09%	1.39%	23.75%
	Others	16.63%	4.44%	4.94%	48.85%	25.14%	9.61%
	No Vote	1.53%	1.47%	5.60%	1.02%	90.39%	30.09%
	% of Voters	21.15%	15.34%	27.40%	7.23%	28.88%	

Table 10: Transition matrix for comuna 5

		<i>Choice in General Election</i>					
		FPV	UNEN	PRO	Others	No Vote	% of Voters
<i>Choice in Primary Election</i>	FPV	94.56%	1.28%	1.29%	1.43%	1.43%	16.46%
	UNEN-CS	1.82%	90.73%	2.14%	2.86%	2.45%	10.32%
	UNEN-Others	1.04%	68.24%	24.31%	3.75%	2.67%	13.99%
	PRO	1.13%	1.56%	94.78%	1.29%	1.24%	20.30%
	Others	16.13%	4.45%	4.80%	50.39%	24.22%	10.60%
	No Vote	1.17%	1.59%	5.80%	1.36%	90.07%	28.33%
	% of Voters	18.66%	20.57%	24.91%	8.53%	27.33%	

Table 11: Transition matrix for comuna 6

		<i>Choice in General Election</i>					
		FPV	UNEN	PRO	Others	No Vote	% of Voters
<i>Choice in Primary Election</i>	FPV	94.44%	1.33%	1.31%	1.48%	1.44%	13.88%
	UNEN-CS	1.75%	91.01%	2.08%	2.82%	2.34%	11.04%
	UNEN-Others	1.00%	69.14%	23.56%	3.74%	2.56%	17.06%
	PRO	1.07%	1.62%	94.81%	1.31%	1.19%	22.32%
	Others	16.01%	4.44%	4.77%	50.81%	23.97%	10.12%
	No Vote	1.39%	1.71%	5.84%	1.40%	89.67%	25.59%
	% of Voters	15.90%	23.88%	27.18%	8.26%	24.79%	

Table 12: Transition matrix for comuna 7

		<i>Choice in General Election</i>					
		FPV	UNEN	PRO	Others	No Vote	% of Voters
<i>Choice in Primary Election</i>	FPV	94.68%	1.25%	1.32%	1.28%	1.47%	16.26%
	UNEN-CS	1.84%	90.68%	2.24%	2.72%	2.52%	10.40%
	UNEN-Others	1.04%	68.17%	24.52%	3.57%	2.70%	13.52%
	PRO	1.08%	1.48%	94.91%	1.16%	1.37%	21.63%
	Others	16.26%	4.46%	4.89%	49.68%	24.70%	9.81%
	No Vote	1.15%	1.53%	5.81%	1.14%	90.37%	28.39%
	% of Voters	18.36%	20.09%	26.37%	7.61%	27.57%	

Table 13: Transition matrix for comuna 8

		<i>Choice in General Election</i>					
		FPV	UNEN	PRO	Others	No Vote	% of Voters
<i>Choice in Primary Election</i>	FPV	94.88%	1.08%	1.36%	0.97%	1.71%	21.95%
	UNEN-CS	2.23%	89.58%	2.64%	2.48%	3.08%	8.12%
	UNEN-Others	1.09%	67.07%	25.46%	3.34%	3.05%	7.72%
	PRO	1.07%	1.23%	95.31%	0.85%	1.53%	22.83%
	Others	17.30%	4.48%	5.29%	46.84%	26.09%	9.35%
	No Vote	1.59%	1.33%	6.56%	0.92%	89.61%	30.03%
	% of Voters	24.54%	13.18%	27.49%	6.35%	28.44%	

Table 14: Transition matrix for comuna 9

		<i>Choice in General Election</i>					
		FPV	UNEN	PRO	Others	No Vote	% of Voters
<i>Choice in Primary Election</i>	FPV	94.68%	1.27%	1.34%	1.20%	1.51%	17.80%
	UNEN-CS	1.82%	90.89%	2.21%	2.50%	2.58%	10.66%
	UNEN-Others	1.10%	68.23%	24.49%	3.45%	2.73%	11.16%
	PRO	1.10%	1.46%	94.95%	1.03%	1.46%	23.45%
	Others	16.37%	4.54%	4.96%	48.84%	25.29%	10.08%
	No Vote	1.17%	1.65%	5.97%	1.04%	90.18%	26.85%
	% of Voters	19.90%	18.97%	27.65%	7.59%	25.89%	

Table 15: Transition matrix for comuna 10

		<i>Choice in General Election</i>					
		FPV	UNEN	PRO	Others	No Vote	% of Voters
<i>Choice in Primary Election</i>	FPV	94.44%	1.36%	1.35%	1.36%	1.49%	15.77%
	UNEN-CS	1.74%	90.98%	2.16%	2.63%	2.49%	11.49%
	UNEN-Others	1.01%	68.71%	24.07%	3.48%	2.74%	13.13%
	PRO	1.05%	1.60%	94.87%	1.15%	1.33%	22.86%
	Others	16.10%	4.53%	4.88%	49.92%	24.57%	10.30%
	No Vote	1.35%	1.68%	6.37%	1.19%	89.41%	26.45%
	% of Voters	17.72%	21.51%	27.37%	8.05%	25.36%	

Table 16: Transition matrix for comuna 11

		<i>Choice in General Election</i>					
		FPV	UNEN	PRO	Others	No Vote	% of Voters
<i>Choice in Primary Election</i>	FPV	94.30%	1.32%	1.35%	1.45%	1.58%	14.51%
	UNEN-CS	1.78%	90.80%	2.18%	2.78%	2.46%	11.26%
	UNEN-Others	1.01%	68.48%	24.09%	3.66%	2.76%	15.34%
	PRO	1.04%	1.52%	94.93%	1.20%	1.31%	23.60%
	Others	16.01%	4.44%	4.85%	50.28%	24.42%	9.40%
	No Vote	1.14%	1.63%	6.31%	1.26%	89.66%	25.89%
	% of Voters	16.28%	22.41%	28.48%	7.72%	25.10%	

Table 17: Transition matrix for comuna 12

		<i>Choice in General Election</i>					
		FPV	UNEN	PRO	Others	No Vote	% of Voters
<i>Choice in Primary Election</i>	FPV	94.08%	1.32%	1.40%	1.42%	1.79%	14.51%
	UNEN-CS	1.78%	90.59%	2.22%	2.73%	2.69%	11.04%
	UNEN-Others	1.01%	68.24%	24.41%	3.59%	2.75%	14.73%
	PRO	1.03%	1.48%	95.00%	1.15%	1.34%	25.64%
	Others	15.99%	4.45%	4.88%	50.08%	24.60%	9.20%
	No Vote	1.11%	1.57%	6.20%	1.18%	89.92%	24.88%
	% of Voters	16.10%	21.58%	30.42%	7.40%	24.50%	

Table 18: Transition matrix for comuna 13

		<i>Choice in General Election</i>					
		FPV	UNEN	PRO	Others	No Vote	% of Voters
<i>Choice in Primary Election</i>	FPV	94.42%	1.32%	1.37%	1.36%	1.53%	9.97%
	UNEN-CS	1.79%	90.70%	2.25%	2.63%	2.63%	9.82%
	UNEN-Others	1.00%	67.83%	24.99%	3.40%	2.79%	18.19%
	PRO	0.96%	1.41%	95.27%	1.02%	1.35%	27.73%
	Others	16.17%	4.48%	4.92%	49.74%	24.69%	6.89%
	No Vote	1.17%	1.56%	6.14%	1.15%	89.98%	27.40%
	% of Voters	11.54%	22.51%	33.67%	5.68%	26.60%	

Table 19: Transition matrix for comuna 14

		<i>Choice in General Election</i>					
		FPV	UNEN	PRO	Others	No Vote	% of Voters
<i>Choice in Primary Election</i>	FPV	94.50%	1.31%	1.35%	1.36%	1.48%	10.68%
	UNEN-CS	1.78%	90.98%	2.20%	2.58%	2.45%	9.57%
	UNEN-Others	1.00%	68.08%	24.94%	3.31%	2.67%	17.78%
	PRO	0.95%	1.42%	95.36%	0.97%	1.31%	25.75%
	Others	16.12%	4.47%	4.90%	49.61%	24.90%	6.87%
	No Vote	1.09%	1.58%	6.14%	1.05%	90.15%	29.35%
	% of Voters	12.23%	22.23%	31.82%	5.60%	28.11%	

Table 20: Transition matrix for comuna 15

		<i>Choice in General Election</i>					
		FPV	UNEN	PRO	Others	No Vote	% of Voters
<i>Choice in Primary Election</i>	FPV	94.41%	1.20%	1.30%	1.49%	1.61%	16.38%
	UNEN-CS	1.93%	89.80%	2.29%	3.13%	2.84%	9.86%
	UNEN-Others	1.08%	66.74%	25.19%	4.04%	2.96%	14.27%
	PRO	1.10%	1.43%	94.72%	1.35%	1.40%	20.13%
	Others	15.88%	4.25%	4.76%	50.80%	24.31%	10.97%
	No Vote	1.21%	1.41%	5.58%	1.38%	90.42%	28.40%
	% of Voters	18.54%	19.16%	25.00%	9.04%	28.26%	

APPENDIX B: ESTIMATES BY *Comuna* WITH COVARIATE

Table 21: Transition matrix for comuna 1 with covariate

		<i>Choice in General Election</i>					
		FPV	UNEN	PRO	Others	No Vote	% of Voters
<i>Choice in Primary Election</i>	FPV	91.83%	1.86%	1.48%	1.92%	2.91%	14.50%
	UNEN-CS	1.32%	91.72%	0.72%	3.03%	3.22%	8.23%
	UNEN-Others	1.44%	68.76%	22.70%	0.98%	6.12%	11.20%
	PRO	1.18%	1.84%	93.48%	1.26%	2.25%	22.10%
	Others	20.37%	2.98%	2.96%	46.11%	27.58%	7.72%
	No Vote	1.17%	1.47%	7.15%	1.08%	89.14%	36.25%
	% of Voters	16.32%	16.72%	26.31%	5.84%	34.81%	

Table 22: Transition matrix for comuna 2 with covariate

		<i>Choice in General Election</i>					
		FPV	UNEN	PRO	Others	No Vote	% of Voters
<i>Choice in Primary Election</i>	FPV	95.11%	1.20%	1.19%	1.12%	1.37%	8.33%
	UNEN-CS	0.26%	89.34%	0.71%	6.35%	3.34%	9.05%
	UNEN-Others	0.92%	69.22%	23.66%	2.44%	3.76%	18.07%
	PRO	0.88%	1.46%	95.73%	0.78%	1.15%	27.73%
	Others	16.87%	5.41%	6.92%	46.87%	23.92%	5.58%
	No Vote	1.09%	1.68%	5.92%	0.96%	90.34%	31.25%
	% of Voters	9.61%	22.46%	33.47%	4.41%	30.05%	

Table 23: Transition matrix for comuna 3 with covariate

		<i>Choice in General Election</i>					
		FPV	UNEN	PRO	Others	No Vote	% of Voters
<i>Choice in Primary Election</i>	FPV	94.85%	1.13%	1.15%	1.19%	1.68%	15.65%
	UNEN-CS	0.27%	89.16%	0.71%	6.50%	3.36%	9.60%
	UNEN-Others	1.00%	68.02%	24.25%	2.92%	3.81%	11.57%
	PRO	1.02%	1.38%	95.29%	1.12%	1.18%	19.98%
	Others	16.70%	5.31%	6.82%	47.36%	23.80%	9.64%
	No Vote	1.20%	1.55%	5.65%	1.23%	90.38%	33.56%
	% of Voters	17.55%	17.77%	24.56%	7.56%	32.57%	

Table 24: Transition matrix for comuna 4 with covariate

		<i>Choice in General Election</i>					
		FPV	UNEN	PRO	Others	No Vote	% of Voters
<i>Choice in Primary Election</i>	FPV	95.33%	1.03%	1.10%	1.05%	1.50%	18.63%
	UNEN-CS	0.27%	89.19%	0.71%	6.47%	3.37%	8.47%
	UNEN-Others	1.01%	68.40%	23.95%	2.84%	3.79%	9.45%
	PRO	1.04%	1.36%	95.25%	1.04%	1.31%	23.75%
	Others	17.06%	5.30%	6.88%	46.78%	23.98%	9.61%
	No Vote	1.60%	1.52%	5.56%	1.14%	90.18%	30.09%
	% of Voters	21.15%	15.34%	27.40%	7.23%	28.88%	

Table 25: Transition matrix for comuna 5 with covariate

		<i>Choice in General Election</i>					
		FPV	UNEN	PRO	Others	No Vote	% of Voters
<i>Choice in Primary Election</i>	FPV	95.21%	1.14%	1.12%	1.26%	1.28%	16.46%
	UNEN-CS	0.27%	89.18%	0.71%	6.51%	3.33%	10.32%
	UNEN-Others	1.00%	68.62%	23.68%	3.05%	3.64%	13.99%
	PRO	1.05%	1.48%	95.08%	1.23%	1.16%	20.30%
	Others	16.71%	5.33%	6.75%	47.89%	23.33%	10.60%
	No Vote	1.24%	1.66%	5.81%	1.55%	89.74%	28.33%
	% of Voters	18.66%	20.57%	24.91%	8.53%	27.33%	

Table 26: Transition matrix for comuna 6 with covariate

		<i>Choice in General Election</i>					
		FPV	UNEN	PRO	Others	No Vote	% of Voters
<i>Choice in Primary Election</i>	FPV	95.11%	1.18%	1.14%	1.30%	1.28%	13.88%
	UNEN-CS	0.27%	89.21%	0.70%	6.50%	3.31%	11.04%
	UNEN-Others	0.96%	69.54%	22.97%	3.01%	3.51%	17.06%
	PRO	1.02%	1.53%	95.10%	1.25%	1.10%	22.32%
	Others	16.63%	5.31%	6.73%	48.18%	23.15%	10.12%
	No Vote	1.48%	1.79%	5.88%	1.60%	89.24%	25.59%
	% of Voters	15.90%	23.88%	27.18%	8.26%	24.79%	

Table 27: Transition matrix for comuna 7 with covariaten

		<i>Choice in General Election</i>					
		FPV	UNEN	PRO	Others	No Vote	% of Voters
<i>Choice in Primary Election</i>	FPV	95.33%	1.11%	1.13%	1.12%	1.32%	16.26%
	UNEN-CS	0.27%	89.21%	0.71%	6.47%	3.34%	10.40%
	UNEN-Others	0.99%	68.56%	23.89%	2.88%	3.68%	13.52%
	PRO	1.02%	1.42%	95.17%	1.10%	1.29%	21.63%
	Others	16.83%	5.32%	6.85%	47.33%	23.67%	9.81%
	No Vote	1.23%	1.59%	5.82%	1.28%	90.07%	28.39%
	% of Voters	18.36%	20.09%	26.37%	7.61%	27.57%	

Table 28: Transition matrix for comuna 8 with covariate

		<i>Choice in General Election</i>					
		FPV	UNEN	PRO	Others	No Vote	% of Voters
<i>Choice in Primary Election</i>	FPV	95.44%	0.97%	1.17%	0.86%	1.56%	21.95%
	UNEN-CS	0.27%	89.20%	0.72%	6.40%	3.40%	8.12%
	UNEN-Others	1.04%	67.38%	24.78%	2.70%	4.10%	7.72%
	PRO	0.99%	1.18%	95.54%	0.82%	1.47%	22.83%
	Others	17.60%	5.33%	7.19%	45.24%	24.64%	9.35%
	No Vote	1.68%	1.36%	6.52%	1.02%	89.42%	30.03%
	% of Voters	24.54%	13.18%	27.49%	6.35%	28.44%	

Table 29: Transition matrix for comuna 9 with covariate

		<i>Choice in General Election</i>					
		FPV	UNEN	PRO	Others	No Vote	% of Voters
<i>Choice in Primary Election</i>	FPV	95.28%	1.14%	1.17%	1.06%	1.36%	17.80%
	UNEN-CS	0.27%	89.25%	0.71%	6.42%	3.35%	10.66%
	UNEN-Others	1.04%	68.65%	23.82%	2.77%	3.73%	11.16%
	PRO	1.06%	1.40%	95.19%	0.97%	1.38%	23.45%
	Others	16.90%	5.39%	6.90%	46.69%	24.12%	10.08%
	No Vote	1.24%	1.71%	5.97%	1.16%	89.91%	26.85%
	% of Voters	19.90%	18.97%	27.65%	7.59%	25.89%	

Table 30: Transition matrix for comuna 10 with covariate

		<i>Choice in General Election</i>					
		FPV	UNEN	PRO	Others	No Vote	% of Voters
<i>Choice in Primary Election</i>	FPV	95.10%	1.22%	1.17%	1.18%	1.34%	15.77%
	UNEN-CS	0.26%	89.25%	0.71%	6.45%	3.33%	11.49%
	UNEN-Others	0.97%	69.08%	23.39%	2.81%	3.76%	13.13%
	PRO	1.00%	1.50%	95.18%	1.09%	1.23%	22.86%
	Others	16.72%	5.41%	6.82%	47.46%	23.59%	10.30%
	No Vote	1.44%	1.77%	6.39%	1.35%	89.06%	26.45%
	% of Voters	17.72%	21.51%	27.37%	8.05%	25.36%	

Table 31: Transition matrix for comuna 11 with covariate

		<i>Choice in General Election</i>					
		FPV	UNEN	PRO	Others	No Vote	% of Voters
<i>Choice in Primary Election</i>	FPV	95.01%	1.17%	1.17%	1.26%	1.40%	14.51%
	UNEN-CS	0.27%	89.20%	0.71%	6.49%	3.33%	11.26%
	UNEN-Others	0.97%	68.85%	23.50%	2.94%	3.74%	15.34%
	PRO	1.00%	1.45%	95.19%	1.15%	1.21%	23.60%
	Others	16.64%	5.32%	6.80%	47.76%	23.48%	9.40%
	No Vote	1.22%	1.70%	6.36%	1.40%	89.32%	25.89%
	% of Voters	16.28%	22.41%	28.48%	7.72%	25.10%	

Table 32: Transition matrix for comuna 12 with covariate

		<i>Choice in General Election</i>					
		FPV	UNEN	PRO	Others	No Vote	% of Voters
<i>Choice in Primary Election</i>	FPV	94.81%	1.18%	1.20%	1.22%	1.60%	14.51%
	UNEN-CS	0.27%	89.20%	0.71%	6.48%	3.35%	11.04%
	UNEN-Others	0.98%	68.60%	23.79%	2.88%	3.75%	14.73%
	PRO	0.97%	1.41%	95.28%	1.09%	1.26%	25.64%
	Others	16.64%	5.33%	6.84%	47.58%	23.61%	9.20%
	No Vote	1.19%	1.65%	6.23%	1.33%	89.60%	24.88%
	% of Voters	16.10%	21.58%	30.42%	7.40%	24.50%	

Table 33: Transition matrix for comuna 13 with covariate

		<i>Choice in General Election</i>					
		FPV	UNEN	PRO	Others	No Vote	% of Voters
<i>Choice in Primary Election</i>	FPV	95.12%	1.16%	1.18%	1.18%	1.36%	9.97%
	UNEN-CS	0.27%	89.24%	0.71%	6.44%	3.34%	9.82%
	UNEN-Others	0.96%	68.20%	24.37%	2.72%	3.75%	18.19%
	PRO	0.90%	1.35%	95.54%	0.95%	1.26%	27.73%
	Others	16.79%	5.35%	6.88%	47.31%	23.68%	6.89%
	No Vote	1.27%	1.62%	6.20%	1.28%	89.63%	27.40%
	% of Voters	11.54%	22.51%	33.67%	5.68%	26.60%	

Table 34: Transition matrix for comuna 14 with covariate

		<i>Choice in General Election</i>					
		FPV	UNEN	PRO	Others	No Vote	% of Voters
<i>Choice in Primary Election</i>	FPV	95.18%	1.16%	1.16%	1.18%	1.32%	10.68%
	UNEN-CS	0.27%	89.25%	0.71%	6.43%	3.34%	9.57%
	UNEN-Others	0.95%	68.47%	24.29%	2.66%	3.63%	17.78%
	PRO	0.91%	1.36%	95.61%	0.90%	1.22%	25.75%
	Others	16.72%	5.35%	6.85%	47.25%	23.84%	6.87%
	No Vote	1.17%	1.65%	6.22%	1.16%	89.80%	29.35%
	% of Voters	12.23%	22.23%	31.82%	5.60%	28.11%	

Table 35: Transition matrix for comuna 15 with covariate

		<i>Choice in General Election</i>					
		FPV	UNEN	PRO	Others	No Vote	% of Voters
<i>Choice in Primary Election</i>	FPV	95.03%	1.06%	1.12%	1.32%	1.46%	16.38%
	UNEN-CS	0.27%	89.07%	0.71%	6.58%	3.37%	9.86%
	UNEN-Others	1.03%	67.14%	24.55%	3.30%	3.98%	14.27%
	PRO	1.04%	1.35%	95.00%	1.30%	1.32%	20.13%
	Others	16.51%	5.13%	6.69%	48.27%	23.39%	10.97%
	No Vote	1.28%	1.45%	5.58%	1.61%	90.08%	28.40%
	% of Voters	18.54%	19.16%	25.00%	9.04%	28.26%	