ARTICLE

# ALTERNATIVE METHODS FOR ESTIMATING ELECTION OUTCOMES

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Abstract: *When When voting is voluntary and there are run-off elections, predicting election results has meant resorting to more complex tools than just surveys asking who voters prefer. This article discusses the new tools that have been developed and discusses the advantages and disadvantages in the different ways each has been used.*

KEYWORDS: *elections, surveys, public opinion, voluntary vote, likely electorate, election forecast, mass media.*
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There are a number of audiences for estimates, projections, forecasts, or predictions of election outcomes. Academic researchers are interested in evaluating empirically how their models of the world work, while political parties, candidates, and elected officials want to know whether policy agendas will stay in place or are likely to shift after an election. They are also interested in how and whether their strategy should change during the course of the campaign as these

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estimates of the outcome change. Businesses and individuals consider prospects for possible shifts or stability in the political climate as they make investment decisions. Even individual citizens are interested in the fortunes of the candidates and parties as they contemplate their own decisions about whether to vote and for whom. In multi-party systems, the time when such information is available and its perceived accuracy are important elements of how seriously the estimates are taken at different stages of the electoral cycle.

Pre-election polling, a key element of all of these estimation techniques, serves a number of functions. In campaigns, polls are an essential part of strategic planning and assessment, helping to develop a winning strategy and evaluate its effectiveness. Polls are conducted and the results disseminated by news organization as part of their election coverage, designed to inform reader and viewers about key issues in the campaign, how the candidates and parties are responding to them, and whether information and interest levels in the electorate are increasing as Election Day approaches. Finally, polls can be used to estimate the current standing of the candidates and the parties relative to each other and how that changes across the campaign. This increasing emphasis on who is ahead and behind and the dynamics of this over time, without attention to explanations for why that is the case, feeds the worst tendencies of the media to employ "horse race" coverage in their reporting (Patterson 2005).

Most news organizations operating in democracies believe that election coverage is one of the most important stories they provide to their readers and viewers. Elections are about the control of government in a democracy and the exercise and transfer of real power. A belief in a representative form of government implies that understanding and explaining why citizens support one party's or candidate's policy positions over another's is central to any mandate that the winner of an election might have. Politicians and political strategists are one source of information about how campaigns and elections should be evaluated and interpreted, but polling can give citizens an independent and powerful voice in this process. However, content analyses show that news organizations are devoting less attention to explanation and more to reporting who is ahead or beyond and what the trajectory of the campaign is in these terms (Patterson 1993).

One implication of this emphasis is that the audience for campaign coverage is underserved in a number of ways. First and foremost, the coverage of issues generally and the representation of the public's voice is downgraded in media coverage as the horse race emphasis takes up a growing proportion of the content of news about the campaign. As a result, citizens learn less about what the important issues are and how their fellow citizens are thinking about them. The prospects for changing patterns of election coverage are not great. In the United States, where many of these patterns first emerged, as well as in foreign countries, where such reporting styles are often taken up by their news organizations, the latest movement is an increased focus on predicting election outcomes. Many news organizations have moved to developing their own models for estimating winners – in individual races as well as in terms of the control of legislative bodies. In the current off-year cycle of legislative elections in the United States, for example, *The Washington Post* and the *New York Times* now support and report on estimates from simulations created by their own statistical models in the Election Lab (2014) and The Upshot (2014). Even political blogs like Daily Kos (2014) supported a model to predict the outcome of these elections.

In this essay, I discuss the three main forms of estimating election outcomes used by political scientists, statistical modelers, and pollsters, all of which are reported by news media at various stages of the campaign.[1] Each has a set of relative strengths and weaknesses that are associated with the accuracy of the resulting estimates, when the estimates are made, and how much information they can provide about how groups of voters are reacting to the campaign, if at all. Some are used to estimate or project the outcome of an individual race like a governor or senator in a particular state. Others are used to estimate the aggregate outcome in politically meaningful terms such as the total number of electoral votes a presidential candidate receives or how many seats in the new legislature (House or Senate in the case of

[1] Some would consider exit polls, surveys with voters leaving their polling place and conducted on Election Day before the balloting ends, as another form of pre-election estimation. They are not included here because while they are important for understanding voting patterns that explain the outcome, they do not provide information for voters, politicians, and government officials before Election Day.

the United States) each party will hold. To a greater or lesser degree, all of them incorporate and are based upon the availability of good pre-election polling data, although some of the methods and models supplement that with information from other data sources as well, often referred to as election fundamentals like presidential approval, incumbency factors, or changes in personal disposable income. These estimation techniques include pre-election polls, political forecasts made with various data sources, and data aggregations that model the outcome through different statistical sources and procedures. Each of them provides important elements of campaign coverage for news organizations.

In this essay, each of these methods will be discussed in turn, including attention to their relative strengths and weaknesses both in potential and in practice. The most detailed descriptions are of their use in the United States because they are most frequently used and widespread there. But their applicability to Chile and other countries is discussed where appropriate. Pre-election polls involve interviewing citizens and associating their preferences with the likelihood that they will actually vote. Anyone who conducts pre-election polls faces a series of measurement issues that can complicate estimation but which generally are minimized as Election Day approaches. The forecasters use statistical models to predict the outcome of the election with attention to how far out from Election Day they can produce estimates from aggregate data, including certain poll measures. Increasingly, statistical models are aggregating the results from multiple polls, sometimes by incorporating other data, to produce outcome estimates with increasing accuracy as Election Day nears. They are aided by the fact that polls generally become more accurate as the election nears, and the number of polls becomes more frequent.

## PRE-ELECTION POLLS

The most common form of estimating election outcomes is through data collected in pre-election polls, and these data are in one way or another the basic inputs into the other forms. In mandatory voting systems, a good probability sample of citizens is a close approximation of the electorate. But in voluntary voting systems – or in periods when

voting shifts from mandatory to voluntary as in Chile – pollsters have to estimate the likely electorate as well as the distribution of candidate preferences. This is an especially difficult task at the time of the transition because there may not be adequate models of voting behavior by population subgroups to guide the definition or specification of the likely electorate.

## Conceptualizing the Likely Electorate

A basic issue that every pollster who wants to estimate election outcomes has to face is determining who will vote and, therefore, whose preferences should be included in producing the estimate of candidate or party preferences. In a voluntary voting system, the general term that is used for this concept and its operationalization is the "likely electorate," identifying the proportion of the eligible citizenry who are actually expected to show up to vote on Election Day. This term has different meanings and hence different operational forms depending upon the specific estimation technique employed.

Studies of elections over time and across political systems show that voter turnout varies according to the conditions of the electoral system, administrative and otherwise, as well as the specific type of elections involved. For example, turnout is higher in compulsory voting systems than in voluntary ones, even though in compulsory systems it does not equal one hundred percent of those eligible and required to vote (Blais & Dobrzynska 1998). In the American system, turnout is higher in presidential elections, held every four years, than in the off-year elections held midway in the intervening periods (Pew 2014). So we observe a jagged turnout picture over time with peaks in the presidential elections and troughs in the off-year congressional elections; this pattern is observed in other democracies where there are separate executive and legislative elections. This sequence also highlights the point that turnout is measured by the number of votes cast for the highest or most visible or salient election appearing on a ballot when there are often other offices at stake.

Pre-election pollsters have particular difficulty in estimating the likely electorate because it is a concept that does not actually exist until Election Day. Some people end up not voting because

they are not interested in the election or do not think their vote will make a difference, while others intended to vote but had unexpected issues arise on Election Day such as illness or unanticipated travel that prevented them from voting. So the probability of voting or measurement of the likely electorate has some known errors associated with it as well as some random factors.

Based upon extended research over more than 50 years, researchers have identified a number of factors that explain why people vote and why they do not.[2] The pre-election pollsters' job is to select a reasonable subset of these factors that can be translated into questions in a pre-election poll that are then combined in a particular way to produce a single score for each respondent. These scores are then combined across respondents to produce an estimate of the likely electorate, and the distribution of candidate or party preferences for this subgroup becomes the estimate of the election outcome. As an example of how variable turnout can be, in the United States in the period from 1948 to 2012, actual turnout in presidential elections - measured as the proportion of the voting age population - ranged from 48 to 62 percent, a difference of almost 30 percent between the lowest and highest rate.

Research on likely voter methods and their effectiveness has been hampered by a number of factors, beginning with the reluctance of many pollsters to reveal the details of their likely voter methodology. These differences, combined with other systematic differences in data collection techniques such as sampling procedures, mode differences, and field work procedures, as well as differences in question wordings and placements, combine to produce what are known as "house effects" (Smith 1978), systematic differences in estimated outcomes that can characteristically favor one candidate or party over another depending on who collected the data. In the United States, some firms produce estimates that typically favor the Democratic presidential nominee while others typically favor the Republican nominee, albeit by small but consistent margins.

Another important issue that pollsters face is whether turnout models they have used in the past will apply effectively to the current

[2] This research starts in the United States with Campbell, Converse, Miller and Stokes (1960) and carries forward to contemporary electorates in Latin America (Carreras & Castañeda-Angarita 2014).

election. For example, presidential campaigns in the United States have increasingly focused their efforts on a limited number of closely contested locations known as the "battleground states" because the Electoral College system awards all of a state's electoral votes to the winning candidate without proportional allocation.[3] In the 2012 election, when Barack Obama and Mitt Romney each raised and spent more than $1 billion for their campaign, they targeted just 10 states and essentially ignored the other 40. A total of 96% of presidential expenditures on television between April 11 (when the two opponents were effectively known) and Election Day on November 6 were spent in these states (Pillsbury and Johansen, 2013). Nearly six times as much money was spent on advertising in Florida in 2012 as in the 40 non-swing states and the District of Columbia combined. Another way to assess the importance that the candidates attach to specific states is to look at their travel schedules during the campaign since their own time is one of the most valuable resources they have. In the 2012 campaign, 99% of the campaign stops by the presidential and vice-presidential candidates were in these 10 states.

Why is this relevant to pre-election polling? In the 2012 election, turnout nationwide was down slightly from the 2008 campaign, but it was up in these 10 states as a group. Heading into Election Day, the polling in these states showed close outcomes, but Barack Obama won nine out of ten of them rather than the two candidates splitting them evenly as might have been expected from the close polling margins in each. This is also important because in previous election campaigns, the winning candidate generally did slightly worse than the pre-election polls suggested (Erikson and Wlezien 2012a and b). But in the 2012 election, the pre-election polls systematically underestimated Obama's share of the two-party vote by about two percentage points. Many observers attributed this to the success of the Obama ground game, especially in the battleground states. A post-election analysis of Gallup poll data suggests that the proportion of respondents from these 10 states in their final pre-election polls accurately reflected their proportion of the adult population of the United States but was

[3] In the 2012 presidential election, these states were Colorado, Florida, Iowa, Nevada, New Hampshire, North Carolina, Pennsylvania, Ohio, Virginia, and Wisconsin.

lower than their contribution to total turnout in the nation. Polling organizations design their samples to represent the adult population of the nation by region, but heretofore they have not stratified on whether they are from battleground or non-battleground states, even before applying likely voter models to the resulting distribution of preferences.

A second possibility is that pre-election models of the composition of the 2012 electorate by race were inadequate. An analysis conducted for the Associated Press indicates that in the last election the turnout of black Americans exceeded the turnout among whites for the first time (Yen 2013). Coupled with the fact that the white proportion of the electorate is on the decline, the combination of these two results suggests that past models of voting behavior and how they get translated into pre-election poll designs may not work as effectively as they have in the past and need to be revisited. This point was brought home in the 2014 midterm elections where turnout was lower than in 2010 and may have produced a small but consistent overestimate of support for Democratic senatorial candidates in the final pre-election polls (Silver 2014b; Tucker 2014; Blumenthal 2014). When the actual electorate is changing, models of the likely electorate need to change accordingly as they are employed by pre-election pollsters.

At a more concrete level, what are the main conceptual components or dimensions of a likely voter model that can be operationalized through pre-election polls? There are five main ones: eligibility, social psychological attributes, political attributes, demographics, and indicators of past behavior. Eligibility has to do with who is qualified and permitted to vote as opposed to those who are excluded. Political attributes include partisanship, general political activity, contact by the campaigns, attention to the media, and knowledge of where to vote. Social psychological attributes can be thought of as long term and short term factors. The former are associated with citizen duty and personal efficacy, while the latter involve attitudes about the current campaign and a commitment to participate by casting a ballot. Demographic characteristics are important as they relate to a citizen's ability to bear the costs of voting in relation to the relative (in)convenience of the voting system. And past behavior is an important indicator of likely current behavior because voting is an acquired habit; those who have voted in the past

have historically been the most likely to vote in the election. However, charismatic candidates, sophisticated get out the vote campaigns, and more sophisticated targeting can contribute to the inadequacy of past voting behavior as the historical basis for predicting turnout in the current campaign (Rolfe 2012; Greene & Gerber 2008).

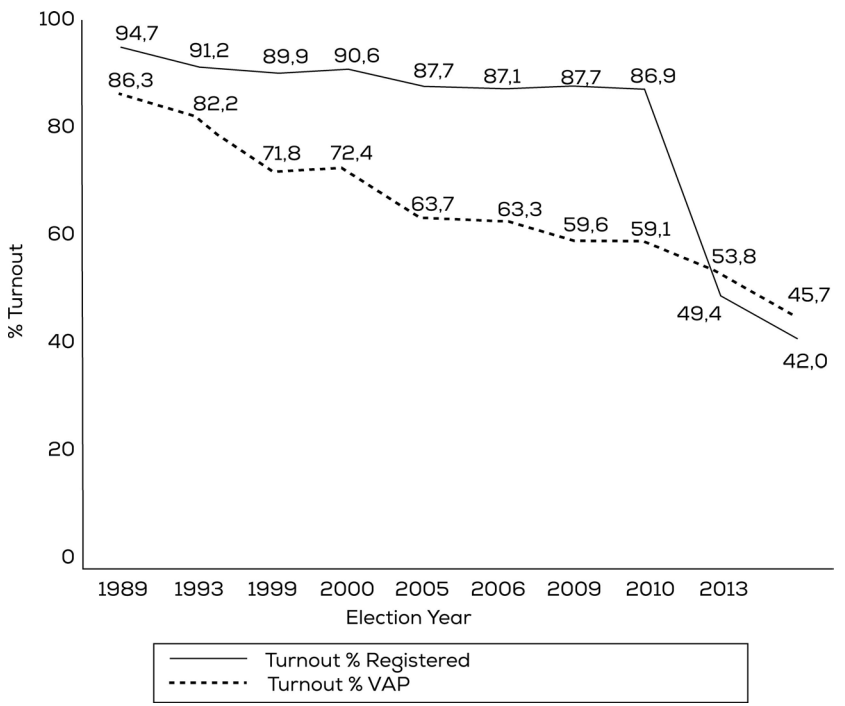
Eligibility is typically denoted by age, citizenship status, and whether registration is required as the first of two steps to cast a ballot. This is the equivalent to describing the essential elements of the political and administrative system for voting. Pollsters typically ignore whether compulsory or voluntary voting is involved because this is a constant for any given election. However, when there is a shift in this requirement between two elections, as there was in Chile in 2013, this can present a different version of the issue of whether old models apply well to the current election. A shift from a compulsory to a voluntary voting system implies that turnout will decline, making estimation of the likely electorate a more complicated and, at least initially, error-prone process as new turnout models may require a series of elections for validation and establishment of confidence in them.

Election procedures in Chile have undergone a series of changes since 1988 and subsequent revisions to the constitution. In elections starting in 1989, registration was voluntary while voting among those who were registered was compulsory. Turnout in the period until 2012, measured as a percentage of the voting age population, declined slowly but inexorably across this period, from 86.3% to 59.6% in the 2009 presidential election. In 2012, the system was changed so that registration became automatic but voting was voluntary. There was a substantial increase in the proportion of the electorate of voting age that was registered, but a small but steady decline in the number of voters resulted in a steeper decline in the proportion of registered who turned out.

As happens in most political systems that make such a change, there was a steep drop in turnout, measured as the percent of the voting age population (VAP), to 53.8% in last November's presidential election. In the runoff between Michelle Bachelet and Evelyn Matthei, turnout declined further to 45.7%. The shift in administrative procedures coupled with the estimation errors in the pre-election polls in Chile obviously raised questions about whether likely voter models used in previous elections applied well to the first election held under the new rules.

The social psychological components that go into determining whether a citizen votes are reasonably well understood in general but not well calibrated to the actual likelihood of casting a vote in a particular election. The components themselves involve long term affinities to the political system itself, such as a sense of citizen duty or obligation to be a good citizen by fulfilling those obligations, including voting, as well as a sense that such participation will make a difference, captured in the concept of personal political efficacy. This includes the belief that authorities will pay attention to citizens' views and care about what they think. In addition, there are attitudes about the particular election in question, such as interest in the campaign, a sense that who wins will make a difference in the policies that will result, and a commitment to participate in the election, expressed a strong preference for a particular candidate or party and a self-reported likelihood of voting.

**Figure 1.** VOTER TURNOUT IN CHILEAN PRESIDENTIAL ELECTIONS, 1989-2013



Research has also shown that partisanship has a role to play, in that people who align with a party are more likely to vote than those who are apolitical or independent. Furthermore, strong partisans are more likely to vote than weak partisans (Jennings 1972; Budge, Crewe, & Farlie 1976). Voting is a habitual form of behavior acquired through repeated actions; individuals who have voted in past elections are more likely to vote in the current one. Individuals who are politically active, measured by participation in rallies, signing petitions, or making financial contributions to a candidate or party, are also more likely to vote, as well as those who have been contacted by the campaigns. Of course, these latter two components are often related (Brady, Verba & Schlozman 1995).

The relative importance of these measures is commonly assessed in the United States through validation studies, whereby self-reports of intent to vote in pre-election studies or self-reports of having voted in post-election studies are checked against administrative records of whether the respondent did vote. This information about electoral participation is a matter of public record in the American system, although there is of course no information about for whom a person voted because of the secret ballot. Political parties use the voter registration files and records of past participation to organize their mobilization and get out the vote (GOTV) efforts. Validation studies are almost as expensive to conduct as surveys employing face-to-face interviewing, especially for national samples. People have to be sent to local election officials' offices to get access to records; and the timing has to be right to insure that the records have been updated with information from the last election. Travel costs for repeated visits can be high. As a result, there have not been many national validation studies conducted recently using this approach, although there have been some completed in local jurisdictions for non-presidential elections.

The Pew Research Center conducted a validation study in Philadelphia in 1999 after their mayoral election (Dimock, Keeter, Schulman, and Miller, 2001). Their validated voting rates for items they included in their likely voter model are presented in Table 1. The results show that from only one-half to four-fifths of the registered respondents who gave responses that suggested a likelihood of voting actually did.

**Table 1.** VALIDATED VOTING RATES FOR RESPONSES TO SURVEY QUESTIONS IN A 1999 PHILADELPHIA SURVEY AMONG REGISTERED VOTERS

| Question and Responser | Validated Voting Rate |
|---|---|
| "Always" or "Nearly always" vote | 82 |
| Knowing where people in your neighborhood vote | 81 |
| Follow what's going on in government "Most" or "Some of the time" | 79 |
| Previously cast a vote in your precinct | 79 |
| Plan to vote in the current election | 77 |
| Giving "Some" or "A lot of" thought to the upcoming election | 50 |

The main reason for these biases in overreporting participation is social desirability in response patterns, i.e., the tendency for respondents to answer questions in the way that they think "good" citizens would or should. This kind of bias represents one of the main sources of error in the development of likely voter models.

## FORMING A LIKELY VOTER INDEX

Each pre-election pollster uses the responses to series of questions to form a measure of likelihood of voting, the operationalization of their concept of the "likely electorate." One problem that researchers have is that this process is the "secret sauce" of pre-election pollsters, something that most of them consider a proprietary method whose details they refuse to disclose. So analyzing the effectiveness of alternative methods or looking at whether the methods could be improved has received relatively little attention because of the lack of information about how this is done. Independent academic research on the topic has been further limited by the lack of validation studies across the last25 to 30 years.

It is important to note that there are other steps in producing a final estimate of the outcome of an election beyond applying a likely voter model. Most importantly, not every respondent answers the trial heat question by stating their preference for a candidate or party. Because there are no "undecideds" in the final vote tabulation, many pollsters allocate the undecided to the candidates or parties contesting the

election so that their shares of the vote will add to 100%. Typically, this is done using one of a small number of algorithms, although again the exact details are often omitted. One procedure allocates the undecided in proportion to the support that the named candidates received. Another method is to allocate them equally. And still a third is to allocate the majority to the challenger to an incumbent in the belief that many respondents just do not want to say they intend to vote against the candidate or party in power.

Some firms use a screening question that ascertains registration status, perhaps combined with a self-reported likelihood to vote. Then the trial heat question about candidate preference is asked only of those who give the "correct" answer to the screening questions. This system is less frequently used in contemporary pre-election polling because it does not have much discriminatory power, and the number of ways that people can vote and the increasing sophistication of GOTV efforts by campaigns can stimulate some people to vote by the end of the campaign who earlier thought they might not.

We do know that there are a variety of ways in which the multiple components of likely voter indices are combined. Typically the responses to a series of questions are assembled into an ordinal index whose values range from "least likely to vote" to "most likely to vote." The series of questions covers the main dimensions affecting voting discussed above, and the resulting index is used in one of two ways. The first is a cutoff method, as developed originally by Paul Perry of the Gallup Organization (Perry 1960, 1973, 1979). In its current form, still in use by Gallup (2014), there is a seven-point scale, and individuals who score 6 or 7 on the scale are counted as likely voters. Their responses to the trial heat question are then arrayed as an estimate of the relative standing of the candidates at the time that the survey was taken, with the distribution for the 7's looking like the outcome in a low or standard turnout election, while the distribution for the two categories combined looks like the outcome for a high turnout election. The important point is that any information from those who score 5 or below is not considered at all. A similar procedure is used by the Pew Research Center (Dimock, Keeter, Schulman, and Miller, 2001).

An alternative method was proposed by Traugott and Tucker (1984) based upon the 1980 validation study conducted in conjunction with the American National Election Study of that election. They used

dichotomies from three survey questions: self-reported registration status, interest in the current campaign, and voting in the previous presidential election to form an 8-point index. From the validation study, they determined the actual voting rate of the respondents in each category, and they used a logit regression of them to establish a weight for each. They then applied these weights to the preference distribution for all of the respondents. By comparing this to the distribution for all registered respondents and to those who fell into category 8, the most likely voters, and the combination of categories 7 and 8, they determined that the use of the probabilistic weights slightly improved the estimation of the election outcome in 1980. This method was adopted by CBS News, where Tucker worked at the time, and has been modified over time as an adaptation to changes in the electoral system and associated shifts in turnout. A more sophisticated version of this procedure was proposed by Petrocik (1991) using the same dataset, and it performed better in estimating the presidential vote from the sample in the 1980 presidential election. Petrocik notes the generic difficulty of evaluating such an approach in non-presidential elections without an appropriate dataset to validate the measure.

Either of these two methods can be applied in alternative ways to estimate the likely electorate. In one application, the researchers construct the index to see what the level of expected turnout is in the current election according to the measured values for each of the components. In another version, the researchers begin with a prior notion of what expected turnout is likely to be, based upon historical trends, current intelligence, or some other factors, and then they move across the index values from highest to lowest likelihood to produce an electorate of the expected size. One problem with this method is that the expected level may fall within a range contained in a specific category of the index, i.e. estimating 42% turnout when category six contains a category of likely voters ranging from 37% to 49% (13 percentage points). The researcher has no easy method for ascertaining which 6% of the sample to keep and which 7% to discard. This can lead to arbitrary and non-reproducible methods for forming the likely electorate.

A third method for forming a likely electorate is the use of self-assigned probabilities of voting and of casting a ballot for each

candidate or party contesting the election. Delavande and Manski (2010, 2013) have done the most extensive research on developing and applying this method. Their method involves a sequence of explanations and questions that begins with a brief explanation of probabilities in terms of percentages on a 0 to 100% scale. Then the first question is "What is the percent chance you will vote in this year's presidential election?" In their work in the 2008 presidential election, the follow up questions were:

> Barack Obama is the Democratic candidate, and John McCain is the Republican candidate. If you do vote in the presidential election, what do you think is the percent chance that you will vote for, Barack Obama (Democrat) ___ % John McCain (Republican)___ % Someone else___ %

The respondent is instructed to make sure that the percentage responses to the latter questions sum to 100%.

Using data from the online American Life Panel (ALP) conducted in 2008 by the RAND Corporation, Delavande and Manski (2010, 2013) look at the respondents' post-election reports of voting and find that those in the 90 to 100% self-reported pre-election probabilities of voting were far and away the most likely to turnout. When they look at the stated candidate preferences conditional on this level of likelihood, they find a better estimate of the outcome of the election, measured as the root mean square error, using this method compared to a likelihood assessment involving an ordinal scale with four or five categories. This method has since been replicated for the 2012 election by the ALP team (Gutsche, Kapteyn, Meijer, & Weerman, 2013 and 2014).

One important conditional on this research is that the general public is unfamiliar with probabilistic estimation and calculation, and it is difficult to administer these questions on the telephone, the most common form of interviewing in most countries. In a web survey administered online, it is possible to provide a total box that indicates how close to respondent is to having their estimates of candidate support probabilities total to 100% and allow for modifications until that total is reached. This is a very important mode difference that may limit the rate of adoption of this alternative method. It is important to note that this technique has not been validated with checks of

administrative records against respondent self-reports, partly because of its newness and partly because of the dispersed geographical nature of a web survey and the associated costs.

There is one additional form of pre-election survey that has been very successful and accurate in estimating the outcome of elections. Voter expectation surveys ask voters who they think is going to win the election in addition to their own candidate preference. Such surveys do not need to define and operationalize the likely electorate; they use the information from all respondents to the survey. In the case of presidential elections in the United States, vote expectation surveys have significantly improved the accuracy of estimates from standard pre-election polling estimates, expert judgments, and forecasts, especially when the estimates from multiple surveys are aggregated to produce the estimate or forecast; similar results have been produced in the United Kingdom (Graefe 2014).

In summary, using pre-election polls to estimate election outcomes is a complicated and complex process. At its heart, the concept is a diffuse one, and the meaning of a likely voter is changing over time as electoral procedures change. Some pollsters who work for candidates have tried to use alternative sampling frames consisting of lists of registered voters. Leaving aside the issue of many public pollsters conducting surveys for multiple purposes such as estimating presidential approval among all adults, registered voter frames have many problems. One is how current the information on them is and when it was last updated. Another is the need for good contact information, whether in the form of street addresses (for linking to other sources of phone numbers and to use in sending advance letters), telephone numbers (for the most common form of survey contact), or email addresses (for use in web surveys). The quality of such information at present does not suit the needs of pre-election pollsters, but it may improve in the future.

The recent experience of pre-election pollsters in Chile illustrates a number of these issues. The rules of the game changed from voluntary registration and compulsory voting to compulsory registration and voluntary voting for the 2013 presidential election. As indicated above, this produced a sharp decline in turnout. Secondly, these elections involve multiple candidates and a two-step runoff process, increasing

the likelihood of strategic voting. The novelty of this electoral situation did produce problems for the pre-election pollsters, as indicated by the comparison in Table 2 of the final pre-election estimates from six sources and the actual results of the first round.[4]

All of the polls suggested that Michelle Bachelet would win the election but probably not avoid a runoff with Evelyn Matthei. However, the estimates also indicate a number of issues that were present in the polling as well as in the campaign. The Independent Democratic Union had difficulty in selecting a presidential campaign that would stay in the campaign; Matthei became the party's selection in late July just before the first polls and without a primary campaign. Some estimates were produced quite far in advance of the election, up to two months, complicating accurate estimation especially under the new voting conditions. Second, only two estimates were based upon a likely voter model, although the details were not disclosed; the other four were based upon samples of adults. Two sources presented results to the .1%, an inappropriate level of precision for estimates based upon the sample sizes for such polls. Five of the estimates did not allocate the undecided or correct for abstentions, introducing guaranteed differences from the eventual outcome. In all, this performance suggests that there is further work needed to improve estimation under the new electoral system in Chile.

## ELECTION FORECASTS

Election forecasters use models to estimate the outcome of elections based upon aggregate data. In the United States, the typical dependent variable is the Democratic (or Republican) share of the two-party vote for president. In most models, there is some component of pre-election polling data incorporated into the estimate, generally a measure of presidential approval. In that sense, forecasters rely upon high quality pre-election poll data, but they supplement those data with other measures of election fundamentals such as the status of the economy or recent changes in economic conditions. The quality of an

[4] The comparison is complicated by the fact that some pollsters allocated the "undecided" so the candidate percentages total to 100% while other firms present them in the distribution of preferences.

**Table 2.** COMPARA COMPARISON OF FINAL PRE-ELECTION POLL ESTIMATES AND THE RESULT OF THE FIRST ROUND OF THE 2013 PRESIDENTIAL ELECTION IN CHILE

| Public Polling Company | ICHEM-U. Autónoma (1) | UDP (2) | CEP (3) | La Segunda-UDD (4) | El Mercurio-Opina Research (5) | IPSOS (6) | Elections Results |
|---|---|---|---|---|---|---|---|
| Dates of Fieldwork | Aug 23-Sep 27 | Sep 2-Oct 10. | Sep 13-Oct 14 | Oct 16-Oct 17 | Oct 19, 20, 26, 27 | Oct 19, Nov 5 | Nov 17 |
| Type of interview | Face-to-face | Face-to-face | Face-to-face | Telephone | Face-to-face | Telephone | |
| Sample | Full sample | Full sample | Full sample | Full sample | Likely voter | Likely voter | |
| Sample Size | 1,708 | 1,300 | 1,437 | 925 | 1,000 | 2,000 | |
| Presidential Candidates | | | | | | | |
| Michelle Bachelet | 40.4 | 38 | 47 | 40 | 46.2 | 35 | 46.67 |
| Evelyn Matthei | 14.1 | 12 | 14 | 26 | 21.7 | 22 | 25.01 |
| Franco Parisi | 8.6 | 11 | 10 | 10 | 7.9 | 15 | 10.11 |
| Marco Enríquez-Ominami | 8.9 | 7 | 7 | 7 | 7.2 | 12 | 10.98 |
| Marcel Claude | 3.6 | 4 | 3 | 3 | 1.7 | 7 | 2.81 |
| Alfredo Sfeir | 0.8 | | 0 | 0 | 0.3 | 3 | 2.35 |
| Ricardo Israel | 0.1 | | 0 | 0 | 0.2 | 3 | 0.57 |
| Roxana Miranda | 0.1 | | 0 | 0 | 1.1 | 2 | 1.27 |
| Tomás Jocelyn-Holt | 0.2 | | 0 | 0 | 0.1 | 0 | 0.19 |
| Don't Know/Don't Answer | 22.6 | 11 | | 14 | | | |
| None | 0.6 | 16 | 3 | | | | |
| Don't Vote/Blank Vote/Null Vote | | | 16 | | 13.6 | | |

*Note:*
(1) Question: If elections were held on Sunday, for which of the following candidates would you vote? Additional information about the survey details is available at http://www.lanacion.cl/noticias/site/artic/20131009/asocfile/20131009131623/encuesta_ichem_ok.pdf.
(2) Question: If presidential elections were held next Sunday, for whom would you vote? (closed question). Given the low number of cases, UDP didn't report candidates making less than 2% of the answers. Additional information about the survey details is available at http://www.encuesta.udp.cl/wp-content/uploads/2013/10/PPT-Encuesta-ICSO-UDP-2013.pdf.
(3) Question: If presidential elections were held next Sunday, and candidates were the following ... for whom would you vote? (secret ballot). CEP also asks this question in the middle of the questionnaire, but numbers are virtually the same. Additional information about the survey details is available at http://www.cepchile.cl/1_5388/doc/estudio_nacional_de_opinion_publica_septiembre-octubre_2013.html.
(4) Question: If the presidential election were next Sunday, for which of the following candidates would you vote? (closed question) Additional information about the survey details is available at http://www.lasegunda.com/Noticias/Politica/2013/10/886758/encuesta-la-segunda-udd-mide-el-vertigo-final-bachelet-alcanza-el-40-matthei-se-mantiene-en-26-y-parisi-supera-a-me-o.
(5) Question: If elections were held on Sunday, for which of the following candidates would you vote? Additional information about the survey details is available at http://impresa.elmercurio.com/Pages/NewsDetail.aspx?dt=2013-11-02&dtB=02-11-2013%200:00:00&PaginaId=2&bodyid=3.
(6) Question: If elections were held on Sunday, for which of the following candidates would you vote? Additional information about the survey details is available at http://www.ipsos.cl/documentos/pulso_electoral_ipsos_comunicado04.pdf.

election forecast is generally based upon two of its attributes – how accurate it is and how far in advance of the election it is produced. One problem that forecasters face is the limited supply of data for producing and evaluating their models. Polling data have been available in the United States only since the 1936 election; that means that leading up to the 2012 presidential election there were only 19 data points, and only 20 afterwards. This makes calibrating models a difficult task, and the confidence intervals around estimates can be large.

Election forecasts are based upon some well-established bodies of literature, including sociotropic voting (Kinder and Kiewit 1981; Kiewit and Lewis-Beck 2011) and retrospective evaluations of political performance (Healy and Malhotra 2013). The former research findings suggest that individuals are more likely to assess candidates and office holders based upon how they think society has been affected rather than on narrow their self interest. The latter body of literature suggests that their evaluations are more likely to be based upon past performance rather than assessments of likely performance in the next term. The operationalization of these concepts in forecasters' models usually take the form of measures of changes in personal disposable income in a period leading up to when the estimate is made, such as in the prior quarter of a year. Some models incorporate other measures such as incumbency. Because there are so few data points to analyze, however, the models are necessarily limited to just a few predictors.

Hibbs (1987) developed one of the earliest of the forecasting models in which he took account of the annualized, weighted average quarterly growth rate of per capita real disposable personal income. In successive iterations, he developed what became known as the "bread and peace" model (2000, 2012) that incorporated and US fatalities in military actions it initiated, ranging from the Korean War, Vietnam War, and actions in Afghanistan. Fair (2010, 2012) has created a model of presidential vote share that has a time series of estimates going back to 1916 that is based only on macroeconomic data without any supplemental information from surveys.

The American Political Science Association holds its annual meeting over the first week in September, and it is customary in presidential election years to organize a panel at which the forecasters present their estimates. These estimates and descriptions of how they

were developed are then published in the October issue of their journal *Political Science* in those years.[5] They recently published a special issue on presidential election forecasting in which the articles focused on data resources and models used in 13 forecasting models, including estimates of the outcome of the presidential election (Lewis-Beck and Stegmaier 2013).

As an illustration of what these models look like and how well they can perform, Erikson and Wlezien (2012) had one of the best estimates for Obama's winning margin in the 2012 election. Their forecast comes from the equation:

Vote = 34.02 + 7.80 LEI Growth$_{13}$ + 0.30 Poll Convention $_{-28}$ = 52.6% Democratic (Obama)

where: LEI Growth$_{13}$ = growth in composite leading economic indicators in the first 13 quarters of the president's current term

and Poll Convention $_{-28}$ = trial heat poll numbers averaged from 28 to 56 days before the first nominating convention

This model was calibrated on the basis of 15 data points from 1952 to 2008, but the estimate itself can be produced in the summer, typically between July and August, of a presidential election year. In this case, the researchers assigned an 80% probability to an Obama victory.

To date, there have not been any published forecasts for presidential elections in Chile based upon similar modeling, presumably due to the lack of an extended time series of polling data for presidential elections. However, there is research that suggests the possibilities for constructing such models under new and limited circumstances. For example, Selb et al. (2013) have developed a model for predicting the outcome of a runoff election based upon first round exit polls, using Konstanz, Germany as their case study. Kamakura, Mazzon, and De Bruyn (2006) use data from the first stage of the 2002 election for the Brazilian state of Sao Paulo, where there was extensive information about the spatial relationship between the parties, to predict the outcome of the second stage based upon estimates of the raw number of votes that each candidate received. They also evaluate their

[5] See for example, 2008 and 2012.

model in other states where there were runoff elections but information on the relationship between the parties was lacking, and their model did reasonably well there as well. With additional research, the prospects for development of such models seems likely

## DATA AGGREGATORS

Recently, several researchers, some with an entrepreneurial bent, have begun to develop statistical models that incorporate pre-election polling data, sometimes combined with other kinds of aggregate data, to estimate the outcome of elections in terms of the popular vote. In the United States, where there is a multi-level system for selecting our president based upon the Electoral College, the data aggregators also combine state and national-level data to produce estimates of who win will each state and therefore receive their electoral votes, accumulating the results to assess which candidate will receive 270 or more electoral votes and secure the victory. The data aggregators rely upon the fact that candidate preference is a well understood concept that is measured in a relatively common way in pre-election polls, so that the results of multiple pre-election polls can be combined. At one level, they typically ignore the details of "house effects" as a source of bias that can contribute to estimation errors; but many compensate for this by calculating and adjusting for differences in the historical accuracy of different polling firms.

The basic ingredient for the aggregators is the pattern of responses to the "trial heat question" asking for candidate preferences "if the election were held today." The Gallup wording, one of the most commonly used is:

> If the election for president were being held today, which candidate would you vote for – Barack Obama, the Democrat, or Mitt Romney, the Republican, or someone else?
>
> As a follow up for those who indicate no preference:
>
> As of today, do you lean more toward – Barack Obama, the Democrat, or Mitt Romney, the Republican?

In the case of both questions, the order of the candidates is rotated for different respondents at random. Typically the proportion of those who volunteer they are undecided or refuse to answer both questions is quite low, typically in the single digits late in the campaign. It is also lower in face-to-face interviews where a "secret ballot" is used. A pollster or a data aggregator will have to decide what to do with that percentage when it is reported: allocate it in some way to either candidate, equally or in proportion to the support received, or apply some other rule of thumb like allocating most of it to the challenger rather than to an incumbent. In any case, the outcome is a percent Democratic and Republican that add to 100%.

The original aggregator was www.RealClearPolitics.com. Started in 2000 by two friends interested in politics but without any substantive background in the field, the site assembles national and congressional-level poll data and averages the results for each party. There are different opinions about how reliable simple averages of polls results are, but it is clear that one of the most common uses of the data – describing whether a candidate's fortunes have improved or worsened based upon the difference in two readings – is unwarranted because each of the measurements is typically based upon an average of different polls (Traugott 2009).

Currently there are a number of data aggregators in the United States who produce estimates of election outcomes at the state and national level. For the purposes of this essay, I will focus only on estimates of the presidential race, where these modelers produce estimates of the national popular vote, the popular vote in each state, and then the total number of electoral votes each candidate will receive under the assumption they win each state according to their estimates. These aggregators produce estimates for many other elections, including referenda, and sometimes produce estimates of other outcomes such as how many seats each party will win a particular cycle for the House, Senate, or in gubernatorial contests. But the commonality that produces the most coverage of their efforts is the presidential estimates.

There are differences in the details and methods of the models that the data aggregators employ, but in general they share the following attributes. They use national level polling data on the presidential race which now appear with daily frequency in the latter part of the

campaign in the United States. They also use state-level pre-election polls as well, which are increasing in frequency but still lag far behind the national numbers. Furthermore, these state-level data are concentrated in the battle ground states and those with larger numbers of electoral votes where news organizations are more likely to see the race as newsworthy, whether or not it is close. Not all of the polls are treated equally; most models make an adjustment for the historic accuracy of the firm.

Most of the models employ some version of Bayesian inference, where the priors include the historical pattern of voting in the state. In addition, some create groups of states that track the national sentiment or are characteristically more or less Democratic (Republican) than the nation as a whole. Furthermore, sometimes the data from key states are used to inform or adjust the national level estimate, and the reverse can be the case where there is more national level data available but the researcher believes that the state historically tracks the national voting pattern. In other words, the models are dynamic and interactive, and they often incorporate recent shifts in support, as measured by the polls, in the current estimate. All of the models produce a point estimate of the outcome with a confidence interval around it, and some models employ simulations with a tabulation of the various outcomes to produce an estimate of the probability of a victory.

Some of the leading sites (those with numerous visitors and which produce accurate estimates) include Sam Wang, a biophysicist and neuroscientist who specializes in meta-analysis. He started his website in 2004 (http://election.princeton.edu), and he often covers many topics outside of politics. Mark Blumenthal started his web site with Charles Franklin, and then continued on his own. After the 2008 election, it was purchased by Huffington Post and now appears at http://www.huffingtonpost.com/news/pollster/. Blumenthal produces new content every day and comments on public opinion generally and source data quality specifically. He recently has produced an election outcome model in conjunction with Simon Jackman, a political scientist and statistician at Stanford. Jackman (2005) had produced a Bayesian model to estimate Australian elections before turning his eye to elections in the United States. Drew Linzer is a political scientist who blogs through the web site http://votamatic.org/. He developed a Bayesian model

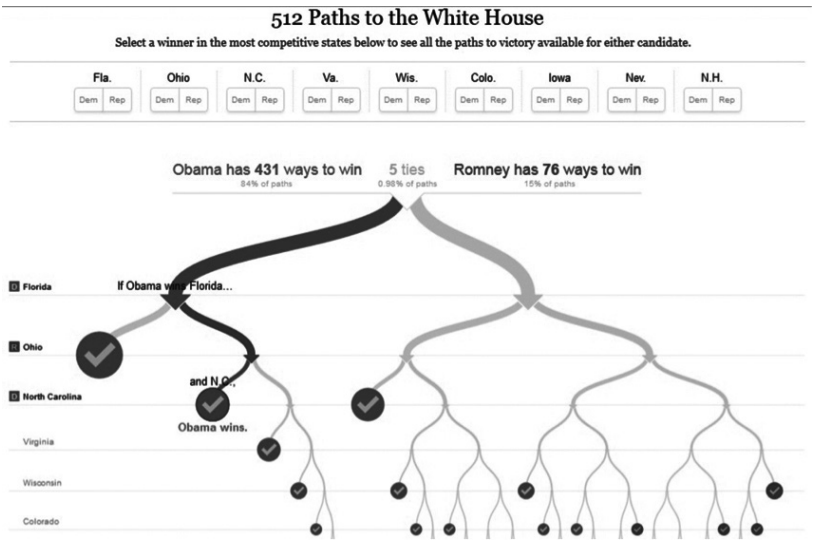
with considerable accuracy, and he has publications that describe his approach in detail (Linzer 2013) representing a form of transparency that is not otherwise present in the field. In the 2014 cycle, Linzer contributed a model to the web site for DailyKos (http://www.dailykos.com/election-outlook/2014-senate) that was deemed the most accurate after the election. Not to be left out of this trend, *The Washington Post* also paid for the development of a model under the heading of the Election Lab (http://www.washingtonpost.com/wp-dre/politics/election-lab-2014) which finished with the second best prediction record in the 2014 Senate sequence.

The most notable of the data aggregators is Nate Silver. He started his career as an invisible blogger on the Daily Kos web site under the pseudonym of "Poblano" where he wrote about the 2008 presidential election. By the fall of that year, he went public with his own web site www.fivethirtyeight.com, producing an accurate estimate of the outcome. In 2010, the *New York Times* licensed his web site for distribution, and he had a very successful set of predictions for the 2010 midterm elections and the 2012 presidential election, where he predicted the outcome of every state and the District of Columbia correctly, which netted the exact electoral vote total for Barack Obama and Mitt Romney as a result.

Silver's move to the *New York Times* gave him enormous visibility. The paper's site was the sixth most visited news site in the United States (Taylor 2012), and one-fifth of the visits during the 2012 campaign were to Silver's page. On Election Day, 27% of the visits were to Silver's page. Because of the accuracy of his estimates and the magnitude of his platform at the *New York Times*, Silver has had a profound effect on how campaigns are covered. His daily estimates and their explanation fed the tendencies of news organizations to engage in horse race coverage and exacerbated that trend.

The following diagram appeared in the *New York Times* as a way to visualize the results of Silver's simulations in terms of paths to victory in the 2012 presidential election, based upon success in the battleground states.[6] The summary on this date suggested that Obama had 431 ways to win while Romney had only 76. This language about

[6] A version of this graphic is available at http://www.nytimes.com/interactive/2012/11/02/us/politics/paths-to-the-white-house.html.




*Font: The New York Times*. Se puede ver el diagrama en acción en: http://www.nytimes.com/interactive/2012/11/02/us/politics/paths-to-the-white-house.html

"paths to victory" entered the lexicon of political reporters near the end of the campaign, supporting journalists' predisposition to favor electability scenarios, this one suggesting the inevitability of Obama's victory. It was adopted by the Obama campaign staff and appeared in successive news articles in the form of quotes from them and in descriptive language used by the reporters themselves.[7]

The effect of these results was a transformation of the tone of the coverage of each candidate's chances in the last two weeks of the campaign – more positive for Obama and more negative for Romney – in a way that colored each's essential media scenarios for viability and electability. After the 2012 election, Silver signed a contract with ESPN for his services, returning to a sports news site, his original love, with a chance to continue in politics. He also got to use his original web site URL, www.fivethirtyeight.com. He recently caused a stir of the same kind as in 2012 when he re-launched with an article indicating that the

[7] See for example Laura Meckler, "Aide: Obama Still Has Easier Path to Victory," *Wall Street Journal*, October 24, 2012, available at http://blogs.wsj.com/washwire/2012/10/24/adviser-obama-still-has-easier-path-to-victory/.

**Table 3.** A COMPARISON OF A MODELED ESTIMATE OF THE OUTCOME OF THE 2013 CHILEAN PRESIDENTIAL ELECTION AND ESTIMATES BASED UPON PRE-ELECTION POLLS.*

Error Margins: TresQuintos Forecast and Pollster Predictions

| Candidate | Tres Quintos | Ipsos | El Mercurio | La Segunda | CEP | UDP | ICHEM | Conecta |
|---|---|---|---|---|---|---|---|---|
| M. Bachelet | 0.62 | 11.51 | 6.80 | 0.16 | 13.59 | 7.70 | 5.93 | 2.53 |
| E. Matthei | 0.61 | 3.03 | 0.11 | 5.22 | 8.34 | 6.81 | 6.65 | 3.13 |
| M. Enríquez-Ominami | 2.71 | 1.11 | 2.65 | 2.84 | 3.29 | 2.60 | 0.61 | 0.10 |
| F. Parisi | 2.01 | 5.27 | 0.97 | 1.52 | 1.43 | 3.66 | 1.9 | 2.13 |
| M. Claude | 1.26 | 3.78 | 0.84 | 0.68 | 1.04 | 2.46 | 1.88 | 1.15 |
| A. Sfeir | 1.62 | 0.95 | 2.00 | 2.35 | 2.35 | 2.35 | 1.31 | 1.73 |
| T. Jocelyn-Holt | 0.60 | 0.19 | 0.07 | 0.19 | 0.19 | 0.19 | 0.07 | 0.19 |
| R. Israel | 0.06 | 1.63 | 0.34 | 0.57 | 0.57 | 0.57 | 0.44 | 0.32 |
| R. Miranda | 0.04 | 2.03 | 0.00 | 1.27 | 1.27 | 1.27 | 1.14 | 0.28 |
| Total Error | 9.53 | 29.50 | 13.78 | 14.80 | 32.07 | 27.61 | 19.12 | 11.56 |
| Average Error | 1.06 | 3.28 | 1.53 | 1.64 | 3.56 | 3.07 | 2.12 | 1.28 |

* This table is taken from Table 2 in Bunker and Bauchowitz (2013).

Republicans had a 60% chance of taking control of the U.S. Senate (Silver 2014). This is much farther ahead of Election Day than his 2012 presidential forecast; and, beyond the coverage the forecast generated, it affected the tone of fundraising appeals in both parties.

Recently, a data aggregation site has appeared for South American elections at the site http://www.chile.tresquintos.com. It was originally co-authored by Kenneth Bunker and Stefan Bauchowitz, graduate students at the London School of Economics in political science and economics respectively although the staff has been growing. Tres Quintos produced a very successful estimate of the outcome of last year's Chilean presidential election, in both the first and second rounds. Their model is an extension of earlier work by Kamakura, Mazzon, and De Bruyn (2006), and they have already produced three estimates over time of the outcome of the upcoming election in Colombia as well as in Brazil. They acknowledge their debt to Linzer, Silver, and Wang, as well as to the methods of Gelman and Jackman.

Their model involves a two-stage process and is described in some detail in an article that appeared in *The Monkey Cage* (Bunker and Bauchowitz 2013). In the first stage, they use the available data to date with an adjustment for each firm's historical accuracy, the sample size, and the time until the election. With this baseline, they use a Bayesian approach with new data to estimate the likelihood that a new data point is accurate based upon the information from the prior polls. They explicitly admit to having a more complex model than the ones used in the United States because the electoral system is more complex in a two-step electoral process than in a direct one. The following table compares the accuracy of their estimates to those from seven pre-election poll estimates. Notice that they have allocated undecided and don't know responses so that all of the candidate estimates add to 100%.

They employ two measures of error. First they calculate the difference in each estimate from the candidate's actual share of the vote. Then they sum those differences to calculate the total error for that source. Finally, they divide the total by nine to get the average error per candidate. This could be seen as somewhat misleading in the sense that TresQuintos provided very accurate estimates for Bachelet and Matthei, the leading candidates, while they fared somewhat worse, compared to the others, for the third through sixth-place candidates who received

between 2 and 11 percent of the vote. That is, their average error for Bachelet and Matthei was 0.62 percentage points, compared to a range of 2.69 to10.97 percentage points for the others. A single success does not validate a method, as Bunker and Bauchowitz admit, but they are off to a good start, and as of this writing they are working on estimates for other South American elections.

## CONCLUSIONS

Estimating election outcomes has become an increasingly sophisticated business, stimulated jointly by an interest in their importance for the democratic process as well as their contribution to news making and business decisions. There are a variety of ways to accomplish this, all of which are based to a greater or lesser extent on high quality pre-election polling data. Some firms rely upon on their own pre-election polls to accomplish the task, but increasingly statistical modelers are aggregating data from different sources to minimize certain kinds of polling errors and produce more accurate estimates than pollsters can on their own.

Their utility depends upon the audience and the kind of information that serves their interests best. Pre-election polls provide the best of explanation for *why* an election turned out the way it did through the analytical opportunities a good questionnaire can provide. Because of problems fixing on the likely electorate, pre-election polls on their own provide a good but not necessarily the best estimate of the outcome. Good statistical models that aggregate polling data provides the best predictions of the outcome, but they do not provide much in the way of explanation on their own. Forecasting models can provide reasonable estimates of the outcome quite far in advance of the lection (up to four months or so), although they are based on an understanding of election fundamentals like incumbency, economic performance, and presidential approval that do not say much about how the campaign itself unfolded.

While most of these techniques were developed in the United States, where polling methods are quite refined and there is a relatively lengthy historical data base of results, they are being adopted with increasing frequency in many other democracies in the world,

including by analysts in South America. While the forecasters and data aggregators provide more accurate estimates of who is going to win the next election than standard pre-election polls, they suffer from the deficiency of not providing any information about why. In this way, they defeat one of the main functions of pre-election polls – giving the public a voice in campaign coverage – while at the same time not providing any explanation for why the voters are choosing to support one candidate or party over another. Elections have meaning, and knowing who is going to take control of the next government is important. However, it is equally important to know about the public's expectations and preferences for the policies that they expect the government to follow.

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