



## Forecasting Brazilian presidential elections: Solving the $N$ problem

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### ABSTRACT

The use of election forecasting models is common practice in the US and other established democracies like France and the UK. However, not much work has been done in the area for more recent democracies. Forecasting election results in recently (re)democratized countries poses a serious challenge, given the very few observations of the dependent variable. Thus, we ask: is it possible to make valid election forecasts when the number of elections we have is very small? In this paper, we present recommendations on how to forecast elections under such circumstances. Our strongest recommendation is to evaluate forecasting models using subnational data. We illustrate our recommendations using Brazilian presidential elections since 1994 and data from the 27 states of the Union. Our findings indicate that forecasting elections in recent democracies is neither futile nor impossible, as some of the models presented here produce reasonably accurate forecasts. © 2012 International Institute of Forecasters. Published by Elsevier B.V. All rights reserved.

### 1. Introduction

Election forecasting has a long tradition, especially in French and American presidential and midterm elections (Lewis-Beck, 2005), but not much has been done elsewhere, including, most notably, in the more recently democratized parts of the world, where elections have been few and far between. The most important constraint in forecasting election results in the newly democratized world is the limited number of observations on the dependent variable: that is, the small number of elections these countries have faced in the recent democratic period. Admittedly, most election forecast models today still deal with a small  $N$  ( $<20$  in most cases), but even that is already three to four times more than are available for newly democratized countries. Thus, we ask: is it possible to make valid election forecasts when the number of elections is extremely low? A low  $N$  constitutes an important limitation when making election forecasts, but we believe that the task is neither futile nor impossible.

There are indeed some solutions to the small  $N$  problem. One possible strategy to increase the sample size is to move to a lower level of analysis (King, Keohane, & Verba, 1994). Electoral districts can be divided into smaller units where information about the dependent variable and (at least some of) the independent variables is available. Consider, for example, a nationally fought election (e.g., a presidential election) where the new unit of analysis could be regions, states, provinces, länder or cantons. Depending on the number of smaller units that can be used, this can improve the  $N$  problem.

Another (more obvious) recommendation would be to avoid specifying models with large numbers of determinants. The smaller the number of independent variables, the greater the number of degrees of freedom available for the estimation. In scenarios plagued by data limitations, parsimony is not a choice but a necessity.

Now, the move from one level of analysis to a lower one can certainly pose new challenges, such as that related to the availability of some measures. To be sure, most countries collect economic data at much lower levels of analysis than the national one, so moving to smaller units should not cause much of a problem for these kinds of data. On the other hand, public opinion

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data measuring more subjective economic and political determinants of the vote can be harder to find. This may affect the kinds of forecasting model one may be able to specify, which consequently influences forecast evaluations. Another potential challenge concerns the issue of unit heterogeneity, where the electoral dynamics are strongly related to regional differences. In this case, additional statistical care will have to be taken to achieve valid forecasts when moving from one level of analysis to a lower one.

In this paper, we illustrate our recommendations using Brazilian presidential elections. Brazil's recent (re)democratization in the 1980s has now produced six presidential elections (1989, 1994, 1998, 2002, 2006 and 2010). We test a model that attempts to explain the vote choice for the incumbent candidate from the 1994 elections onward. Because of the low  $N$  size at the national level, this model focuses on explaining election outcomes at the subnational level, more specifically at the state level in Brazil. Therefore, our modeled variable is election outcomes for the incumbent candidate in Presidential elections in each of the 27 states of the Union.

In the next section we discuss the basic models for election forecasting in older democracies. Next, we evaluate three forecasting models using data from Brazil's recent presidential elections. We conclude with a discussion of the value of each of these three models for predicting presidential election results in Brazil, a recently (re)democratized country.

## 2. Theory: the basic model

Election forecasting models tend to be quite simple, and usually follow this basic form:

$$\text{Vote} = f(\text{economy, politics}),$$

where the vote (generally expressed as the vote for the incumbent party or candidate in the case of the US presidential election, or the total vote share received by the left-wing presidential candidates during the first round in France) is a function of some economic and political factors. Conventional economic determinants include objective measures of economic performance such as economic and income growth, inflation and unemployment (or job creation), or other kinds of economic indices (e.g., the US Leading Economic Indicator), as well as measures of government spending. Some models also include subjective economic measures such as those related to consumer sentiment, including voter perceptions about their retrospective and/or prospective personal finances, and perceptions about the positivity (or negativity) of economic news. The expectation is that good economic performances and positive voter perceptions of the economy and personal finances should benefit incumbents (or candidates running under the same party label as incumbents) who are seeking reelection.

Political determinants, for their part, are generally composed of public opinion measures of government popularity, vote intentions, and party identification. Some models also include the incumbent's number of terms in office. The expectation is that popular governments

should be more successful in their reelection bids than unpopular ones, although long tenures should reduce the likelihood of reelection. Similarly, parties and candidates which generally do well in pre-election polls, and those that have large bases of partisans, also generally tend to do better in elections.

Most election forecasting models include only a limited number of these factors (two to three determinants on average). Most models use a combination of objective economic measures and subjective measures of public opinion (e.g., Abramowitz, 2004, 2008; Campbell, 2004, 2008; Lewis-Beck, Bélanger, & Fauvelle-Aymar, 2008; Lewis-Beck & Tien, 2004, 2008) while others only use measures of one kind, either all objective (e.g., Cuzán & Bundrick, 2008) or all subjective (e.g., Holbrook, 2004). Pure economic or political models are not very common, but see Norpoth (2004, 2008) for a pure political model.

The choice of variables to include in models is restricted by data availability. In the developed world, there are plenty of series to choose from, either of a political or economic nature. However, the same is not true in new democracies. This issue is important, because a forecast evaluation is contingent upon the specification of the models. If there are data limitations, then the quality of the models, and thus their predictive capacity, may suffer, posing yet another challenge for forecasting in young democracies.

## 3. Forecasting Brazilian presidential elections

We select Brazilian presidential elections as a good case for evaluating election forecasts when the number of observations is very low. In the 1980s, Brazil went through a period of re-democratization, first with gubernatorial elections in 1982, followed by the promulgation of a new constitution in 1988, and the first presidential elections in 1989 after more than 20 years of absence. Since then, Brazil has held six presidential contests (1989, 1994, 1998, 2002, 2006 and 2010), of which the first was won by Fernando Collor de Mello, from a small party that no longer exists, and the remaining elections were won twice by the Partido da Social Democracia Brasileira (PSDB) and three times (the last three elections) by the Partido dos Trabalhadores (PT).

Brazilian presidents elect themselves based on a majority of the popular vote, at times requiring a second round to have a winner. Only in the two elections won by the PSDB, in 1994 and 1998, was there no need for a second round, with Fernando Henrique Cardoso winning a majority of the popular vote in the first round. The Brazilian electorate is made up of over 100 million voters and participation is compulsory, albeit justified abstention and casting a null or a blank vote are allowed by law. Still, turnout is very high, with around 80% of the eligible population voting in each election. However, Brazil is not only populous, it also extends over a very large territory (larger than the continental US) and forms a federation. The territory is divided into five regions and 27 states. Thus, Brazil constitutes a good case for examining the question at hand, not only because it has held only a handful of presidential elections in recent times, but also because its territory is divided into smaller units.

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