

**Who Votes Strategically?
An Individual-Level Model that Accounts for Measurement Error in the Dependent
Variable with an Application to the 2006 Mexican Presidential Election**

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Abstract: A large formal and empirical literature exists analyzing strategic voting. However, conceptual and empirical controversy remains. This paper addresses two shortcomings of the literature: the tendency to misclassify strategic voters and a lack of emphasis to determine which voters are more likely to vote strategically. Using an exit poll from the Mexican 2006 presidential elections, I find that the share of the electorate that voted strategically is remarkably similar to that of other elections in different countries. Moreover, I discern the sociodemographic and political determinants of strategic voting with an individual-level model that accounts for the possible misclassification of strategic voters, thus rendering consistent coefficients. Strength of party identification for the candidate that is being abandoned and a college-level education are statistically significant predictors of sophisticated voting. The results illuminate how political persuasion takes place during presidential campaigns and enable a better understanding of how strategic considerations shape party systems in presidential democracies.

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I. Introduction

Arguably the most controversial issue in the strategic voting literature concerns how to measure the share of the electorate that votes in favor of a candidate who is not the first choice in order to try to affect the outcome of the election. Without a doubt, this is a very difficult endeavor, as it is impossible to know exactly why a voter cast a ballot the way he or she did. Discerning whether a vote change responded to strategic considerations or was simply the result of political persuasion during the campaign is hard to establish.

Yet, the proper measurement of strategic voting is important for two reasons. First, it gives a notion of the extent of the practice of strategic voting. If strategic voting is a pervasive practice, campaign strategies can be geared towards attracting this segment of the electorate. It also helps address the theoretical debate on the rationality of the voters, as the act of voting strategically requires a certain degree of political sophistication. Second, measuring strategic voting correctly is essential to conduct proper econometric analysis. Otherwise, as Greene (2008) points out, regression coefficients are inconsistent.

In this paper, I apply the technique proposed by Hausman, Abrevaya, and Scott-Morton (1998) that corrects the potential error in the measurement of strategic voting and thus renders consistent coefficients. The methodology not only provides better econometric results, but it also yields estimates of the probability that respondents were incorrectly classified as strategic voters. To the best of my knowledge, this paper is the first to apply Hausman et al.'s (1998) method in political science, and the potential benefits are large not only for the empirical analysis of strategic voting, but also for the

wide range of applications with categorical dependent variables with potential measurement error.

The next section defines strategic voting more in detail. Section 3 explains the controversy regarding the proper measurement of strategic voting. Section 4 discusses the substantive implications of strategic voting—issues for which accounting for measurement error is crucial. Section 5 describes the case of the 2006 presidential election in Mexico and makes the point that it is a particularly good case to analyze strategic voting. Section 6 describes the methodology and the results. Section 7 concludes.

II. What is strategic voting?

Strategic voting—mainly referred to as “tactical voting” in the European literature—refers to the act of casting a ballot in favor of a candidate who is not the first choice in order to try to affect the outcome of the election (Blais et al. 2001; A Blais and R Nadeau 1996; Cox 1997). Primarily, this entails a situation where the preferred candidate or party is considered to be out of contention and the voter decides to support one of the frontrunners. This behavior can be induced if one of the leading candidates is particularly disliked and if the frontrunners are polling closely together (Heath and Evans 1994). If the voter is indifferent between the frontrunners, then she will be unlikely to want to switch her vote away from her first pick. Similarly, if a candidate is expected to win easily, the incentives to voting strategically are reduced. Occasionally, a voter can cast a ballot for a candidate who is not the preferred one and who is unlikely to win the election. This has been labeled as “expressive strategic voting” (Burden 2005; Franklin, Niemi, and Whitten 1994), and it addresses the fact that voters may want to help certain causes

when (i) their preferred choice is bound to win the election easily or (ii) a different candidate is likely to win the election handily and a vote for the preferred candidate is perceived to have a negligible impact.

While this is the most accepted definition of strategic voting and the one that will be used in this paper, other versions exist. For example, Fisher (2004) relies on first principles of formal modeling to provide a more precise definition where he identifies three necessary conditions: (i) the voter must have short-term instrumental motivations, (ii) she must cast a ballot for a party other than the first preference, and (iii) the vote choice must be consistent with the principle of utility maximization (p. 153). Fisher's definition is particularly helpful for rational choice modeling, but there are two reasons why a more parsimonious definition can be preferred. First, it appears intuitively possible for voters to cast ballots strategically with long-term objectives in mind. Second, for many types of empirical testing of strategic voting, little is added by explaining that utility maximization must be satisfied. After all, this amounts to saying that individuals are in some way rational, which is readily granted after acknowledging that the act of voting itself—no matter how close together the frontrunners are polling—defies straightforward rationality considerations.

In the end, since a strategic vote's impact on the final outcome of the election is negligible, a discussion of strategic voting should address why individuals can engage in such behavior. Acevedo and Krueger (2004) provide an excellent account of the psychological reasons why people may vote despite it appearing to be contrary to the principle of rationality: the belief of personal relevance (thinking that one's vote really will matter) and the voter's illusion (the tendency to project one's own behavior into

those who are similar, but not those who are different, and thus think that if we abstain from voting, others who also support our candidate will abstain, not realizing that supporters of the other candidate are just as likely to stay at home). Clearly, both of these phenomena apply to the subset of strategic voters in an election.

III. The controversy over how to measure strategic voting

While there is some disagreement regarding the exact definition of strategic voting, arguably the central controversy in the strategic voting literature concerns what is the appropriate method of measuring the extent of strategic voting in an election. Scholars have adopted different techniques, constrained by having to use survey datasets with questionnaires that were not necessarily designed to analyze strategic behavior.

According to the level of analysis, approaches can be separated into two main groups: those that use macro-level data (Burden 2005; Cain 1978; Johnston and Pattie 1991) and those that use individual-level survey data (PR Abramson et al. 2004; Alvarez and Nagler 2000; A Blais and R Nadeau 1996; A. Blais, R. Nadeau, Gidengil, and Nevitte 2001; A Blais, Young, and Turcotte 2005; Duch and Palmer 2002; Niou and P Paolino 2003). Using macro-level data to make individual-level behavioral inferences has been sharply criticized elsewhere (Alvarez and Nagler 2000; Fisher 2004), so we will not expand on it here. Suffice it to say that the approach is seldom used in the contemporary literature, remaining as a tool primarily for instances where quality survey data is not available.

Among the studies that rely on individual-level data, there are also two major camps: those that infer behavior directly from responses to survey questions and those that infer behavior indirectly by modeling vote choice and including variables to estimate

strategic considerations. The direct measurement can occur in two ways: using a pre-electoral survey or a post-electoral one. The first type—a post-election survey—asks respondents if they voted for a party other than their preferred one because they thought that their first choice had little chance of winning. It has been used primarily by scholars analyzing British voting behavior, since the British Election Studies questionnaire has included a question of that type for some time,¹ and it is the approach preferred by Fisher (2004), Heath & Evans (1994), and Blais, et al. (2005). A similar method has been used in a recent analysis of Taiwanese voting behavior (Niou and P Paolino 2003).² A variant of this approach—less often used—consists on analyzing responses to open-ended questions asking why the respondent chose to support a particular party (Niemi, Whitten, and Franklin 1992). The second type of direct measurement relies on pre-electoral surveys that ask the respondents whether they would vote strategically given the hypothetical scenario that their preferred candidate had little chances of winning. This technique was used recently by Duch & Palmer (Duch and Palmer 2002) in their study of the 1997 Hungarian election.³

The second approach among individual-level analyses is indirect in that it models vote choice and includes variables to estimate strategic considerations (Alvarez and Nagler 2000; Alvarez, Boehmke, and Nagler 2006; A. Blais, R. Nadeau, Gidengil, and

¹ The actual wording of the question is the following: “Which one of the reasons on this card comes closest to the main reason you voted for the party you chose?”

1. I always vote that way
2. I thought it was the best party
3. I really preferred another party but it had no chance of winning in this constituency
4. Other (write in)
5. None of these/Don't know”

² The question used in this case was “If the candidate you voted for was not your first preference, for whom did you originally wish to vote?”

³ Duch & Palmer (2002) analyzed strategic voting in the Hungarian parliamentary election of 1997. The exact question of the wording they used is the following: “If it seems that the party you prefer will get too few votes to get into Parliament, would you still vote for that party, or would you vote for a party that has better chances?”

Nevitte 2001; Poiré 2000).⁴ As proposed originally by Alvarez and Nagler (2000), these variables are the extent to which the preferred party is out of contention, the closeness of the race between the two leading parties, and the interaction between the first two variables. It is designed to study Westminster-style parliamentary elections, since it relies on the fact that in each district voters will have different incentives to vote strategically depending on the expected chances of winning of each party. The estimation of the size of strategic voting consists on contrasting the predicted vote choices using the model with those predicted when the “strategic” variables are set to zero (that is, simulating circumstances where strategic considerations are absent from voters’ minds).

A third approach to measure strategic voting lies between the direct and the indirect methods and uses the common “feeling thermometer” questions to determine the voters’ first preferences and compares these with the revealed vote choice (P. R Abramson et al. 1992; PR Abramson et al. 2004; Cain 1978; Lanoue and Bowler 1998; Merolla and Stephenson 2007). In most cases, voters cast a ballot for the candidate that they rank highest; in the other instances, strategic voting could have potentially occurred. This method is direct in that it uses voters’ responses to survey questions on their preferences, but it is indirect in that it infers strategic behavior from discrepancies between “feeling thermometer” rankings and vote choice, rather than by analyzing questions that ask respondents whether they voted strategically. In some instances using pre-electoral surveys (e. g., Abramson, et al., 1992), this approach is combined with a question on the perceived probabilities of winning of each candidate, to ensure that the

⁴ Alvarez and Nagler (2000) introduced this method with the label “direct measurement approach.” However, we agree with Evans (2001) and Blais, et al. (2005) in the sense that, since it relies on the modeling of behavior rather than on the direct questioning of it, it is more appropriately labeled as “indirect.”

strategic behavior followed from the belief that the preferred candidate was out of contention.

These individual-level approaches have both advantages and disadvantages. The direct approach has the benefit of relying on a question that prods exactly on the type of behavior that is being analyzed. However, (i) when it relies on post-electoral surveys, responses can be contaminated by after-the-fact rationalization on the part of voters (Rahn, Jon A. Krosnick, and Breuning 1994) and (ii) when pre-electoral surveys are used, it may be easy for respondents to answer in the affirmative to the hypothetical scenario of strategic voting, while in reality they may not feel compelled to abandon their first choice at the time of casting their ballot. Both of these elements could contribute to inflated estimates of strategic voting.

The indirect approach—modeling the vote—sidesteps the measurement error problems from the strategic voting questions, but may very well produce biased estimates due to incorrect model specification or to measurement error in other questions that are included in the analysis. Particularly troublesome is the fact that the vote choice models seldom account for the joint endogeneity of some variables, which leads to inconsistent estimates—as demonstrated, *inter alia*, by Griliches (1977). Some authors choose to avoid the joint endogeneity problem by excluding those independent variables from the model (e. g., Poiré [2000]), but it has been shown that in non-linear models—such as the multinomial logit and multinomial probit estimators commonly used—the exclusion of a relevant variable leads to inconsistent estimates for the entire vector of parameters, regardless of whether it is partially correlated with some of them or not (W. H. Greene 2008; Yatchew and Griliches 1985). Moreover—at least in the operationalization

proposed by Alvarez and Nagler (2000)—the indirect approach relies on results from the previous election to approximate the probability of winning of each party in a district, since polling data at that level of disaggregation is rarely available. This can lead to serious measurement error in a key independent variable, since it is to be expected that expectations of candidate viability in one election do not exactly mirror the pattern observed in the previous election. One final shortcoming of the indirect approach, as Blais, et al. (2005) and Fisher (2004) have pointed out, is that those respondents determined to have behaved strategically from the modeling analysis do not coincide with those with self-reported strategic behavior, raising questions about who are the abstract people that are claimed to have voted strategically. In the end, it appears that the most important contribution of the vote choice modeling approach is the fact that it provides estimates of coefficients on strategic considerations and that it shows that these have the signs predicted by rational choice theory (see, e. g., Alvarez & Nagler, 2000). Nonetheless, the reliability of this approach to measure the size of the strategic vote is highly controversial.⁵

Finally, using feeling thermometers to infer the ranking of candidate preferences suffers from the disadvantage that it assumes that higher “warmth of feeling” towards a particular candidate is equivalent to preferring that candidate for elective office. In other words, it is possible that a voter ranks a candidate higher on the feeling thermometer scale due to the candidate’s high level of charisma while in an aggregate consideration the voter preferred someone else. Moreover, the use of feeling thermometers requires a

⁵ Evans (2002) and Blais, et al. (2005) noticed that the direct and the indirect approaches seemed to render similar estimates of the size of strategic voting in the same elections. However, we believe that the fact that each method identifies different respondents in the survey as strategic voters should warn against thinking that the choice of estimation technique is inconsequential.

criterion to determine how to classify ties in the rankings. On the other hand, the approach has the advantage that it avoids the measurement problems of the direct method (that is, *ex-post* rationalization or false behavioral expectation given an unlikely hypothetical scenario) and that it is readily available in many survey questionnaires that were not explicitly designed to gauge the level of strategic voting.

Regardless of which estimating technique is used, empirical studies have differed on the universe of respondents that are included in the analysis (or, as Shaw, et al. (2005)] would say, they differ in the “denominator” used to calculate the percentage of strategic voters). In other words, some studies present the percentage of strategic voters in the electorate as a whole, whereas others provide the percentage of strategic voters only among those voters who were in a situation where they could have potentially cast a strategic vote (Alvarez, et al., 2006; Blais, et al., 1996). This latter group excludes voters from districts where the election was not competitive and voters whose first preference was one of the frontrunners. The main advantage of using this subsample of “potential” strategic voters is that it limits the analysis to those voters who were faced with that option, thus preventing a severe underestimation of strategic voting. The main disadvantage is that it discards “expressive” strategic voting by supporters of the frontrunners. However, since most studies are concerned primarily with “classical” strategic voting, this possible misclassification is not a huge concern.

Table 1 presents the estimates of the size of strategic voting found in a review of the relevant literature, along with the estimation technique used, the election under study, and whether the universe of voters is unrestricted or restricted to voters who were in a potential strategic situation. The results range from a minimum of 2.4% in the study by

Niou and Paolino (2003) on the 2000 Taiwanese presidential elections—with an unrestricted universe of voters—up to a maximum of 64% in Alvarez, et al.’s (2006) analysis of the 1997 British general election—with a restricted subsample of voters. Despite these differences, there is a pattern of strategic voting around 10% among estimates of the overall voter population (unrestricted) and around 30% when only considering the subset of voters could have potentially made a strategic choice. The similarity of most estimates (once the restricted or unrestricted universe condition has been accounted for) is striking given that they derive from different countries and time periods.

[TABLE 1]

IV. Substantive questions regarding strategic voting

As important as the methodological question of the proper measurement of strategic voting is—and its implications for assessing the rationality of the voter—several studies have addressed substantive issues regarding strategic voting. At least three different research agendas can be identified: (i) in the subfield of political behavior, what are the determinants of strategic voting; (ii) in the subfield of party politics, what is the impact of strategic voting on the party system; and (iii) from a pragmatic perspective, what is the impact of strategic voting on the outcome of the election. Each of these is briefly discussed below.

Two approaches exist to test the determinants of strategic voting. The first follows from the “calculus of voting” tradition (Riker and Ordeshook 1968), focusing on the utility for the voter of different outcomes in the election and on the perceived

probabilities that each outcome occurs (Abramson, et al., 1992; Abramson, et al., 2004; Merolla & Stephenson, 2007). It assumes that all voters make voting decisions rationally are thus capable of voting strategically. The idea is to verify whether a strategic vote can be predicted by the differentials in expected utility associated with pairwise comparisons between candidates. In a well-known study of this type, Abramson, et al. (1992) infer utilities from the feeling thermometers scores and the voters' perceived probabilities follow from a survey question asking respondents to estimate the chances of winning of each candidate on a 100-point scale. Their results validate the assumption of voter rationality, since the expected utility differentials have a statistically significant impact on the vote decision that is in the hypothesized direction (although see Grafstein [(2003)] for a dissent on the interpretation of Abramson, et al.'s [1992] results).

The second approach does not assume that all voters are “sophisticated.” Rather than measuring the effect of expected utility differentials on the voting decision, it tests whether sociodemographic, political, and cognitive characteristics of the voters increase their likelihood to vote strategically (Duch & Palmer, 2002; Lanoue & Bowler, 1992). In truth, this second perspective complements the first, since it tests whether the most politically sophisticated voters are particularly likely to vote strategically. This is because formal models require voters to have some sense of the chances of winning of each candidate, since otherwise it would be difficult to know when to abandon the first preference and for whom to vote instead (Cox, 1997, p. 78). In fact, Fey (Fey 1997) has developed a model where knowledge of pre-election polls is necessary for voters to coordinate strategically, since that is how information on others' perceptions of candidates' viabilities is disseminated. With each new poll, voters learn about the chances

of winning of each contender and adjust their expectations and behavior accordingly. It follows that those who follow politics more closely and have a better understanding of political events are expected to be aware of potential strategic situations and to act upon them. The statistical analyses testing political sophistication usually include the level of schooling, the level of self-reported attention to the campaign, and media exposure as proxy variables.

Interestingly, the findings in this line of research contradict the political sophistication hypothesis. Educational attainment and media exposure are generally not significant, while political variables—such as strength of partisan identification—is a strong and highly significant predictor. Lanoue and Bowler (1992), in their account of the 1983 and 1987 British elections, found that a university education had a small positive impact on the likelihood of strategic voting (significant at the 5% level doing a one-tailed test) in 1983, but its effect was not significant in the 1987 election. Duch and Palmer (2002), on their part, show that in the 1997 Hungarian elections, schooling, media usage, and political information were not significant predictors of strategic voting, whereas the intensity of partisan attachments was.

Regarding the study of party politics, strategic voting has been identified as the driver of Duverger's Law—the tendency of single-member, plurality electoral systems to converge to a two party system (Duverger 1954). The idea is that single-member districts reward the winning party disproportionately, since it obtains the only seat from the constituency regardless of the closeness of the election. Accordingly, voters have incentives to shy away from preferred parties that are out of contention in order not to waste their vote (i. e., vote strategically), while strong candidates have incentives to run

only for parties that are strong enough to win the district (Cox, 1997). This mechanism sets in motion a cycle where third-place parties receive fewer votes and legislative seats than their true support warrants and then are less able to recruit strong candidates, getting even fewer votes in the next election, and so forth. The process is hypothesized to occur at the district level, but over time is expected to shape the national political system.

Plenty of formal models exist that identify conditions for Duverger's Law to take place (Cox, 1994; Fey, 1997; although see Clough [(2007)] for a dissent), but testing the propositions empirically has been more difficult, in large part due to the fact that the analysis requires gathering data for a sequence of elections and inferring that changes in the number of parties are due to the incentives spelled out above.

A third substantive question on strategic voting concerns whether it affects the outcome of specific elections. The literature is rather scant on this important regard, and the general findings are inconclusive. Kim and Fording (2001), using an individual-level *direct* approach, conclude that while strategic voting may weaken third parties through time, it seldom matters in the outcome of the election because (i) strategic voters are few when compared to the total electorate and (ii) they tend to distribute themselves fairly evenly between the frontrunners. Galbraith and Rae (1989), on the other hand, pursued a macro-level analysis of the 1987 British election and argued that strategic voting significantly helped the opposition parties. In this regard, the use of individual-level data seems to be the right methodology to test the impact on the election, since they allow for the counterfactual analysis. However, no other studies were found in our review of the literature that provided additional support to either position on this debate.⁶

⁶ Fieldhouse, et al. (2007) find evidence that third parties are most affected by strategic voting, but not regarding the winner of the election.

V. The Mexican Case

The Mexican 2006 presidential election is an ideal setting for the study of strategic voting, both for methodological and substantive reasons. First, the Mexican electoral system—where the president is elected by direct vote—provides a context where strategic coordination among voters can more easily take place. Unlike parliamentary elections where district-level polling data can be scarce or unreliable, national level polls are widely broadcast, allowing voters to adjust their behavior accordingly. In other words, “mechanical frictions” hindering strategic considerations, in theory, should be reduced by the fact that each vote counts towards the final tally, regardless of in what district it is cast.

Second, the election featured a “textbook” scenario for voters to be aware of strategic voting possibilities. As Figure 1 shows, of the three major parties, two were virtually tied for first place throughout the latter part of the campaign while the third one trailed by a wide margin. It also happened that the trailing party, the PRI (Institutional Revolutionary Party), traditionally has drawn support from voters of all ideological dispositions, so that a good proportion of its backers would find the left-of-center PRD (Party of the Democratic Revolution) or the conservative PAN (National Action Party) ideologically close to them. Hence, “ideological frictions” preventing strategic voting were also reduced.

[FIGURE 1]

Third, a large, nationally representative exit poll is available to conduct the multivariate regression analysis (Moreno, Mancillas, and Gutiérrez 2009). This exit poll

has two advantages over traditional post-electoral surveys. First, it does not suffer from the bias where respondents over-report voting for the winning candidate, which is commonly found in surveys conducted several days after the election (Wright 1993). Second, it is a large dataset (n=5803) that provides a good number of observations to satisfy the asymptotic assumptions of maximum-likelihood estimation, the statistical technique customarily used in this type of analysis.

While the scholarly study of strategic voting in Mexico has been sparse, it has addressed both the level of strategic voting and its substantive implications. Poiré (2000) used the indirect measurement approach—modeling the vote—and estimated that almost 10% of the electorate in the 1997 congressional elections voted strategically, and Magaloni and Poiré (2004) used panel data to measure the extent of strategic voting in the 2000 presidential election. Additionally, Greene (2002), from a formal theory perspective, and Magaloni (1997), using an empirical approach, analyzed the impact of strategic considerations on the composition of the party system and the resilience of the dominant PRI.

VI. Methodology and Results

The exit poll for the 2006 Mexican presidential election was conducted by the research team of *Reforma* newspaper—a highly experienced pollster in Mexico (see, for example, Domínguez, Lawson, and Moreno 2009). A total of 140 electoral sections were sampled—out of 64,000 nationwide—based on a probability proportional to size criterion (after an urban-rural stratification). Every third voters leaving the polling station was approached by the interviewers. The non-response rate, based on the most stringent criteria described in the guidelines of the American Association for Public Opinion

Research (American Association for Public Opinion Research 2008), was 34%, and the total number of valid responses was 5,803 (Moreno, Mancillas, and Gutiérrez 2009).

In order to account for item non-response, which was as high as 27.7% in the question asking for the ideological self-placement of the respondent, the software program Amelia II for multiple imputation was used (Honaker, King, and Blackwell 2009). As King et al. (2001) demonstrate, multiple imputation under the assumption of a multivariate normal distribution generally leads to lower mean-squared-error estimates, even if some of the variables are ordinal or even nominal. For our purposes, the greater number of observations allows for better convergence in the implementation of maximum likelihood estimation. The number of imputations for each missing value was 5, which is the default setting in Amelia II.

The method proposed by Hausman et al. (1998) introduces a subtle modification to the traditional binary dependent variable model. Thus, instead of estimating,

$$E(y_i|x_i) = \Pr(y_i = 1 | x_i) = F(x_i'\beta), \quad (1)$$

two misclassification probabilities, α_0 and α_1 , are introduced to measure the probabilities that a “true” 0 is erroneously classified as a 1 and that a “true” 1 is erroneously classified as a 0, respectively. The new model is

$$E(y_i|x_i) = \Pr(y_i = 1 | x_i) = \alpha_0 + (1 - \alpha_0 - \alpha_1) * F(x_i'\beta). \quad (2)$$

All the parameters are identified as long as a condition that $\alpha_0 + \alpha_1$ is less than one.⁷

In this paper, a “full model” is presented to discern what factors lead to strategic voting. The regression is run only for those respondents who were facing a potential strategic situation. Moreover, the measurement of strategic voting is done using the

⁷ A Stata code to implement this technique is available from the author upon request.

“feeling thermometers” included in the exit poll questionnaire. The list of variables is presented below.

- *Strategic voter.* Classified as 1 if a respondent ranked an out-of-contention candidate at least as high as one of the two frontrunners and ended up voting for a frontrunner. If a more strict measure is used, requiring strong preference over both frontrunners, the results do not change substantially; yet, convergence of the model is more difficult to achieve due to the smaller number of 1's. Given that misclassification is being accounted for, the exact way to measure strategic voters is not crucial as long as measurement error is not too high.
- *Gender.* Dummy variable coded as 1 if the responded is female.
- *Age.* Age of the respondent, coded in groups of 5 years.
- *North.* Dummy variable for the northern region.
- *West.* Dummy variable for the western region.
- *Center.* Dummy variable for the central region.
- *Low interest.* Dummy variable coded as 1 for all respondents that claimed to have paid a low level of interest or higher to the campaign.
- *Medium interest.* Dummy variable coded as 1 for all respondents that claimed to have paid a medium level of interest or higher to the campaign.
- *High interest.* Dummy variable coded as 1 for all respondents that claimed to have paid a high level of interest.
- *Ideology.* Absolute value of the ideological self-placement of the respondent, which was coded from strong left (-2) to strong right (2).

- *Primary*. Dummy variable coded as 1 for all respondents that completed primary school or more.
- *Secondary*. Dummy variable coded as 1 for all respondents that completed secondary school or more.
- *High School*. Dummy variable coded as 1 for all respondents that completed high school or more.
- *College*. Dummy variable coded as 1 for all respondents that completed at least college.
- *PRI Strength*. Ordinal variable taking the values 0 (“not a PRI identifier”), 1 (“weak PRI identifier”), and 2 (“strong PRI identifier”).
- *PAN Strength*. Ordinal variable taking the values 0 (“not a PAN identifier”), 1 (“weak PAN identifier”), and 2 (“strong PAN identifier”).
- *PRD Strength*. Ordinal variable taking the values 0 (“not a PRD identifier”), 1 (“weak PRD identifier”), and 2 (“strong PRD identifier”).
- *Other party*. Dummy variable coded as 1 if the respondent identified with a party different from the PRI, PAN, or PRD.
- *Income*. Variable measured on a 10-point scale of income brackets.
- *Urban area*. Dummy variable coded as 1 if the respondent lived in an urban area.

Table 2 presents basic descriptive statistics for all these variables—restricting the sample to those respondents who faced a strategic voting situation—for the original dataset, prior to any imputations. Interestingly, when strategic voting is measured using strong preferences, the share of the electorate that voted strategically, 30%, is remarkably

similar to estimated published for elections in other countries. If weak preferences are used instead, then the number is higher.

[TABLE 2]

Table 3 presents the results of the probit full model accounting for potential misclassification and compares them to an uncorrected model. Several findings stand out. Methodologically, the model estimates, with a high level of precision, that the probability of incorrectly classifying a regular voter as a strategic voter was 8%. Conversely, the probability of incorrectly classifying a strategic voter as a regular voter was 28%. The high probability of misclassifying strategic voters is striking, given that the measurement technique—using weak preferences—would be expected to decrease this probability. Additionally, it is noteworthy that in all instances, the standard errors reported by the uncorrected model are considerably lower than those of the corrected model. In addition to providing inconsistent estimates, the uncorrected model also overestimates their precision.

Substantively, the strength of partisan attachment to the party of the out-of-contention candidate is a significant negative predictor of strategic voting. In other words, party loyalists hold on to their preferred candidate even if his or her chances of winning are slim. Moreover, those respondents who attended college showed a positive and statistically significant probability of voting strategically as compared to their counterparts who only completed high school.

These results contrast with those presented by other authors. Duch and Palmer (2002), for example, conclude that higher educational attainment is not a statistically

significant predictor of strategic voting. This could be due to differences of the cases, as their study analyzes a parliamentary system, rather than a presidential one, and uses a different method to classify strategic voters. Moreover, in their probit regression, the variable for educational attainment is assumed to be linear on a 0 – 5 scale.⁸ The results of my analysis, however, strongly support the idea that it is mainly the final stage of education—a university degree—which increases the chances of voting strategically by a significant amount.

On the other hand, both studies conclude that a strong partisan attachment towards the out-of-contention candidate decreases the propensity to vote strategically. In the “calculus of voting,” it appears that party identification still plays a pre-eminent role.

VII. Conclusion

This paper provides several contributions to the literature on strategic voting. First, it finds that the share of the electorate that voted strategically in the 2006 Mexican presidential elections was remarkably similar to that of previous elections in Canada, Israel, the United Kingdom, and the United States. Given the wide heterogeneity in terms of political systems and sociodemographic characteristics of the electorate, this result suggests that the ability to vote strategically is rather universal.

Second, it introduces a methodology to correct for the misclassification of strategic voters. In so doing, this technique allows researchers to sidestep much of the debate on how to measure strategic voters. As long as the level of misclassification is not too high and the model is correctly specified, the methodology of Hausman et al. (1998)

⁸ As Greene (2003, p. 120) argues against coding educational variables in this way, as it “unduly restricts the regression.” The idea is that it is a very strong assumption to suppose that an increase from, say, primary school to secondary school leads to the same effect as an increase from high school to college.

provides consistent coefficients. As the example presented in this paper shows, the size of the bias of the coefficients and standard errors of the uncorrected model can be substantial.

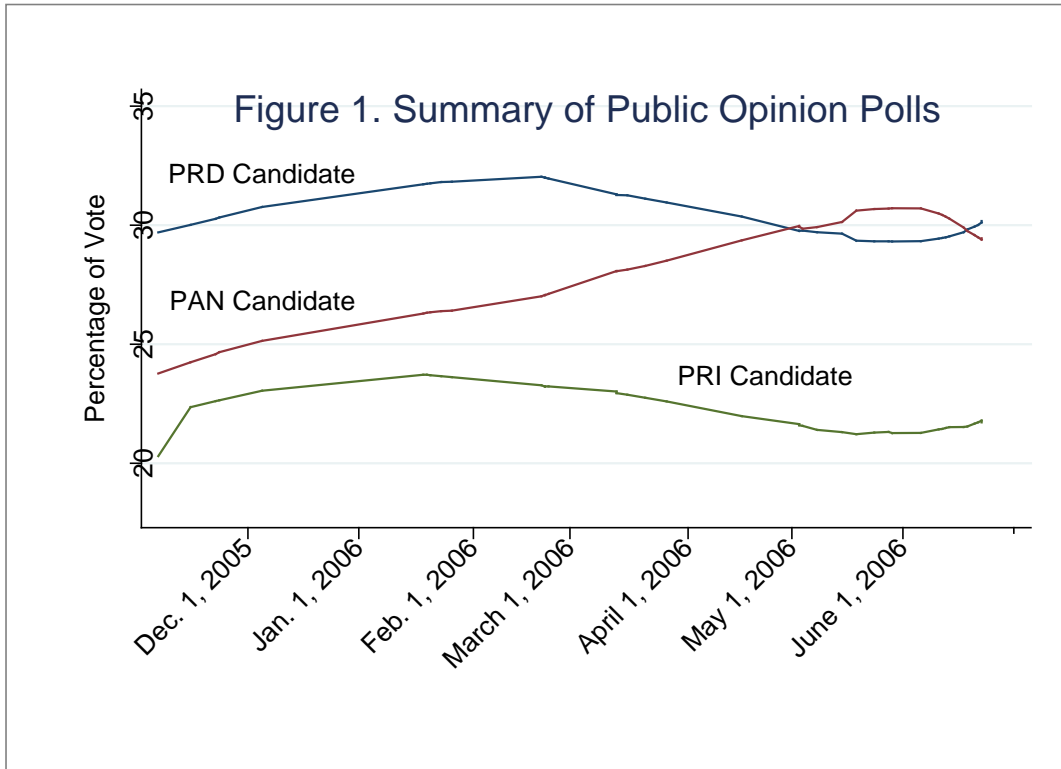
Third, this paper provides new evidence regarding what kinds of voters are more likely to vote strategically, *given the opportunity to do so*. In this regard, it is interesting to notice a non-linearity in the effect of educational attainment on strategic voting. Only for the case of college graduates is education a significant predictor. In other cases, the null hypothesis of zero cannot be rejected.

Table 1. Published Estimates of the Extent of Strategic Voting

Study	Election	Estimation Approach	Restricted or Unrestricted Universe	Extent of Strategic Voting
Abramson, et al. (1992)	1988 U.S. presidential primaries	Feeling thermometers	Unrestricted	13% of Republicans and 15% of Democrats
Abramson, et al. (2004)	1999 Israeli prime minister election	Feeling thermometers / Direct	Restricted / Unrestricted	32% / 11%
Alvarez & Nagler (2000)	1987 British election	Indirect	Unrestricted	7.20%
Alvarez, et al. (2006)	1987 and 1997 British elections	Indirect / Direct	Restricted	43% (1987) and 64% (1997) / 17% (1987) and 30% (1997)
Blais & Nadeau (1996)	1988 Canadian federal election	Feeling thermometers	Restricted / Unrestricted	28% / 6%
Blais, et al. (2001)	1997 Canadian federal election	Indirect	Unrestricted	3%
Blais, et al. (2005)	1999 Ontario election	Indirect / Direct	Unrestricted	3.6% / 5.5%
Cain (1978)	1970 British general election	Feeling thermometers	Unrestricted	9% (14.6% if ties are included)
Duch & Palmer (2002)	1997 Hungarian election	Direct	Unrestricted	13.60%
Heath, et al. (1991)	1987 British election	Direct	Unrestricted	6.50%
Johnston & Pattie (1991)	1983 and 1987 British elections	Macro-level	Unrestricted	5.1% (1983) and 7.7% (1987)
Lanoue & Bowler (1998)	1988 Canadian federal election	Feeling thermometers	Unrestricted	13%
Merolla & Stephenson (2007)	1988-2000 Canadian federal elections	Feeling thermometers	Restricted / Unrestricted	Unrestricted: 13.03% (1988), 10.7% (1993), 15.5% (1997), and 13.3% (2000); restricted: 34.3% (1988), 24.5% (1993), 26.2% (1997), and 34.8% (2000)
Niemi, et al. (1992)	1987 British election	Direct	Unrestricted	17%
Niou & Paolino (2003)	2000 Taiwan presidential election	Direct	Unrestricted	2.40%
Poire (2000)	1997 Mexican congressional election	Indirect	Unrestricted	9.87%
Shaw, et al. (2005)	2003 California recall election	Candidate rankings	Restricted / Unrestricted	35% / 19%

Table 3. Determinants of Strategic Voting
Binary Probit - Preliminary Results

	Corrected Model	Uncorrected Model
Gender (Female)	-0.0726 (0.164)	-0.038 (0.066)
Age	0.044 (0.035)	0.013 (0.014)
North	-0.1954 (0.197)	-0.0248 (0.076)
West	-0.0012 (0.319)	0.0274 (0.091)
Center	0.1706 (0.359)	0.1032 (0.142)
Low Interest	-0.6526 (0.442)	-0.2466 (0.137)
Medium Interest	-0.058 (0.223)	0.018 (0.084)
High Interest	0.0504 (0.183)	0.0554 (0.077)
Ideology (Absolute)	0.0786 (0.100)	0.062 (0.038)
Primary	0.6104 (0.606)	-0.0456 (0.150)
Secondary	0.0084 (0.270)	-0.0676 (0.091)
High School	-0.1152 (0.279)	-0.0166 (0.100)
College	0.4414 (0.262)	0.1762 (0.106)
PRI Strength	-1.6264 (0.322)	-0.7418 (0.049)
PAN Strength	5.3658 (473.571)	0.4268 (0.066)
PRD Strength	4.246 (199.667)	0.3294 (0.081)
Other party	-0.9444 (0.529)	-0.6146 (0.333)
Income	0.01 (0.032)	0.0146 (0.013)
Urban Area	-0.1624 (0.344)	0.025 (0.135)
Constant	0.1216 (0.878)	-0.0264 (0.242)
α_0	0.08252 (0.014)	
α_1	0.2834 (0.032)	
Log Likelihood	-1106.993	-1122.486
Observations	2168	2168
Standard errors in parentheses		



Note: The non-parametric regression technique lowess was estimated with forty commercial, publicly available polls taken place prior to the election date of July 2, 2006 (bandwidth=0.5). Undecideds, refusals, and supporters of minor-party candidates constitute the rest of the samples. Source: Dominguez, Jorge I., Chappell Lawson, and Alejandro Moreno (editors), 2009, *Consolidating Mexico's Democracy: The 2006 Presidential Campaign in Comparative Perspective*, Baltimore, MD: Johns Hopkins UP.

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