Polit Behav (2016) 38:899–920
DOI 10.1007/s11109-016-9340-1

ORIGINAL PAPER

Expressive and Strategic Behavior in Legislative Elections in Argentina

Lucas Núñez[1]

Published online: 21 April 2016

Abstract In this paper I study 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, utilizing a rich data set of ballot box data. The results show that strategic behavior is not widespread among 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. I also find high levels of vote wasting when analyzing other provinces during the same election cycle. These results suggest that these electorates might be composed of a mixture of voters with strategic and expressive motivations, where the expressive factions dominate.

Keywords Strategic voting · Voter transitions · Bayesian models · Ecological inference

Introduction

We generally 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

Electronic supplementary material The online version of this article (doi:10.1007/s11109-016-9340-1) contains supplementary material, which is available to authorized users.

✉ Lucas Núñez
lnunez@caltech.edu

[1] Division of the Humanities and Social Sciences, California Institute of Technology, 1200 E California Blvd, Pasadena, CA 91125, USA

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), and social pressure (Kuran 1995) among others.[1] 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.[2] 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 candidate 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 has no chance of getting 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. While the focus of the paper is in the City of Buenos Aires, I also report the levels of vote wasting in the other Argentine provinces that held senatorial elections during the same year. The new Argentine primaries, instituted in 2009, provide a interesting laboratory for strategic voting. Their general lack of internal competition, together with their open and mandatory character, implies that 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 win 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 few exceptions, and that has mostly

[1] See Hamlin and Jennings (2011) for a review of the foundations of expressive voting behavior.

[2] There is a large literature dealing with voter turnout and it's determinants. See, for example, Gerber et al. (2014), Gerber et al. (2013), Gerber and Green (2000), Beys (2006), Ashworth and Clinton (2007).

ignored developing countries.[3,4] 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. The data I analyze are official electoral outcomes at the ballot box level, and are the most disaggregated data that is legally available. 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 "Introduction" Section I describe the senatorial electoral system in Argentina and the primary election system. I also present the hypotheses derived from the theoretical literature on strategic voting. In "Estimation of Strategic Voting Behavior" Section, 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 "Data and Methods" Section, I describe the data and particular method used in this paper. "Results" Section presents the results for the City of Buenos Aires, as well as a short analysis for other provinces. Finally, "Conclusion" Section concludes.

The Argentine Senatorial Electoral System and Hypotheses

Senators in Argentina are elected to six-year terms by popular vote on a provincial basis, with one third of provinces holding elections every two years. 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 office, but they are allowed to vote in different primaries for different offices. Thus, the electoral system closely resembles a two-round electoral system, rather than a traditional primary-and-general election system. This resemblance is accentuated by the general lack of internal competition. In fact, the average number of effective number of internal party-lists during the

[3] For 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).

[4] Kawai 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. Some papers have covered strategic behavior related to coalition governments (Hobolt and Karp 2010; Irwin and Van Holsteyn 2012; Meffert and Gschwend 2010; among others). Duch and Palmer (2002) and Tavits and Annus (2006) study former communist countries.

2013 elections was below two for all national offices, and in most cases very close to one. This means, that even in cases where primaries are contested, the electoral results tend to be lopsided within a party and, thus, competition is minimal (see Online Appendix A). Because of this low level of competitiveness, 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.[5] 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 win 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.[6] 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 (*Propuesta Republicana*) and left-wing FPV (*Frente para la Victoria*), had uncontested primaries. For the other major party, UNEN (*Unión y Encuentro*), 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").[7] Finally, the category "No Vote" includes individuals registered to vote, but whose votes were blank, void, null, or did not turn out to vote.[8] For the other provinces I conducted similar aggregations where necessary, considering the top three parties separately, and grouping minor ones in the category "Others." The main focus of this paper is to determine the extent to which voters vote strategically, or instead "waste" their vote on a party that has no chance of getting elected. Cox (1997)'s theoretical model of strategic voting predicts that the number of parties that

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

[6] It is possible, though, that voters make mistakes when casting their ballots, or that election officials make counting errors.

[7] The 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 incumbent 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.

[8] All 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.

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 in the City of Buenos Aires considered in this paper where two parties can obtain seats, if voters are strategic, 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.[9] Under the assumption that voters use the outcome of the primary elections as a reflection of the relative strength of parties, minor parties should receive no votes in the general, as they are not among the top three parties in the primary.[10] 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).

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 (row UNEN-Others in Table 1). Finally, I expect that most voters who voted blank or did not turn out to vote would to 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).

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.[11] 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

[9] If the party with the third largest vote share trailed significantly behind the runner-up, it could be optimal for the supporters of the third (and smaller parties) to cast a vote for one of the top two, in order to affect which of them obtains one and two seats. This is why the number of parties who can obtain a seat plus one is an upper bound on the number of vote-getting parties with strategic voters, instead of tighter prediction.

[10] This assumption rules out situations in which voters believe that most of the support for a given party in the primary election was simply the result of strategic primary voters, instead of a reflection of the support for that party. It is indeed possible that some of the votes obtained by UNEN-CS and UNEN-Others were actually cast by voters who preferred FPV or PRO, but tried to influence the only major contested primary. Nonetheless, it is unlikely that a large part of UNEN primary voters are of this type, as that would require a complex coordination between voters and a balancing act to avoid diluting the vote share of their preferred party too much.

[11] See, for example, Weisberg and Miller (1980).

Table 1 Illustration with no vote wasting

	Choice in General Election					
	FPV (%)	UNEN (%)	PRO (%)	Others (%)	No vote (%)	% of Voters (%)
Primary election						
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
% of Voters	16.8	19.9	28.3	7.0	28.0	

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 pairwise 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 over-report voting for the winner of the election.[12] 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 elections. 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 behavior. This approach is an improvement from previous methodologies, but it is difficult to establish the validity of the counterfactual. Spenkuch (2015) exploits the two-tier structure of Germany's electoral system where the underlying

[12] See Benewick et al. (1969), Himmelweit et al. (1978).

preferences are inferred under the assumption that voters vote sincerely in the proportional tier of the election, and strategic or expressive behavior is derived from the second (majoritarian) tier.[13] 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 Rose et al. (2001) and is an extension to King's Ecological Inference method (King 1997). 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 (see Goodman 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 et al. 2008), ticket-split voting (Burden and Kimball 1998; Benoit et al. 2004; 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 programing 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). 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.

Data and Methods

Data

The data used here are the official provisional vote counts for the 2013 Primary and General elections. The data for the City of Buenos Aires consist of the number of

[13] Germany's two tier system has been exploited by Gschwend (2007) by considering that voters not only care who gets elected, but what coalition government results from the election. Meffert and Gschwend (2010) conduct similar analyzes for Austria, and Bowler et al. (2010) for New Zealand.

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. 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. The provisional data used for the other provinces has a similar coverage, although the number of ballot boxes is smaller because these provinces have smaller populations than the City of Buenos Aires. It is important to note that even though the data are aggregate, the level of aggregation is extremely 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.[14] 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 quite homogeneous in demographic terms, as voters in each ballot box come from the same neighborhood, and even from the same city block.[15]

Estimation Model

The method employed in this paper is a Bayesian hierarchical model estimated via Markov Chain Monte Carlo methods, following Rose et al. (2001). The data consist of the marginals for 6 × 5 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 the primary ($\mathbf{X_i} = (X_{1i}, .., X_{6i})$), and the general election ($\mathbf{T_i} = (T_{1i}, ..., T_{5i})$). 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^i_{rc}). 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^i_{rc} 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

[14] For 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.

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

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 points with the highest value of the estimated density over the hyperplane for ballot box i. The presence of ballot boxes in with a lopsided primary, can help with identification of the β^i's as the natural bounds will be narrow. In an extreme case, if all voters in a ballot box choose the same party in the primary, then we can observe the transition matrix for that ballot box directly. Yet, in most ballot boxes for this election primaries are not lopsided. In this case, the statistical portion of the model will be contributing most to the estimation. This statistical portion of the model is most powerful when there is sufficient variation in the vote shares of the different parties across ballot boxes. The idea is that this variation produces hyperplanes with different slopes, which makes it easier for the statistical model to pinpoint the location where they intersect, compared to the case in which the hyperplanes are almost parallel. Online Appendix B (see Fig. 2) shows that there is indeed significant variation in the vote shares of the different parties in both the primary and the general election, which will helps in providing accurate estimates of the β^is. The validity of the estimates derived from this method rely on three assumptions. The first is that the quantities of interest β^i_{rc} 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 highly 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 implausible. 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.[16]

The second (and most critical) assumption is that the vector $(X_{1i}, ..., X_{6i})$ is independent of the elements in β^i_r. 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

[16] The city of Buenos Aires is administratively divided into 15 *comunas*, each with its respective community center for administrative purposes.

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 Escolar (2003) note that ecological inference methods will produce biased estimates in the presence of extreme spatial heterogeneity. 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 spatial correlation pattern in votes because similar voters tend to live in certain areas, it is unlikely that 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 $\theta_i = (\theta_{1i}, ..., \theta_{5i})$ 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).

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

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

which imples that:

Table 2 Notation for Ballox Box i

	Choice in General Election					
	FPV	UNEN	PRO	Other	No vote	No. of Voters
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

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

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 $\frac{1}{\lambda}$.

Estimation Procedure

Following Rose et al. (2001), the posterior distribution is proportional to the product of the likelihood and the prior:

$$\begin{aligned} & P(data|\beta_i, i = 1, ..., p) \times P(\beta_i, i = 1..., p|\delta) P(\delta) \\ = & \prod_{i=1}^{p} \prod_{c=1}^{C} \theta_{ci}^{T'_{ci}} \times \prod_{i=1}^{p} \prod_{r=1}^{R} \\ \times & \left[\frac{\Gamma\left(d_r \sum_{c=1}^{C} \exp(\gamma_{rc} + \delta_{rc} Z_i)\right)}{\prod_{c=1}^{C} \Gamma(d_r \exp(\gamma_{rc} + \delta_{rc} Z_i))} \prod_{c=1}^{C} \beta_{rc}^{i d_r \exp(\gamma_{rc} + \delta_{rc} Z_1) - 1} \right] \\ \times & \exp\left(-\lambda \sum_{r=1}^{R} d_r \right) \end{aligned} \tag{1}$$

where β_i denotes all the β_{rc}^{i}'s in unit i, and $\delta = (\gamma_{rc}, \delta_{rc}, d_r)_{r,c=1,1}^{R,C-1}$. The marginals of this posterior distribution can be obtained using the Gibbs sampler (Tanner 1996). To do this, the distribution of each unknown parameter conditional on the full set of parameters has to be obtained.

$$P(\beta_{rc}^{i}|\{\beta_{jk}^{i}\}_{j\neq r}^{k\neq c}, d_r, \gamma_{rc}, \delta_{rc}) \propto \theta_{ci}^{T'_{ci}} \times \theta_{Ci}^{T'_{Ci}} \times \beta_{rc}^{i d_r \exp(\gamma_{rc} + \delta_{rc} Z_i)} \times \beta_{rC}^{i d_r - 1} \tag{2}$$

$$\begin{aligned} & P(\gamma_{rc}|\{\beta_{rc}^{i}\}_{i=1}^{p}, d_r, \{\delta_{rc}\}_{c=1}^{C-1}, \{\gamma_{rj}\}_{j\neq c}) \propto \\ & \prod_{i=1}^{p} \frac{\Gamma\left(d_r \sum_{c=1}^{C} \exp(\gamma_{rc} + \delta_{rc} Z_i)\right)}{\Gamma(d_r \exp(\gamma_{rc} + \delta_{rc} Z_i))} \beta_{rc}^{i d_r \exp(\gamma_{rc} + \delta_{rc} Z_i)} \end{aligned} \tag{3}$$

$$\begin{aligned} & P(\delta_{rc}|\{\beta_{rc}^{i}\}_{i=1}^{p}, d_r, \{\delta_{rj}\}_{j\neq c}, \{\gamma_{rc}\}_{c=1}^{C-1}) \propto \\ & \prod_{i=1}^{p} \frac{\Gamma\left(d_r \sum_{c=1}^{C} \exp(\gamma_{rc} + \delta_{rc} Z_i)\right)}{\Gamma(d_r \exp(\gamma_{rc} + \delta_{rc} Z_i))} \beta_{rc}^{i d_r \exp(\gamma_{rc} + \delta_{rc} Z_i)} \end{aligned} \tag{4}$$

$$P(d_r|\{\{\beta_{rc}^{i}\}_{i=1}^{p}, \{\gamma_{rc}\}, \{\delta_{rc}\}\}_{c=1}^{C-1}) \propto$$

$$\prod_{i=1}^{p} \frac{\Gamma\left(d_r \sum_{c=1}^{C} \exp(\gamma_{rc} + \delta_{rc} Z_i)\right)}{\Gamma(d_r \exp(\gamma_{rc} + \delta_{rc} Z_i))} \beta_{rc}^{id_r \exp(\gamma_{rc} + \delta_{rc} Z_i)} e^{(-\lambda d_r)} \tag{5}$$

To generate Markov chain for the Gibbs sampler, one draws a random deviate from each of the full conditionals, then updating the values of the variable after each draw. Given that none of the distributions are standard ones, the sampling from these distributions is done with the Metropolis algorithm (Metropolis et al. 1953).

Results

In this section I present four sets of results. First, I show that voters participating in the primary and general elections are virtually identical. Second, I present the estimated voter transition matrix at the city level (without covariates) and analyze the implications for strategic voting. As a robustness check, I present the estimates of the voter transition matrix including dummies for each *comuna* as covariates, thus allowing each *comuna* to be a different cluster. Given that the standard errors are typically small, I relegated them to Online Appendix C to avoid clutter. The final part of this section presents a summary of vote wasting behavior in other provinces. 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 2 × 2 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 where 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 Rose 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 the voters who did not show up in the primary did so for the general election, which is equivalent to 1.6 % of the total eligible voters. These estimates imply that the individuals attending to the precincts

Table 3 City-wide estimates of turnout across elections

	General Election		
	Voted (%)	Did not vote (%)	
Primary			
Voted	99.83	0.17	76.01 %
Did not 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

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 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. The fact that UNEN had a contested primary diminishes the informational value of the of the primary elections relative to a situation in which all primaries are uncontested. But, it is important to note that the winner of the UNEN primary (UNEN-CS) would still be considered a viable contestant for the general election if it stood by it's own, trailing the FPV by only 1.3 percentage points. In that sense, these primaries still provide very valuable information on the strengths of parties for the general election: PRO is clearly in the lead, and FPV and UNEN are contesting the runner-up seat. 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."[17] 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, and considering them separately would not enrich the results in any 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 chance of becoming elected. While a 7 % rate of vote wasting behavior does not seem to be a big proportion, one should look 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 were 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 also 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

[17] All 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, if they choose to do so.

Table 4 City-wide voter transition matrix

	Choice in General Election					
	FPV (%)	UNEN (%)	PRO (%)	Others (%)	No vote (%)	% of Voters (%)
Primary election						
FPV	94.49	1.26	1.33	1.31	1.61	14.2
UNEN-CS	1.83	90.64	2.23	2.69	2.60	12.9
UNEN-others	1.02	68.16	24.54	3.52	2.76	13.7
PRO	1.04	1.47	95.04	1.09	1.36	20.6
Others	16.24	4.46	4.90	49.63	24.77	12.1
No vote	1.22	1.55	5.94	1.13	90.15	26.4
% of voters	16.8	19.9	28.3	7.0	28.0	

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

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.

The second hypothesis presented in Table 1, that the voters of the winner of the UNEN primary, the PRO, and the FPV 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*.[18] It is important to note that the city as a whole is the electoral district. The breakdown by *comuna* allows me to analyze how voters in different areas of the same district behave. The results show that even though the total votes shares for different parties in the primary and general elections have considerable variation across the different *comunas*, the estimates for 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.[19] 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.

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 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

[18] See Online Appendix D.

[19] See Online Appendix E estimates by *comuna*.

Table 5 City-wide voter transition matrix with covariate

	Choice in General Election					
	FPV (%)	UNEN (%)	PRO (%)	Others (%)	No vote (%)	% of Voters (%)
Primary election						
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	16.8	19.9	28.3	7.0	28.0	

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

Table 6 Wasted votes

Province	Wasted votes (%)
Chaco	63.91
Ciudad de Buenos Aires	74.40
Entre Ríos	68.77
Neuquén	93.25
Río Negro	58.71
Salta	80.87
Santiago del Estero	71.95
Tierra del Fuego	64.96

election can then be seen as a way of showing their preference, possibly to avoid the party from becoming irrelevant or disappearing.

Evidence from Other Provinces

Seven provinces held senatorial elections simultaneously to the ones in the City of Buenos Aires during the 2013 election cycle. I estimated the voter transition matrix between the primary and general elections for each of the provinces (Online Appendix F for the full transition matrices). Table 6 shows the amount of vote wasting among the voters who had the opportunity to avoid it by supporting one of the top three parties in the general election for each of the provinces. Although the results show variation across the provinces, the amount of vote wasting is generally high, ranging from about 59 % in Río Negro, to 93 % in Neuquén.

In the province with the lowest vote wasting, Río Negro, one of the small parties representing half of the votes received by small parties in the primary election withdrew from the general election, despite qualifying for it. This fact helps explain the low levels of vote wasting in this province, as voters of the party that withdrew faced fewer alternatives in which to waste their votes. In the province with the

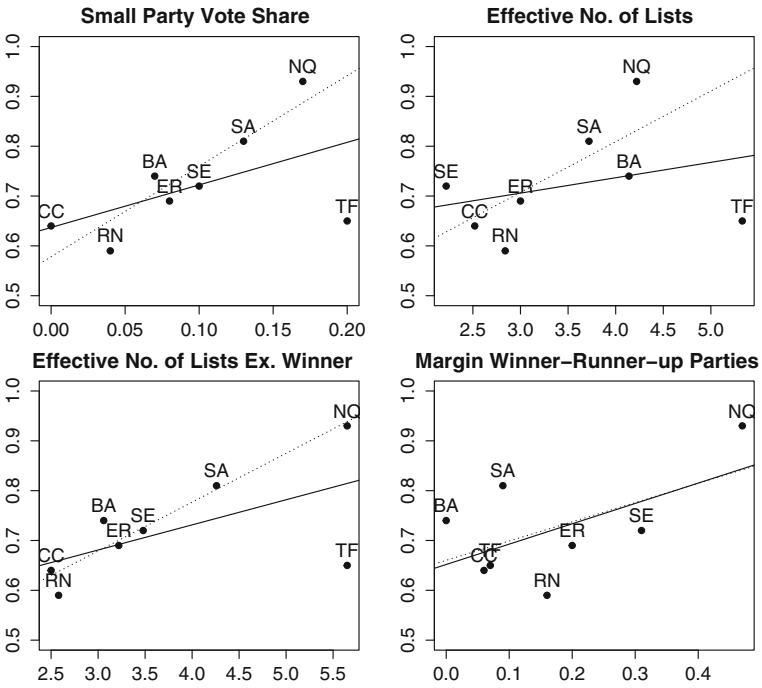

Fig. 1 Correlations with Vote Wasting The provinces' two letter codes are BA for Buenos Aires, CC for Chaco, ER for Entre Ríos, NQ for Neuquén, RN for Río Negro, SA for Salta, SE for Santiago del Estero, and TF for Tierra del Fuego. The solid line in each of the plots shows the best linear fit of the data, whereas the dashed line shows the best linear fit when excluding Tierra del Fuego.

second lowest level of vote wasting, Chaco, none of the small parties qualified for the general election, meaning their supporters could waste their vote only by casting a blank ballot. On the other end of the spectrum, vote wasting in Neuquén Province reached 93 %. This province also saw the largest margin of victory, with the *MPN* garnering 55 % of the valid votes between its two internal primary lists to only 9 % of the runner-up party. It is possible that voters facing such a lopsided election did not find it worthwhile to entertain strategic behavior. To take a more systematic view in the comparison of the levels of vote wasting across the different provinces and the City of Buenos Aires, Figure 1 presents correlation plots between the amount of vote wasting among those who could avoid it and several variables of interest.[20]

[20] I also considered other variables that might be related to the levels of vote wasting across provinces (unreported). The vote share of the third party and the margin between the second and third parties show no clear relation with vote wasting, although it is reasonable to expect that the better the performance of the third party and the smaller the margin, the less vote wasting should be observed. The actual (as opposed to effective) number of lists shows a very weak positive correlation with vote wasting, but was excluded as the effective number of lists is a better representation of competition and the complexity of the election.

The upper-left plot shows the correlation of vote wasting with the vote share of the small parties during the primary election that qualified to the general election. This correlation is 0.58, meaning that the better the performance of the small parties in the primary election, the less likely their supporters would abandon them in the general election by strategically casting a vote for one of the top three parties. This behavior is consistent with voters who (correctly or incorrectly) perceive their small parties to be increasingly viable as they garner more support during the primary election. This correlation increases to 0.9 when excluding Tierra del Fuego, which is a clear outlier in the plot. The upper-right plot shows the correlation of vote wasting with the effective number of lists competing during the primary election. A higher number of effective lists means that the votes where split amongst multiple lists in an equitable manner. This diminishes the informational value of the primary elections, as it becomes harder for voters to distinguish viable from non-viable lists. The correlation between these two variables is relatively low, 0.3, but increases to 0.72 when excluding Tierra del Fuego Province (which is a clear outlier in all plots). The lower-left plot shows the correlation of vote wasting with the effective number of lists competing during the primary election, after excluding all internal lists of the party that garnered the highest support.[21] By excluding the winning party from the calculation of the effective number of lists, I can take a closer look at the information value of the primary elections. In particular, if the runner-up and lower ranked parties obtained similar vote shares, then the effective number of lists (excluding the winner) will be high, which implies that voters will have a harder time in distinguishing viable from non-viable parties and coordinating on them. The correlation of this measure with vote wasting is 0.59, and rises to 0.96 when excluding Tierra del Fuego Province. The final plot, the lower-right, shows the correlation between vote wasting and the margin of victory of the party that obtained the most votes during the primary election and the runner-up. This plot shows a positive, although relatively low correlation between the two variables, suggesting that the the more contested the race between the top two parties in the primary (the smaller the margin) the lower is the amount of vote wasting. This correlation is consistent with voters being more likely to behave strategically when their vote is more likely to matter in deciding who the winner of the election is. Finally, voters in Tierra del Fuego Province seem behave in a way that does not fit the explanations provided above. In particular, the primary election in that provinces provided relatively poor information about viability and likely winners based on the strong performance of the small parties and the high effective number of parties (excluding the winner or not). But, despite the low information provided by the primaries, voters in this province have one of the lowest levels of vote wasting found in this paper. A closer inspection to election results in this province, suggests that the principal source of this low level of vote wasting is the behavior of the supporters of the *PJ*, which garnered 7 % of the valid votes and came in 5th place during the primaries, but lost around two-thirds of its support between the primary

[21] That is, the effective number of lists excluding the winning party is calculated by completely ignoring the party that obtained more votes in the primary election and obtaining the effective number of parties from among the remaining ones.

and general elections. The other small parties obtained almost the same vote shares in the two elections, suggesting that either the supporters of *PJ* are very different than the average voter in the province, or the presence of coordinating efforts by party elites.[22]

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 and seven other provinces during the 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) engaged 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. The analysis of other provinces that held senatorial elections during the 2013 election cycle largely confirms the high levels of vote wasting, but with regional variations. In particular, provinces where smaller parties fared better during the primary, the margin of victory between the winner and runner-up was higher, and where vote shares where least concentrated during the primaries showed higher levels of vote wasting. The findings in this paper imply that the debate between strategic and expressive behavior does not seem to have a definitive 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

[22] The parties that increased their vote shares between primary and general elections are loosely aligned with the *PJ*.

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.

Acknowledgments The author would like to thank R. Michael Alvarez for invaluable advise, Roderick Kiewiet, Jean-Laurent Rosenthal, Welmar Rosado, and Marcelo Fernández, and participants at the MPSA Annual Meeting in Chicago April 2015 and the 32nd Annual Meeting of the Society for Political Methodology in Rochester July 2015. Replication code and data is available at the Political Behavior Dataverse at "Replication Data for: 'Expressive and Strategic Behavior in Legislative Elections in Argentina"', http://dx.doi.org/10.7910/DVN/PEXMHA

References

Abramson, P. R., Aldrich, J. H., Paolino, P., & Rohde, D. (1992). 'Sophisticated' voting in the 1988 presidential primaries. *American Political Science Review*, *86*, 55–69.

Alvarez, R. M., Boehmke, F. J., & Nagler, J. (2006). Strategic voting in British elections. *Electoral Studies*, *25*, 1–19.

Alvarez, R. M., & Nagler, J. (2000). A new approach for modelling strategic voting in multiparty elections. *British Journal of Political Science*, *30*, 57–75.

Alvarez, R. M., & Kiewiet, D. R. (2009). Rationality and rationalistic choice in the California recall. *British Journal of Political Science*, *39*(2), 267–290.

Andreadis, I., & Chadjipadelis, T. (2009). A method for the estimation of voter transition rates. *Journal of Elections, Public Opinion, and Parties*, *19*(2), 203–218.

Ashworth, S., & Clinton, J. D. (2007). Does advertising exposure affect turnout? *Quarterly Journal of Political Science*, *2*(1), 27–41.

Benewick, R., Birch, A., Blumler, J., & Ewbank, A. (1969). The floating voter and the liberal view of representation. *Political Studies*, *17*(2), 177–195.

Benoit, K., Laver, M., & Giannetti, D. (2004). Multi-party split-ticket voting estimation as an ecological inference problem. In G. King, O. Rosen, & M. Tanner (Eds.), *Ecological inference: New methodological strategies*. Cambridge: Cambridge University Press.

Blais, A., & Nadeau, R. (1996). Measuring strategic voting: A two-step procedure. *Electoral Studies*, *15*, 39–52.

Bowler, S., Karp, J. A., & Donovan, T. (2010). Strategic coalition voting: Evidence from New Zealand. *Electoral Studies*, *29*(3), 350–357.

Brennan, G., & Hamlin, A. (1998). Expressive voting and electoral equilibrium. *Public Choice*, *95*, 149–175.

Brennan, G., & Hamlin, A. (1999). On political representation. *British Journal of Political Science*, *29*, 109–127.

Burden, B. C., & Kimball, D. C. (1998). A new approach to the study of ticket splitting. *American Political Science Review*, *92*(3), 533–544.

Cain, B. (1978). Strategic voting in Britain. *American Journal of Political Science*, *22*, 639–655.

Calvo, E., & Escolar, M. (2003). The local voter: A geographically weighted approach to ecological inference. *American Journal of Political Science*, *47*(1), 188–204.

Calvo, E., & Murillo, M. V. (2005). When parties meet voters: Assessing political linkages through partisan networks and distributive expectations in Argentina and Chile. *Comparative Political Studies*, *46*(7), 851–882.

Cox, G. M. (1997). *Making Votes Count*. Cambridge: Cambridge University Press.
Cox, G. G., & Shugart, M. (1996). Strategic Voting under Proportional Representation. *Journal of Law, Economics & Organization*, *12*(2), 299–324.
Downs, A. (1957). *An economic theory of democracy*. New York: Harper.
Duch, R. M., & Palmer, H. D. (2002). Strategic voting in post-communist democracies? *British Journal of Political Science*, *32*(1), 63–91.
Duncan, O., & Davis, B. (1953). An alternative to ecological correlation. *American Sociological Review*, *18*, 665–666.
Duverger, M. (1954). *Political parties: Their organization and activity in the modern state*. London: Methuen.
Eckstein, Z., & Shachar, R. (2007). Correcting for bias in retrospective data. *Journal of Applied Econometrics*, *22*(2), 657–675.
Gay, C. (2001). The effect of black congressional representation on political participation. *American Political Science Review*, *95*(3), 589–602.
Gschwend, T. (2007). *Ticket splitting in mixed electoral systems*. Reutlingen: SFG-Elsevier.
Gerber, A. S., Huber, G. A., Doherty, D., & Dowling, C. M. (2014). Why people vote: estimating the social returns to voting. *British Journal of Political Science*. doi:10.1017/S0007123414000271.
Gerber, A. S., Huber, G. A., & Hill, S. J. (2013). Identifying the effect of all-mail elections on turnout: Staggered reform in the Evergreen state. *Political Science Research and Methods*, *1*(1), 91–116.
Gerber, A. S., & Green, D. P. (2000). The effects of canvassing, telephone calls, and direct mail on voter turnout: A field experiment. *American Political Science Review*, *94*(3), 653–663.
Beys, B. (2006). Explaining voter turnout: A review of aggregate-level research. *Electoral Studies*, *25*(4), 637–663.
Golosov, G. V. (2010). The effective number of parties: A new approach. *Party Politics*, *16*(2), 171–192.
Goodman, L. (1959). Some alternative to ecological correlation. *American Journal of Sociology*, *64*, 610–624.
Hamlin, A., & Jennings, C. (2011). Expressive political behavior: Foundations, scope, and implications. *British Journal of Political Science*, *41*(3), 1–26.
Heath, A., & Evans, G. (1994). Tactical voting: concepts, measurements, and findings. *British Journal of Political Science*, *24*, 557–561.
Heath, A., Curtice, J., & Jowell, R. (1991). *Understanding political change: The British voter 1964–1987*. Oxford: Pergamon Press.
Herron, M. C., & Sekhon, J. S. (2005). Black candidates and black voters: Assessing the impact of candidate race on uncounted black votes. *Journal of Politics*, *61*(1), 154–177.
Himmelweit, H., Biberian, M., & Stockdale, J. (1978). Memory of past vote: Implications of a study of bias in recall. *British Journal of Political Science*, *8*(3), 365–375.
Hobolt, S. B., & Karp, J. A. (2010). Voters and coalition governments. *Electoral Studies*, *29*, 299–307.
Irwin, G. A., & Van Holsteyn, J. J. M. (2012). Strategic electoral considerations under proportional representation. *Electoral Studies*, *31*, 184–191.
Johnston, R., & Hay, A. (1983). Voter transition probability estimates: An entropy maximizing approach. *European Journal of Political Research*, *11*(1), 93–98.
Johnston, R., & Pattie, C. (1991). Tactical voting in Great Britain in 1983 and 1987: An alternative approach. *British Journal of Political Science*, *21*, 95–128.
Johnston, R., & Pattie, C. (2000). Ecological inference and entropy maximizing: An alternative estimation procedure for split-ticket voting. *Political Analysis*, *8*(4), 333–345.
Katz, G., & Levin, I. (2011). Modeling electoral coordination: Voters, parties, and legislative seats in Uruguay. *Journal of Politics in Latin America*, *3*(2), 3–41.
Kawai, K., & Watanabe, Y. (2013). Inferring strategic voting. *American Economic Review*, *103*(2), 624–662.
Kiewiet, D. R. (2013). The ecology of tactical voting in Britain. *Journal of elections, Public Opinion and Parties*, *23*(1), 86–110.
King, G., Rosen, O., & Tanner, M. A. (2004). *Ecological inference: New methodological strategies*. New York: Cambridge University Press.
King, G., Rosen, O., Tanner, M. A., & Wagner, A. F. (2008). Ordinary economic voting in the extraordinary election of Adolf Hitler. *The Journal of Economic History*, *68*(4), 951–966.
King, G. (1997). *A solution to the ecological inference problem: Reconstructing individual behavior from aggregate data*. Princeton: Princeton University Press.

Kuran, T. (1995). *Private truths, public lies: The social consequences of preference falsification*. Cambridge, MA: Harvard University Press.

Lau, O., Moore, R. T., & Kellerman, M. (2007). Eipack: Ecological inference and higher-dimension data management. *R News*, *7*(2), 43–47.

McCarthy, C., & Ryan, T. (1977). Estimates of voter transition probabilities from the British General Elections of 1974. *Journal of the Royal Statistical Society, Series A (General)*, *140*(1), 78–85.

McKelvey, R. D., & Ordeshook, P. (1972). A general theory of the calculus of voting. In J. Herdon & J. Bernd (Eds.), *Mathematical applications in political science VI* (pp. 32–78). Charlottesville: The University of Virginia Press.

Meffert, M. F., & Gschwend, T. (2010). Strategic coalition voting: Evidence from Austria. *Electoral Studies*, *29*, 339–349.

Metropolis, M., Rosenbluth, A., Teller, M., & Teller, E. (1953). Equation of state calculations by fast computing machines. *Journal of Chemical Physics*, *21*, 1087–1092.

Moser, R. C., & Scheiner, E. (2009). Strategic voting in established and new democracies: Ticket splitting in mixed-member electoral systems. *Electoral Studies*, *28*, 51–61.

Myatt, D. P. (2007). On the theory of strategic voting. *Review of Economic Studies*, *74*, 255–281.

Niemi, R., Whitten, G., & Franklin, M. (1992). Constituency characteristics, individual characteristics, and tactical voting in the 1987 British General Election. *British Journal of Political Science*, *22*, 229–254.

Rose, O., Jiang, W., King, G., & Tanner, M. A. (2001). Bayesian and frequentist inference for ecological inference: The RxC case. *Statistica Neerlandica*, *55*(2), 134–156.

Saiegh, S. (2015). Using joint scaling methods to study ideology and representation: Evidence from Latin America. *Political Analysis*, *23*(3), 363–384.

Schnakenberg, K. E. (2014). Group identity and symbolic political behavior. *Quarterly Journal of Political Science*, *9*(2), 137–167.

Schuessler, A. A. (2000). *The logic of expressive choice*. Princeton: Princeton University Press.

Spenkuch, J. (2015). *(Ir)rational voters?*. Mimeograph: Northwestern University.

Tanner, M. A. (1996). *Tools for statistical inference: Methods for the exploration of posterior distributions and likelihood functions*. New York: Springer.

Tavits, M., & Annus, T. (2006). Learning to make votes count: The role of democratic experience. *Electoral Studies*, *25*, 72–90.

Upton, G. (1978). A note on the estimation of voter transition probabilities. *Journal of the Royal Statistical Society, Series A (General)*, *141*(1), 507–512.

Weisberg, H., & Miller, A. (1980). *Evaluation of the feeling thermometer: a report ot the National Election Study Board based on data from the 1979 Pilot Study*. Mimeograph: University of Michigan.