

Modeling and Forecasting Electoral Participation around the World: Voter Turnout in Democratic Regimes, 1972-2006

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Ever since Rose (1980) and Powell (1982), electoral participation has been considered a highly important area of political research as an indication of the health of a democracy. For this reason, facilitating voting participation is an important goal in society. This paper builds on relatively recent cross regional work by André Blais and colleagues to examine more closely how well models of turnout perform in predicting turnout out-of-sample, which we argue is an important goal of social science (e.g., Blais 2006, Blais and Aarts 2006, Blais and Dobrzynska 1998, Blais, Masicotte, and Dobrzynska 2003). We use data on what is close to the population of national lower house elections in democratic systems held between 1972 and 2006 in a design that allows us to test the forecast accuracy of several (relatively) turnout models. Our results suggest that macro-models do a comparatively poor job of forecasting turnout when compared to a model that simply uses the last elections turnout as the explanatory variable.

The distribution of elections across time and space

Previous multi-regional studies of turnout have done little by way of describing the phenomena that they seek to explain.¹ In this section we describe some of the broad

¹ The figures that we use here come from previous data collected by Blais and Dobrzynska for elections for 1972 to 1995, supplemented by additional data (see Blais and Dobrzynska (1998). Figures for some

features of electoral turnout, which necessitates some digression into a discussion of the spread of democracy since the 1970s. We focus primarily over the distribution of elections over time. When discussing the *number* of elections, we discuss both elections for which participation data are present and those for which they are missing. When discussing turnout, we can obviously only talk about those elections for which we have participation data.

It is not completely clear what the population of national democratic elections is, but our dataset covers most all of the lower house elections held between 1972 and 2006. Elections are considered democratic if the Freedom House's political rights score in the year of the election is a 1 or 2.² Our dataset contains the turnout rate in over 550 such elections in 106 different countries.

There are only about 50 elections in countries included in the 2006 Freedom House rankings for which we lack turnout information. As Figure 1 illustrates, most of these missing observations are for a few, small countries with populations under 150,000: Andorra (1), Kiribati (5), Micronesia (8), Monaco (2), Nauru (10), Palau (3), and Tuvalu (6). That said, except for Micronesia and Palau, we have turnout for at least one election in all of these countries.³

Figure 1 here

The number of democratic elections varies considerably across time and space. A confluence of the breakdown of the Soviet Union and other third wave democratic transitions has, not surprisingly, produced to a dramatic increase in the number of countries holding democratic elections. Between 1972 and 1981, there were 126 elections in our dataset. In the most recent decade (1997-2006), there were 208 elections (See Figure 2).

missing elections in that time period as well as data for democratic elections for years after 1995 were collected by the authors from a variety of sources, primarily: Psephos, Adam Carr's elections website, IDEA's turnout archive, and Binghamton's Center on Democratic Elections' Election Results Archive. Turnout Data and sources for non-turnout data are available from the authors.

² We do not investigate what determines turnout in non-democracies, though it is reasonable to argue that we should. Many of the factors said to effect turnout should not vary between democracies and non-democracies, while certain other factors should.

³ We have turnout data for 55 elections in a number of small countries, so, while small country elections are underrepresented in the dataset, they are represented.

The expanded number of elections can be driven by three things:

- 1) more frequent elections within existing democracies
- 2) more newly independent, democratic states, or
- 3) democratization in existing states.

The frequency of elections in established democracies could change either as a result of constitutional changes requiring more frequent elections, or because of a tendency to call for early elections. In the 32 countries considered politically free in both the first four and last four years that we examine (see Appendix A), the total number of elections is 151 in the first half of the period (1972-1988) and 145 in the second half (1990 and 2006). Thus, the frequency of elections has not really changed much over time in the established democracies.

Figure 2 about here

The period since the 1970s has seen a large number of countries that were “born democratic.” Newly independent states that have been democratic since their independence are mostly tiny islands—Antigua (1981), Belize (1981, not an island), Dominica (1978), Kiribati (1978), Marshall Islands (1991), Federated Micronesia (1991), Palau (1994), St Kitts (1982), St Lucia (1979), St Vincent (1979), Solomon Islands (1991), Tuvalu (1977), and Vanuatu (1980). If we add a few other cases of countries born after 1974 that have been *primarily* democratic since then (i.e., Grenada, Papua New Guinea, Sao Tome, Suriname), we find that half or more of the 82 additional elections that occurred during the 1997-2006 period (compared to the 1972-1981 period) are accounted for in these states. The collapse of the Communist bloc created another six democracies which are also rather small: the Baltic States (Estonia, Latvia, and Lithuania) in 1991, the Czech and Slovak Republics (both in 1993) and Slovenia (1991).

Recognizing the role of new states in the expansion of the share of democratic countries in the world has important implications. In contrast to the idea that democracy has spread more widely and evenly in recent decades, the regional distribution of fully democratic elections has changed little since the 1970s (though it is probably a more valid claim viewed from the perspective of the mid-1980s). In the 1970s, the bulk of democratic elections occurred in Western Europe, North America, and Oceania. 76 of the

126 democratic elections between 1972 and 1981 occurred in countries in those two regions. At the turn of the twenty-first century, those proportions are almost identical. The small size of many new democracies suggests that the share of democratic countries has grown much faster than the portion of the world's population living in democratic regimes.

In summary, it is important to understand that the expansion of democracy has brought with it an expansion in the number of elections over time, but this expansion has been driven primarily by the creation of a number of very small new states-- many of whom had been protectorates of established democratic powers. Democratization of existing states has increased, but is of secondary importance in the increase in democratic states. Second, the increased number of legislative elections has not fundamentally changed in regional distribution between the 1970s and the turn of the twenty-first century. The largest absolute growth has been in the regions that were already democracy rich (Europe and North America).

Distribution of Turnout Rates

In our dataset, the proportion of registered voters casting a ballot in a democratic election involving the selection of members of the lower house of the legislature is almost 75%. Although previous quantitative investigations of turnout have assumed that turnout is (at least conditionally) normally distributed, it is not. A histogram of the 564 cases for which we have information (Figure 3) illustrates that turnout is skewed to the right.⁴ Moreover, turnout is not distributed across the range of theoretical values: i.e., 0 to 100. Turnout of less than 50% and more than 95% is extremely rare. Only around 30 elections have turnout below 50%. There is no election where observed turnout is below 20% and turnout falls below one-third of registered voters in only three elections: Mali 1992 and Colombia 1991, El Salvador 1993. Turnout has been regularly below 50% in Colombia (when it was having free elections), Poland, and Switzerland. At the other end of the spectrum, extremely high turnout is quite rare; there have been only 17 cases where turnout was at least 95%. Turnout at this level happens regularly only in two countries: Malta and Australia.

⁴ The distribution of values in BD's dataset has a similar shape.

Falling Turnout

Consistent with the recent chorus of concern about declining voter participation in established democracies, voter turnout has declined over time across the world (Franklin 2004, Gray 2000). Table 1 shows that turnout has declined. Turnout was over 78% of registered voters in elections from 1972-1988, but just over 72% in elections 1990-2006. (The corresponding medians were 80% and 72%.) Turnout falls whether we focus on the elections in continuous democracies (81% versus 76%), in recently transitioning democracies (81% versus 72%), in countries that were “born democratic” after 1972 (73% versus 68%), or those that have been intermittently democratic (70% versus 64%). Of those countries with at least one election before and after 1989, the number of countries reporting lower average turnout exceeded the number reporting higher average turnout by 46 to 13. Though all of their elections have occurred after 1989, there is also clear evidence of large declines in turnout in almost all of the Eastern European democracies since their transitions in the early 1990s. Hungary appears to be the only post-Communist democracy that has not experienced significant declines in turnout. The pattern for turnout decline extends across regions as well. Of those countries with democratic elections both before and after 1989, countries with declining turnout greatly outnumber those with rising turnout.

Modeling and Predicting Electoral Turnout

The preceding portion of the paper presented a largely descriptive overview of voter turnout during the last several decades. The remainder of the paper takes a somewhat different tack. We evaluate the utility of a general model of turnout proposed by Blais and Dobrzynska (1998) against two alternative models. We conduct this comparison primarily using the elections that they used to estimate model parameters for the period 1972-1995. We then apply those estimates to forecast other election outcomes.⁵ The rest of the paper proceeds as follows. In the next section we briefly explain the importance of out of sample testing to evaluate models. Next we briefly

⁵ In all but a few cases, the additional observations are for elections held after 1995. If the election was included as an observation in their dataset, it was used to estimate the training parameters. If it was missing, then it is used in the test dataset.

provide an overview of Blais and Dobrzynska's model and the logic behind it, and review the results of our replication. The next section presents two alternative models. We then estimate parameters on a set of 291 democratic elections between 1972 and 1995. Finally, we use these sets of parameters to forecast turnout in 165 elections and compare results.

Out-of-sample testing and empirical political science

Though hardly the first to do so, a recent paper by Rein Taagepera levels criticism on political scientists' excessive attention to linear regression analysis and "post-dictive" thinking (Taagepera 2005). He points out that what characterizes all "hard" scientific thinking is that it is oriented to predicting unknown results, while most forms of empirical analysis in political science (including almost all regression analyses in the journals) are post-dictive. Almost all "hard" scientific theories are also concerned not just with predicting "what direction" one causes another thing to move, but also "how much" it causes it to move. Others have raised essentially similar criticism about the way that political scientists develop and test their propositions (e.g., DeMarchi 2004).

One could argue that, while these criticisms are generally correct, a lot of work does actually go beyond the "sign and significance" mode of empirical analysis. Editors and reviewers increasingly insist that authors report the substantive implications of their regression estimates. Nonetheless, empirical political scientists seldom argue very much about the size of the substantive effects of their variables, even though such impacts are the point (cf. Blais 2006). Indeed, it is not uncommon to find attempts to refute existing findings in the literature by presenting another regression result in which the parameter in question is "no longer statistically significant" with little discussion at all about whether or not a refined model have any effect on *substantive* estimates, or why some alternative explanation (e.g., variable) provides superior explanatory power.

These sorts of problems are, in our view, closely related to another problem in the conventional approaches to model building in political science: regression analysis seldom takes the theory-testing role it is designed for. It often amounts to simple descriptive curve-fitting. Rather than developing a model and then testing the model with sample data, researchers more commonly start with a sample of data and hone a model to fit that data. Usually, this procedure winnows down a very large number of possible explanatory variables based on some logical reasoning but, most centrally, the "statistical

significance” of parameter estimates and overall model fit. This approach fails to conform at all with the standard scientific approach to deriving and testing a model, and, as we will see below, produces overfitting the data.⁶

It is important to point out that, notwithstanding Taagepera’s criticism of “postdictive” regression analysis, the alternative is not simply to turn to “formal” models. (There are steps in that direction that remain mostly limited to models based on the axioms of microeconomics.) Aside from the fact that formal models often lack plausible empirical referents, there is nothing inherently wrong with using induction as a way to help make modeling decisions, i.e., to uncover what features may or may not be promising explanations. But - this is critical - building such a model with data is not a test of the model (or even a single parameter). When a model is *developed* using a set of data, that dataset cannot rightly serve as evidence of the usefulness or predictive (or even statistical) power of the model. We need confirmation that such a model is good from additional data.⁷

But where do we get additional data? An obvious answer is to collect more. Barring that option, another possibility is simply to divide datasets at the outset into separate “model development” and “model testing” datasets, presumably using some type of “random” selection mechanism. If neither of these options is available to a researcher, however, the real point is that there cannot really be *a* discussion of having tested the model. Adopting this approach, reveal gaping holes in a lot of empirical political science research. And insofar as it helps to redirect our efforts from reading about model development to looking at model performance, it can lead to more progressive research agendas.

Models of turnout

⁶ It is not that *a priori* theoretical/empirical considerations are completely absent, it is that such considerations very often constitute a very general first cut to honing a model with multiple regression.. For example, continuous variables are often assumed to have linear effects with no justification for thinking that a continuously linear relationship is plausible. And it is not terribly common to see comparisons of parameters in similar analyses, even though the goal of regression is to find the “correct” effect of X on Y.

⁷ It is also important to point out, in agreement with Taagepera’s claims, that the use of linear regressions as the primary (or sole) basis for deriving theoretical models is fundamentally flawed. Any decent text on statistics in the social sciences (at least the econometrics texts that I am familiar with) states pretty early on that statistical analysis relies on a host of other things being done right: having the right measures of the right concepts, having the right functional forms of the relationship, etc.

Electoral turnout has long been viewed as a critical indication of the political performance of democracies (Powell 1982, 1986, Jackman 1987, Blais and Dobrzynska 1998, Franklin 1996). Blais and Dobrzynska (1998, cf. Blais Maiscotte, and Dobrzynska 2004), hereafter referred to as BD, provide what might be judged as the most comprehensive effort to build a general macro-model of voter turnout using data from around the world. Theirs remains the only previous turnout study that evaluates electoral turnout generally, that is beyond a very limited set of (mostly industrial) countries (Blais 2006, cf.; Fornos, Power, and Garand 2004; Kostadinova 2003, Pérez-Liñán 2001). BD examine 324 democratic elections for the national legislature occurring between 1972 and 1995 in 91 different countries.

BD's model is inspired mainly by Powell's (1982) and Jackman's (1987) comparative studies of turnout of industrial democracies, emphasizing three broad classes of explanation that are plausible determinants of political participation: socioeconomic context, constitutional setting, and the party system. For each of these three types of explanation, BD present several variables that they suggest as plausible explanations for variations in turnout.

For socio-economic context, DB look at life expectancy, GNP per capita, growth in GNP per capita, population density, size of the population, and illiteracy. For institutional setting, they estimate effects for compulsory voting laws, voting age, electoral system (PR, or effectively PR compensatory mixed systems), disproportionality, the decisiveness of the election, the degree of democracy. For party system variables, they include the closeness of the election (measured as the difference in vote share of the two largest parties), the number of parties receiving at least 1% of the vote, and whether or not the largest party wins a majority of votes.

In estimating the effects of these different variables on turnout, DB employ a sort of stepwise modeling procedure. In important respects, it is a good illustration of contemporary approaches to "in-sample model building" that is informed by theoretical precepts and previous efforts. Socioeconomic factors are entered and statistically significant ones retained. Next, institutional factors are entered and significant ones retained, and finally party system factors.⁸ DB also use six regional dummy variables

⁸ In an inductive type of model specification process such as theirs, step-wise regression is a very flawed approach. One of the more cogent explanations of the problems with stepwise regression is Hanushek and

for Europe, North America, South America to account for, in essence, unmeasured “cultural” differences and a dummy variable for Switzerland.

The final model presented in BD suggests that turnout is positively affected by:

- per capita income
- compulsory voting
- the decisiveness of the election
- higher minimum voting age
- the presence of a more proportional, PR-type electoral system
- closeness of the election
- being in Oceania (relative to Europe).

It is negatively affected by:

- the number of people in the country,
- being in Africa, North or South America
- the number of parties receiving at least 1% of the vote

In developing their model, BD pay comparatively little attention to whether the assumptions that underpin regression analysis are present. As with our dataset, our replication of Blais and Dobrzynska (1998) suggests that the residuals from their OLS estimates are heteroskedastic and are skewed to the right. This does not affect the parameter estimates of any of their models, but it does bias the standard errors. However, it *is* potentially important when models are developed using “significant” regression estimates as criteria for inclusion.

A related problem arises in their analysis due to the fact that many of their observations of turnout are drawn from different elections in the same country. In itself this could raise a problem, but greatly compounding it is the fact that the number of elections per country varies considerably (i.e., the panels are unbalanced). Some countries have eight or ten elections in their dataset, while others have only one election. It is important to point out that these violations only potentially cause a problem. They do not bias parameter estimates. Critically, however, when statistical significance is used as a criterion for retaining variables, these violations can lead to specification errors.

Jackson (1977, pp. 95-6). For our purposes, however, how model was specified is less important than judging its ability to predict turnout in other elections.

In all of the estimates they present, BD use all of the available cases to estimate the parameters. Again, all of this is standard practice, and mirrors the approach of their predecessors. But it means that, in essence, their final model is based on each variable's marginal (i.e., individual) fit with to a single sample of data. Hence it is susceptible to the argument that the model overfits the data.

In our data collection, we started with BD's original dataset of over 324 elections between 1972 and 1995. Using this, we were able to exactly replicate the results they report in their paper. However, in the course of updating the dataset, we uncovered a few coding errors, and added some missing information for some of the variables in observations in their dataset. Because of this, our replication estimates are computed with a number of observations that were dropped from their regression estimates.⁹ The estimated model (see Table 2, column 1 below, which reports results only without Switzerland) accounts for about 55 percent of the variation. The overall mean of the sample used in the estimate is 78.2.¹⁰ The root mean squared error is about 8.8.

To determine how well the model fits the *new* sample, we computed predicted values of turnout based on the parameters estimated from the BD (training) dataset and the values of the model variables in the test dataset (i.e., the 165 elections held after 1995 for which we had full data). If the parameters from the training dataset perfectly predicted out-of-sample, the coefficient on "training" would approach 1 and the constant will approach 0, and the predicted values would explain a large portion of variation in the second sample. Obviously sampling error will reduce the overall fit to the new data, even if the model was completely accurate.

Figure 4 plots the predicted (by BD's model) versus actual values for the test data. Their estimates overestimate turnout quite substantially. The RMSE is about 11.2. The predicted mean turnout is much higher than the observed (76.3 % versus 71.4%). Second, the model produced several predictions of turnout over 100%, which is logically impossible. Third, about *one-quarter* of the observations have actual turnout that is

⁹ The main impact these changes is to increase the slope of GDP per capita, and to reduce the a(absolute) magnitude of the regional dummies. The overall variance explained is virtually unchanged. This discrepancy also raised significant coding concerns about the GDP per capita series, which will be addressed in future versions of the paper.

¹⁰ Due to collinearity, the Switzerland dummy variable is redundant in parameterizing the test dataset. Thus, all of our results exclude Switzerland. Previous work typically included a dummy variable for Switzerland, which only serves to inflate the statistical precision of the model anyway.

lower than the model ever predicts. The results are very similar whether or not Switzerland is included in the estimation and forecasting.

Figure 4 about here

An alternative model

Since regional dummies constitute a pretty low standard for assessing the forecast accuracy of a model, we develop a preliminary alternative model to BD. In developing this model, we have attempted to reduce the parameter space as much as possible by using dummy variables rather than assuming continuous slopes for nominally linear measures.

Direct Costs of not voting: Following BD and a host of previous studies (Powell 1982, Jackman 1987, Blais and Carty 1990, Black 1991, and Franklin 1996), we anticipate that a formal requirement to vote increases turnout (1=voting is compulsory).

Level of development: A high level of development is often considered important for political participation. However, the idea that wealth would be linearly associated with more participation in general, or in elections in particular, seems a stretch. While evidence within and across countries is consistent with the idea that wealth facilitates participation, we suggest that the effects of greater wealth matter more at the bottom than the top, and, furthermore, that extreme inequality will undermine full participation. Lacking very good indicators of income or wealth inequality, we use the United Nation's Human Development Index as a basis for indicating the overall well-being of a country beyond wealth. Countries scoring above .8 receive a designation "high development" (hdihi=1), those between .6 and .8 "middle development (hdimed=1), and those below .6 "less developed" (hdilo=1)

Democratic history: The public euphoria surrounding free elections will tend to be higher in countries that have recently democratized, or that have democratized after a long hiatus, regardless of their other characteristics. We count the first election within the first four years of receiving a political rights score of one or two as a new democracy election (newdem=1). However, we anticipate that in very poor countries there is a

chance that, despite the euphoria, the boost to turnout may be constrained by a generally weak administration. We thus include the interaction between new democracy and low HDI development (poornewdem=1).

Electoral impact: Turnout should be lower in countries where elections are democratic, but where the election can be widely anticipated by a sizable portion of the population to have limited policy impact. This is more likely to be true where:

- a) *who* one supports is not represented in the legislature,
- b) the constitutional line of electoral accountability is ambiguous and the election is not decisive,
- c) corresponding civil liberties are weak (i.e., in illiberal democracies), and
- d) corruption is high (and rule of law is low).

The first point suggests a rationale for why party list proportional systems with large district magnitudes are so commonly held to attract higher turnout (Blais and Aarts 2006). In such systems, for most people, most votes do go for parties that gain some representation from the district. In majoritarian systems, voters for the losing candidate are, in fact, unrewarded with representation. This is connected to the idea that people are likely to have more platforms (parties) to choose from, but it also helps to explain why simply having “more choices,” in the form of more parties, does not increase turnout. Indeed, as the number of electoral parties grows *beyond the number of seats in a district*, we would be more likely to observe more votes for parties with no representation. To measure the effect, we use a dummy variable for PR systems, counting compensatory mixed systems as PR (similar to BD), and we include a measure of *wasted votes* which is the percentage of national votes that go to parties with *no* seats.

This argument may also reconcile the seemingly contradictory empirical finding that PR and district magnitude, which are associated with more parties, increases turnout, but the number of electoral parties is negatively associated with turnout. The prospect of “regret” implies that there is an optimal number of parties (for maximizing turnout) that is conditional on the electoral system: higher optimum in PR, lower in majoritarian systems. Having parties above the optimum number means that voters confront a larger

chance of casting a vote for a loser. Having fewer parties reduces chances for regret, but also reduces choice, prompting some people to stay home.¹¹

The second main claim is that turnout will be lower where elections are not viewed as decisive. We agree with BD (and others) that when legislative elections are simultaneous with election to other offices (if they exist), turnout will be higher. However, we disagree with limiting the effect of these offices to the timing of their elections on two counts. First, divided powers at the national level pose “accountability problems” which are arguably worse than those in multi-party Parliamentary systems characteristic of PR. In voting, the complexion of the government is never in the hands of individual voters or districts. One advantage for “pure” Parliamentarism (even the multi-party variety) is that constitutional responsibility for government is more clear-cut for the marginal voter they would seem to be the case when power is divided by offices rather than shares of the legislature. Even if I vote, and even if my vote is decisive for one election, it may not be decisive for other important offices (*even if they are simultaneous*).

We identify at least three standard areas of divided accountability: *presidentialism, federalism, and bicameralism*.¹² In the present paper we only estimate effects for presidentialism and federalism, using a dummy variable to designate each. In terms of turnout in legislative elections, we argue that turnout will be lower in states that have strong Presidentialism and/or strong federalism, regardless of whether elections for those positions are simultaneous with the legislative elections or not. We also include BD “decisiveness,” since we do expect that when elections for these other offices are held simultaneously, turnout will be higher than when they are not. We slightly transform BD’s measure to be either decisive—i.e., other major office elections (President, upper chamber, sub-national in federal systems) do not occur or are simultaneous -- or are not -- i.e., some other major office election is non-simultaneous.

The third point is that citizens are less likely to turnout when they reasonably foresee major threats to the outcomes of the democratic process or risks from their

¹¹ Ideally, we would compute this share at the district level. In majoritarian electoral systems, we expect the same relationship to apply at the district level; but there are good reasons to think that we understate the disincentives to vote when we use the aggregate votes for parties that win no seats.

¹² BD deal only with presidentialism, and define it simply as a popularly elected President. Our definition of presidentialism includes a more stringent definition. Presidents must have strong independent powers over government and legislation. For instance, our version counts France as Presidential, but not, contra BD for example, Finland and Ireland.

democratic participation. Thus, turnout should be lower where there are comparatively weak civil liberty protections, where regimes that have intermittently (and recently) suspended political democracy, and where corruption is rife. Moreover, where there is significant civil unrest (e.g., on going civil war), we expect turnout to be lower. Civil conflict likely raises the possibility of electoral violence, and increases the likelihood that non-trivial segments of the electorate reject the legitimacy of democratic politics. We operationalize “weak civil liberties” as an average of 3 or more on the Freedom House civil liberties scale in the year of and prior to the election. We operationalize intermitted democratic history as a democratic election in a country that has lost its democracy and regained it within less than five years. Corruption is measured using scores on the corruption perceptions index; a score below 6 on the scale is considered “corrupt” and civil conflict as the presence of a internal civil conflict in the UCDP/PRIO Armed Conflicts Dataset (Version 4). (Ideally, we would also be able to include in civil unrest, opposition electoral boycotts, as these would obviously reduce turnout).

Thus, the initial model that we want to investigate is the following:

Turnout = D(Compulsory Voting), D(Medium HDI), D(Low HDI), D(Newdem), D(Low HDI*Newdem), D(PR), wasted voted, D(Decisive Election), D(Presidential System), D(Federal System), D(Low Civil Liberties), D(Recent history of Interruption of democracy), D(Corruption), D(Civil conflict)

Table 2 (column 3) provides parameter estimates for our model in the training dataset. The root mean squared error in the training data set is 8.84. Forecasts for the test dataset are, as with BD’s model much less precise, 10.96.

Table 2 about here

Informal analysis of individual model parameters

Informally, we can compare the estimated parameters for each of the variables in the model in both the training and test datasets. A conventional approach to comparing these sets of results would be to see where estimates are statistically significant, presumably in both the training and test data. However, if we want to have some sense of precision, we

might also want to ask whether the parameter estimates are similar in *magnitude* and statistical significance in the parameters values in columns 1 and 2 and 3 and 4..

Results for common variables in both BD and our models:

1. Compulsory Voting Consistent with a long line of previous work, we find that compulsory voting not only increases turnout, but consistently adds about 10-11 points to turnout on average (Blais 2006). Further support for an effect can be seen in two countries where compulsory voting was in place and later abolished, the Netherlands (after 1967) and Venezuela (after 1988). Turnout fell after compulsory voting was abolished by about 12 and 30 points, respectively. Moreover, the unconditional difference in turnout among compulsory and non-compulsory voting is about the same: 10.5 points.

2. Election Decisiveness: When lower house elections are simultaneous with other elected offices, such as a President or a second chamber, or there is a unicameral Parliamentary system, we find that turnout is 4-10 points higher. The unconditional difference is about 7 points. Unfortunately, the range of the estimate in our model (6-10 points) and BD's model (4.5 to 7 points) is quite large.

3. Proportional Representation: Though we find evidence that proportional representation enhances turnout, this evidence appears to be very weak at best. Estimates of the effect range broadly from less than 2 points to about 4.5 in BD's model, and our model produces estimates that are smaller, but somewhat more consistent across the two samples. While the unconditional difference in means is about 4.5 points, Blais' claim that PR only appears to boost turnout in Europe seems borne out. Mean turnout in PR and non-PR systems outside of Europe is almost identical: 72.5 versus 72.4.

Results for variables in BD model only

Aside from results common to both models, only a few results in BD's model appear to provide consistent effects on turnout. Countries in North America have consistently lower turnout than those in Europe, on the order of 7-11 points. (If we add the North America dummy to our model we find similar estimates.) Countries in Oceania average turnout about 4-6 points higher than Europe, but there is a high degree of variance around these estimates. Insofar as these regional dummies are intended to stand in for cultural differences, it might be helpful (and more powerful) to develop more substantive cultural

indicators in the future. (For instance, cultural differences between Canada and Honduras are arguably more pronounced than those between Honduras and El Salvador.)

In addition to region, decisiveness, and compulsory voting, BD's model suggests two other strong effects: national population and wealth. BD's model estimates imply that turnout is about 2-4 points higher for a 10-fold increase in population.

Perhaps the most consistent estimator of turnout in BD's model appears to be GDP per capita. A 10-fold increase in GDP per capita is associated with narrow range of higher turnout: 8-9 points. (Further inspection of their dataset suggests that there may have been a serious miscoding of this variable.)

The replication results suggest little to no support for the effects of several factors popularly thought to affect turnout. In the replication dataset, a higher voting age has a negative, insignificant effect on turnout. A similar pattern emerges for the number of political parties. (Note that this contrasts with the finding for wasted votes in our model.)

Results for variables only present in our model

The forecasting results of our model compare only marginally better with the results in BD's model. The mean squared error for our model is just under 11%, while for the BD model it is about 11.2%. It is notable that we do slightly better in forecasting though we did slightly worse in the training dataset. Of course, neither of these results is particularly impressive when it comes making us able to predict turnout in the future. To get a sense of this weakness, perhaps it is more instructive to examine one more model. This one predicts turnout on the basis of turnout in the last election, estimating turnout in any first election with the overall mean of turnout in the dataset to that point.

One notable set of findings, though they are not consistently statistically significant in the test dataset, is the impact of first elections on turnout. The average effect of first elections in moderately and highly developed countries is in the training dataset is a very *poor* predictor of *first* elections in underdeveloped countries. The average effect is statistically significant in both cases, but about 8 points too low in the training dataset. Substantively more consistent is the lower turnout in the first elections in severely underdeveloped countries. They have 14-17 points lower turnout than other elections.

We also find consistent estimates across models (in terms of magnitude of effect) for wasted votes, (strong) presidentialism, federalism, and corruption. For corruption and

wasted votes, estimated effects are less than 25% different, and both are statistically significant. In terms of the direction of effect, the one surprising result is federalism, which both is predicted to increase turnout by about 3 points.

The results for wasted votes have to be considered provisional given how they are measured. As they stand, the results indicate that for every 10 percentage points of votes for parties in a district that go to “losers” (i.e., parties that do not gain any seats from the district), turnout is about 2 points lower.

Conclusion: Forecasting turnout?

The forecasting results of our model compare only marginally better with the results in BD’s model. The mean squared error for our model is just under 11%, while for the BD model it is about 11.2%. It is notable that our model did just slightly better in *forecasting* though we did slightly worse in the training dataset. Of course, neither of these results seems particularly impressive when it comes making us able to predict turnout in the future. There are many more studies of over time variations in turnout in specific countries (or developed countries) that could surely provide improvements on what we’ve done here.

To get a sense of how well or poorly these model do, we examine one more model. This one uses turnout in the last national election to estimate current turnout. Turnout in any first election is estimated by the overall mean of turnout in the dataset to that point. The estimates and forecast performance of this model is given in the last two columns of Table 2. Lagged turnout fits the training data less well than either BD’s model or our model. However, the forecast performance of the model much better in test data set (9.3 versus 11 and 11.2).

We have little doubt that this, or the two models presented in this paper can be improved upon, perhaps even by simply combining them. Future work will show. The bigger point that we hope to have made here lies instead in where the evidence of that improvement will lie and where it will not. Our examples illustrate that an improvement on in-sample fit provided no improvement in the predictive accuracy of forecasts, and also suggests how statistically and substantively significant parameter estimates may not add *predictive* (i.e., scientifically meaningful) value to understanding any social science phenomenon.

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Turnout by type		
Continuous Democracy	81	76
Born Democratic	73	68
Transitioned to Democracy	81	72
Intermittent democracy	70	64
Overall	78	72
Turnout by region		
	1972-88	1990-2006
Europe	82.8	73.9
N Amer	73.2	65.7
S Amer	72.4	74.7
Africa	67.4	69.1
Asia	67.4	70.4
Oceania	84.8	80.1

Table 1: Average Turnout by democratic history and region

	1		2		3		4		5		6	
	Training	Test+	Training	Test+	Training	Test+	Training	Test+	Training	Test+	Training	Test+
Compulsory voting	11.239	10.368	12.238	10.377								
	[7.79]**	[4.60]**	[8.09]**	[4.12]**								
Decisiveness	4.362	6.966	5.897	10.438								
	[3.84]**	[3.94]**	[4.42]**	[5.03]**								
Proportional Electoral S	4.595	1.976	3.904	3.021								
	[2.64]**	[0.79]	[3.29]**	[1.63]								
N America	-7.472	-10.732										
	[3.32]**	[4.04]**										
S America	-4.668	4.314										
	[2.19]*	[1.36]										
Africa	-5.168	1.373										
	[1.60]	[0.37]										
Asia	-1.376	5.287										
	[0.64]	[1.49]										
Oceania	3.893	5.711										
	[1.47]	[1.65]										
GDP per capita (log10)	9.245	8.216										
	[6.48]**	[4.76]**										
Population (log10)	-1.901	-3.916										
	[2.43]*	[3.64]**										
Voting age	1.4	-1.052										
	[2.69]**	[0.62]										
Proportionality * Disproportionality	-0.272	-0.256										
	[1.91]	[0.94]										
Closeness	-0.128	-0.058										
	[2.18]*	[0.62]										
Parties (log 10)	-8.769	4.044										
	[2.52]*	[0.83]										
One-party vote majority	0.634	6.743										
	[0.33]	[2.17]*										
High HDI			-2.762	-2.983								
			[1.74]	[1.22]								
Low HDI			-4.055	0.625								
			[1.33]	[0.13]								
New Democracy			3.801	12.229								
			[1.98]*	[2.98]**								
Low HDI* New democracy			-13.342	-17.02								
			[3.01]**	[1.74]								
Wasted Votes			-0.197	-0.244								
			[1.96]	[2.04]*								
Presidentialism			-4.971	-4.135								
			[3.07]**	[1.79]								
Federalism			3.389	2.95								
			[2.20]*	[1.26]								
Civil Conflict			-8.238	-1.822								
			[4.55]**	[0.36]								
Corrupt Society			-7.365	-8.954								
			[4.80]**	[4.59]**								
Lagged Turnout							0.883	0.78				
							[.052]**	[.057]**				
Constant	28.254	66.134	75.233	69.379			8.01	14.49				
	[2.24]*	[2.10]*	[52.97]**	[29.68]**			[4.09]	[4.49]**				
n	291	165	290	165	290	163						
R-squared (Training)	0.55	0.50	0.53	0.42	0.50	0.53						
R-squared (Forecast)+	0.31		0.35									
RMSE (Training)	8.76		8.84		8.95							
RMSE (Forecast)+	11.23		10.96		9.32							

Absolute value of t statistics in brackets

* significant at 5%; ** significant at 1%

+-- "Forecast" refers to overall model performance assuming parameters from the Training dataset. The individual coefficients in the "Test" columns (2, 4 and 6) are the estimated parameters **without forecast constraints**. Ideally, these will be very similar to the parameters lying beside them.

Table 2: Parameter estimates of models of comparative electoral participation

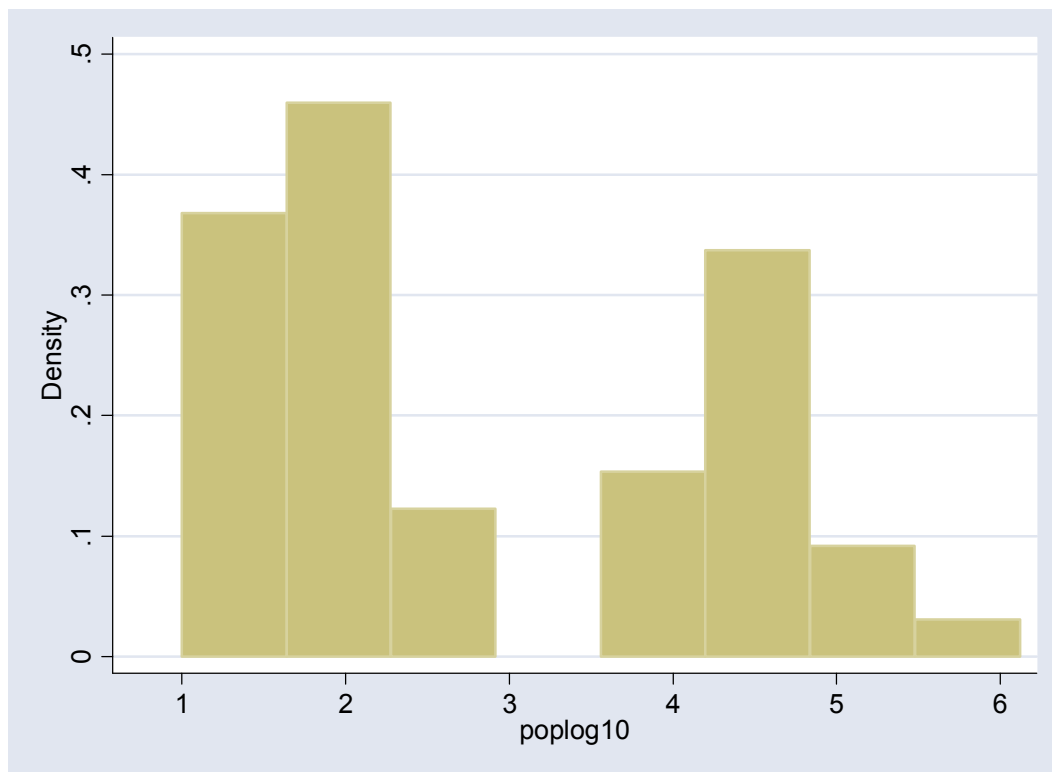


Figure 1: Distribution of elections with missing turnout data by log10 of national population

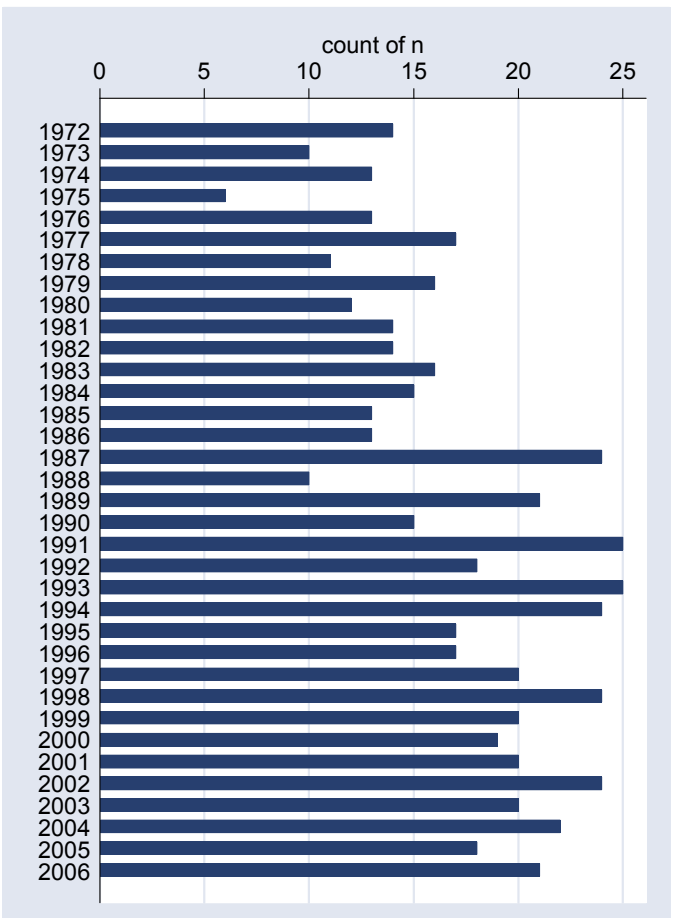


Figure 2: Number of democratic national lower house elections (1972-2006)

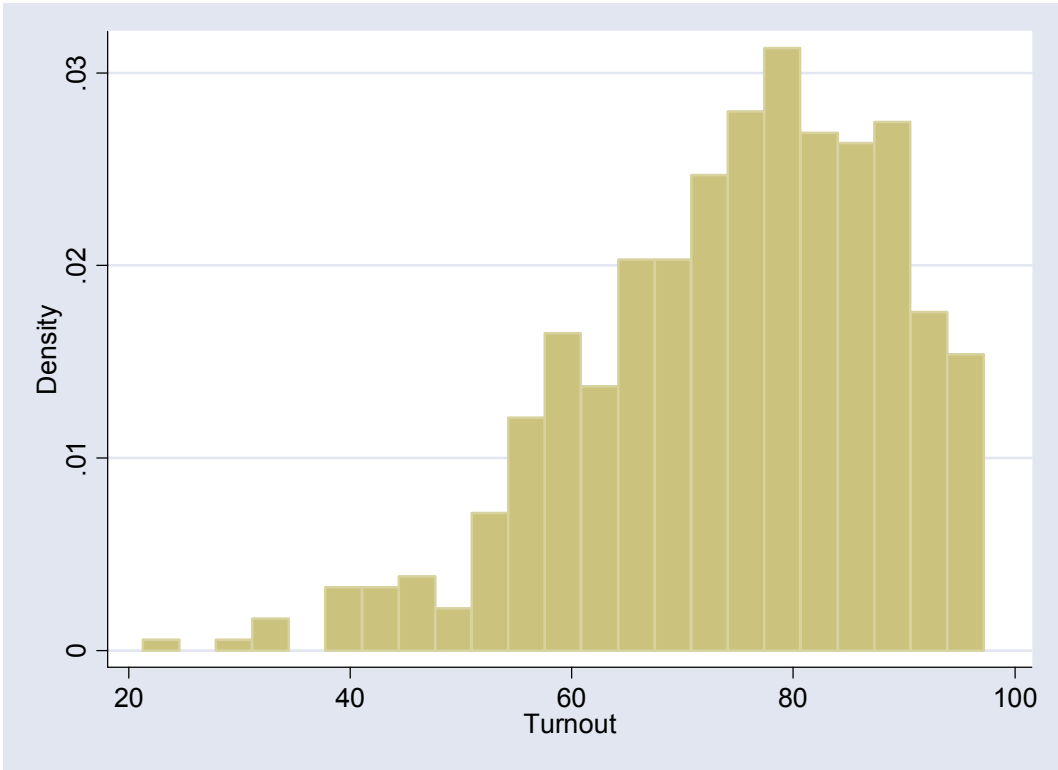


Figure 3: Distribution of turnout in 564 elections 1972-2006

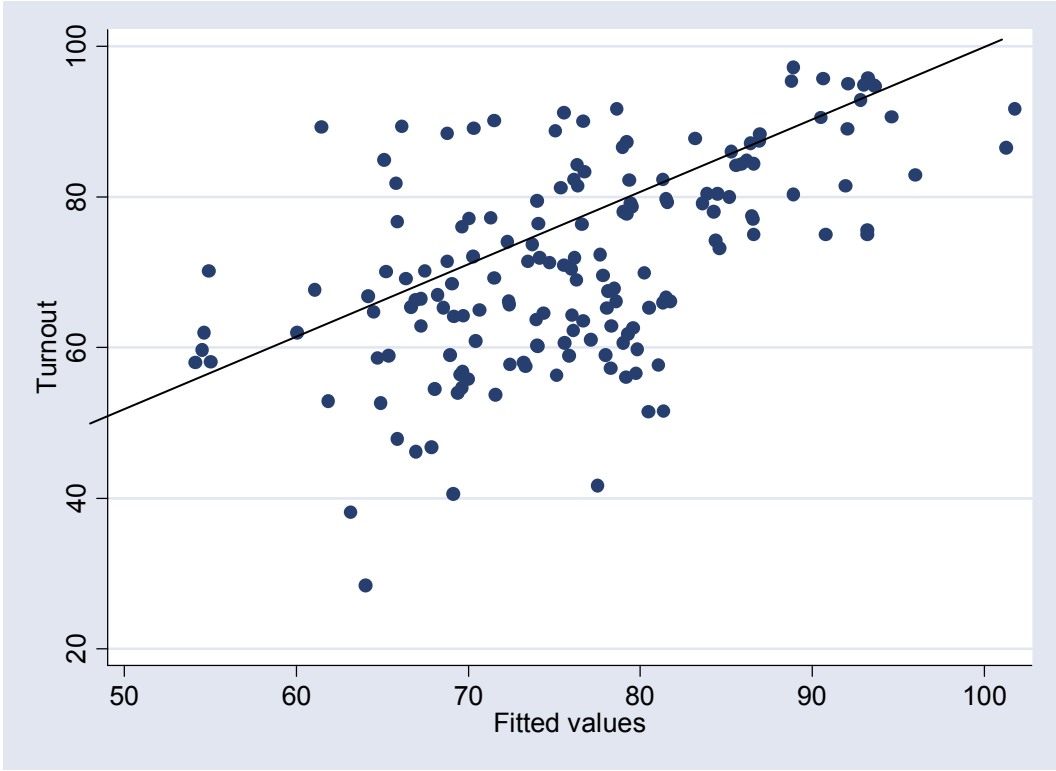


Figure 4: BD-Predicted versus actual turnout in the 165 elections 1995-2006

Appendix A: Countries politically free in 1973-6 and 2001-5*

Australia	France	Nauru
Austria	Germany	Netherlands
Bahamas	Iceland	New Zealand
Barbados	India	Norway
Belgium	Ireland	San Marino
Botswana	Israel	Sweden
Canada	Italy	Switzerland
Costa Rica	Jamaica	Trinidad and Tobago
Denmark	Japan	United Kingdom
El Salvador	Luxembourg	United States
Finland	Malta	

- *Some countries may have been not free between these two periods.*