# Forecasting Elections from Voters' Perceptions of

# Candidates' Ability to Handle Issues

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**Abstract:** We used the index method to predict U.S. presidential election winners based on issues polls. Issues polls ask voters which candidate they expect to do a better job in dealing with the issues facing the country. A simple heuristic, which predicted that the candidate who is rated more favorably on a larger number of issues will win the popular vote, was correct for nine of the ten elections from 1972 to 2008. We then used simple linear regression to relate the incumbent's relative ratings to the actual popular two-party vote-shares. The resulting model yielded out-of-sample forecasts that were as accurate as forecasts from the Iowa Electronic Markets and established econometric models. The model has implications for political decision-makers as it can help to decide which issues to focus on in campaigns.

When deciding about whom to vote for, voters use many different strategies. Redlawsk (2004) reported experimental data showing that some people aim at evaluating the candidates on all issues in order to make the "best" decision whereas others use simple heuristics to limit their comparison to a small subset of issues. In the extreme case, people may compare candidates on a single issue, such as the "economy" (a behavior known as single-issue voting).

Graefe and Armstrong (2010) developed the *big-issue model* to forecast U.S. presidential election outcomes based on only a single piece of information. Using a version of the take-the-best heuristic (Gigerenzer & Goldstein, 1996), the big-issue model predicts that the candidate with the higher voter support on the single most important issue facing the country will win the popular vote. The big-issue model provides a quick and inexpensive forecast that is expected to be accurate when the most important issue is of widespread importance.

In situations where there is no single issue that is clearly more important than others or if the relative importance of issues changes over time, it would seem prudent to include more issues. This is likely to improve on accuracy and stability of the forecast. We tested this assumption and developed a model for forecasting U.S. presidential elections that incorporates voters' perceptions of the candidates' relative performance on the complete set of issues raised in polls. For this, we used the *index method*, a method that is especially useful for selection problems with many variables and a substantial amount of prior knowledge. The resulting *issue-index model* can also aid candidates in developing campaign strategies around issues.

## Index method

The index method has long been used for forecasting and selection problems. Analysts prepare a list of key variables and specify from prior evidence whether they are favorable (+1), unfavorable (-1), or indeterminate (0) in their influence on a certain outcome. (Alternatively, the scoring can be 1 for a positive position and zero otherwise.) The analysts simply add the scores to determine the forecast. The higher the total score, the higher the forecast of the dependent variable. For selection problems with multiple choices, the analyst would pick the option with the highest score.

### Conditions

An important advantage of the index method is that it does not estimate weights from historical data on the variable of interest. This makes the method particularly valuable in situations with small samples and many variables, or in situations in which the variables change over time. The underlying idea is to use unit weights for assessing the directional influence of each variable on the outcome. Thus, the index method requires good domain knowledge (e.g., prior research or expert knowledge).

In general, the index method is useful if (1) a large number of variables are important, (2) good knowledge exists regarding which variables have an effect and the direction of that effect, (3) new variables are likely to arise and (4) valid and reliable quantitative data are scarce. The primary disadvantage of the index method is that it is difficult to estimate the size of the effect a variable has on the outcome.

### *Prior research on unit weights*

The index method is often criticized for giving each variable a unit weight. This skepticism is rooted in people's common belief that employing differential weights will increase the accuracy of a model. However, prior evidence on the relative performance of unit weighting and multiple regression (which estimates optimal weights from existing data) suggests that the issue of weights is *not* critical for selection problems. Rather, evidence has often shown that unit-weight models provide more accurate *ex ante* forecasts than regression weights for the same data.

Einhorn & Hogarth (1975) compared the predictive performance of multiple regression and unit-weighting for selection problems. They concluded that unit weighting outperforms regression if the sample size is not large and the number of predictor variables and inter-correlation among these variables is high.

Empirical studies have been consistent with this finding. In analyzing published data in the domain of applied psychology, Schmidt (1971) found regression to be less accurate than unit weighting. In a review of the literature, Armstrong (1985, p.230) found regression to be slightly more accurate in three studies (for academic performance, personnel selection, and medicine) but less accurate in five (three on academic performance, and one each on personnel selection and psychology). Czerlinski et al. (1999) compared multiple regression and unit-weighting for 20 prediction problems (including psychological, economic, environmental, biological, and health problems), for which the number of variables varied between 3 and 19. Most of these examples were taken from statistical textbooks in which they were used to demonstrate the application of multiple regression. The authors reported that, not surprisingly, multiple regression exhibited the best fit to the training data, which was used to build the model. However, unit weighting showed higher accuracy when predicting new data.

For the domain of election forecasting, Cuzán & Bundrick (2009) applied an equal weighting approach to three regression models for predicting popular vote shares in U.S. presidential elections: Fair's equation (Fair, 1978) and two variations of the fiscal model (Cuzán & Heggen, 1984). For the 23 elections from 1916 to 2004, the equal weighting scheme outperformed two of the three regression models – and did equally well as the third – when making out-of-sample predictions. When the authors used data from the 32 elections from 1880 to 2004, they found that equal weighting yielded a lower mean absolute error than all three regression models.

### *Index models for election forecasting*

Lichtman (2008) was the first to use the index method for forecasting U.S. presidential elections. His "Keys" model assigns values of zero or one to an index of thirteen predictor variables. The model predicts the incumbent party to lose the popular vote if it loses six or more of the thirteen keys. Examples of the keys include two measures of economic conditions, questions of whether the incumbent president was involved in a major scandal, and whether the current administration was affected by foreign or military success (or failure). The "Keys" model provided correct forecasts retrospectively for all of 31 elections since 1860 and prospectively for all of the last seven elections. No model has matched this level of accuracy in picking the winner of the popular vote. In addition, the forecast of the "Keys" model has

decision-making implications: It advises political parties to nominate candidates that are considered national heroes or highly charismatic.

Armstrong and Graefe (2011) used an index of 59 biographical variables to predict the popular vote winner in the 29 U.S. presidential election winners from 1896 to 2008. The variables measured included whether a candidate was married, went to a prestigious college, or was taller than the opponent. The "bio-index" model correctly predicted the winner in 27 of the 29 elections and yielded ex ante forecasts for the four elections from 1996 to 2008 that were as accurate as the best of seven econometric models. The bio-index model also has decision-making implications for political campaigns. It can help political parties to select the candidates running for office.

## Issue-indexes

To capture the perceived issue-handling competence of candidates and translate it into a single score, the index method seemed to be the appropriate choice for several reasons: (1) the number of issues (i.e., variables) that are considered important in a particular election campaign is large (sometimes more than 40), (2) the importance of certain issues (e.g., the economy, crime, or health care) varies substantially between elections, (3) issues arise and disappear over time (e.g., global warming, the war in Iraq, or a financial crisis), (4) the number of observations is small (i.e., information about how voters perceive candidates to handle the issues was available only for the last ten elections from 1972 to 2008), and (5) polling results might suffer from measurement error. Following the use of the index method, simple linear regression was used to translate the index scores into predictions of the two-party popular vote shares.

This approach assumes that election outcomes follow the problem concerns of voters. In particular, it is assumed that the voter believes it is important *whether* candidates will be able to handle the issues – not *how* they would solve them.

### Data

Data were collected and analyzed from polls that asked voters to name the candidate who would be more successful in solving a problem. For example: *"Now I'm going to mention a few issues and for each one, please tell me if you think Barack Obama or John McCain would better handle that issue if they were elected president…"* (cf. CNN/Opinion Research Corporation Poll. July 27-29, 2008). The issues included topics such as terrorism, the economy, and immigration. Note that issue and problem are used interchangeably.

**-- Table 1: Final number of polls, issues, and index scores per election year --**

Polling data were obtained by searching the *iPOLL Databank* of the *Roper Center for Public Opinion Research* for the time frame starting exactly one year before each respective Election Day. For the elections before 1988, data was collected by manually searching for all available polls. For the elections from 1988 to 2008, data was collected by searching "better job OR best job" to manage the large number of available polls. For 2008, the data was collected from www.pollingreport.com. Given the lack

of data on issues in the earlier years, the analyses were conducted starting in 1972. As shown in Table 1, a total of 427 polls were reviewed to determine voters' opinion on 314 issues for the ten elections from 1972 to 2008.

### Selecting the issues

In selecting the issues, an operational definition was followed: *"A political issue is a matter of public concern and is something that the next president can be expected to take action about. An issue always focuses on a particular problem. Issues do not include policies for solving problems."* Four coders (both authors and two research assistants) independently classified each issue as to whether or not it fits this definition. If a tie existed between the four coders on a particular issue (i.e., two coders did classify an item as issue while the remaining two coders did not), the authors made the final decision. It is recommended to use four or more independent coders for selecting and coding the issues. The complete data, including the coding of the issues, used in this study are available online: http://tinyurl.com/pollyissues-data.

### Generating the index and calculating scores

Voters' support for the candidates on each issue was used as a variable in the index. On each day in the forecast horizon, results were averaged from all available polls to calculate the voters' support for the candidates on a particular issue. In case of repeated polls by the same polling institute, poll results were first averaged for each polling institute. Averaging was expected to improve reliability and thus to reduce forecast errors.

For each issue, index scores were generated for the candidates; assigning "1" to the candidate receiving the higher voter support and "0" to the opponent. In cases in which candidates achieved equal voter support, both candidates were assigned "0." Finally, the index scores were summed to calculate the overall index score (S) for each candidate. The calculation of a two-issue-index is displayed in Table 2 as an example of how scores were derived.

**-- Table 2: Example calculation of simple two-issue index scores --**

### Issue-index heuristic to determine the election winner

The following heuristic was used to predict the popular vote winner: *the candidate with the higher overall index score (S) will win the popular vote*. Note the heuristic's simplicity; it does not require historical information from previous elections. In using S to forecast the election winner of a specific election, the model only draws on information from the respective election year.

Table 1 shows the heuristic forecasts on Election Eve in a particular election. The forecasts correctly predicted the winner of the popular vote for nine of the ten elections in our sample. In 1980, it did not predict Reagan to win against Carter.

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### *Issue-index model to predict two-party vote shares*

Simple linear regression was utilized to generate the issues-index model in order to predict the two-party popular vote shares. The predictor variable is the relative index score (I) of the incumbent party's candidate, which represents the percentage of the issues that favored the candidate of the incumbent party. That is, only a single predictor variable is used to represent all issues. The dependent variable is the actual two-party popular vote share received by the candidate of the incumbent party (V). For the ten elections from 1972 to 2008, this yielded the following vote equation: $V = 40.3 + 0.22 * I$. Thus, the model predicts that an incumbent would start with 40.3% of the vote; from there, depending on the value of I, the incumbent would be able to increase his share of the vote. If the percentage of issues favoring the incumbent went up by 10 percentage points, the incumbent's vote share would go up by 2.2 percentage points. Consistent with traditional forecasting models, the model reveals a slight advantage for the incumbent. If the candidates achieve equal index scores (i.e. $I = 50\%$), the candidate of the incumbent party is predicted as the winner (i.e., $V = 51.3\%$). REMEMBER NOTE ON BASIS

## Forecast accuracy of issue-indexes

For each election year, the forecast origin started 150 days prior to Election Day, which was moved forward by one day at a time until Election Eve. For elections that occurred from 1980 to 2008, forecasts could be calculated for each of the 150 days prior to Election Day. For the elections in 1972 and 1976, the first issue poll was released 88 and 124 days prior to Election Day, respectively. Thus, a sample of 1,412 forecasts was collected over all ten elections.

The issue-indexes provide two ways for predicting the outcome of elections: (1) a simple heuristic to predict the popular vote winner and (2) the issue-index model to predict the popular vote winner and to forecast the popular two-party vote shares.

### *Predicting the election winner*

The performance of issue-indexes for predicting the correct winner varied with new polls becoming available during the forecasting horizon. The results, reported as the hit rate, are shown in Table 3. The hit rate is the proportion of forecasts that correctly determined the election winner.

The issue-index *heuristic* correctly predicted the winner 72% of the times. This performance was achieved without using information from previous election years. The forecasts of the issue-index *model* performed better. These forecasts were calculated through N-1 cross-validation, which is a standard procedure in forecasting research for measuring out-of-sample accuracy. This means that the observations from nine elections were used to build the model (i.e., training data) that made a forecast for the one remaining election. The model correctly predicted the winner 79% of the times.

**-- Table 3: Number of daily forecasts and hit rate of issue-indexes --**

### Predicting the incumbent's two-party vote share

Most of the traditional forecasting models produce their forecasts around Labor Day in the respective election year, about eight to nine weeks prior to Election Day. Table 4 reports the forecasts of the issue-index model calculated about nine weeks, or 63 days, before Election Day. Again, the forecasts were calculated through N-1 cross-validation. The model correctly predicted 8 out of the 10 elections and yielded a mean absolute error (MAE) of 3.5 percentage points. In addition, Table 4 shows the respective forecasts calculated on Election Eve, which correctly predicted 9 out of the 10 elections, with a MAE of 3.6 percentage points.

**-- Table 4: Out-of-sample forecasts of the issue-index model and actual votes for the incumbents --**

### Performance of the issue-index model compared to econometric models and the big-issue model

The critical test is how well the models forecast prospectively (that is, for years not included in the estimation sample). *Ex ante* forecasts were generated for the last three elections from 2000 to 2008 by successive updating. That is, only data that would have been available at the time of the respective elections were used for building the model. To predict the 2008 election, data on the nine elections from 1972 to 2004 were used; for the 2004 election, data on the eight elections from 1972 to 2000 were used; and, for the 2000 election, data on the seven elections from 1972 to 1996 were used.

The results are shown in Table 5, along with forecasts from eight econometric models for which we could obtain comparable ex ante forecasts. Most of these forecasts were published in *PS: Political Science and Politics*, 34(1), 37(4), and 41(4). The forecasts for Fair's model were obtained from his website (http://fairmodel.econ.yale.edu). The forecast of the big-issue model was derived from Graefe & Armstrong (2010). For an overview of the predictor variables used in most of the econometric models, see Jones and Cuzán (2008).

**-- Table 5: Issue-index model, econometric models, and big-issue model:
Absolute errors of ex ante forecasts (calculated by successive updating) --**

On average, the early September forecasts yielded a lower MAE than each of the eight econometric models. In addition, the MAE was only about half as large as the average error of the econometric models and the big-issue model. Note that in addition to being more accurate, the forecasts from the issue-index model were also more reliable: the standard deviation of the forecast errors was lower compared to all econometric models but the model by Norpoth.

However, the early September forecast of the issue-index model did not predict the correct winner in the 2004 election. Early September forecasts provide only snapshots of voters' perceptions at a certain point in time. However, new information becomes available continuously during the election campaign.

Particularly the presidential debates, usually starting in late September, provide a stage for candidates to reveal information on how they stand on the issues as well as to raise new issues. For

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example, across the ten elections in our sample, five new issues on average were raised in polls after early September. In general, voters learn about the candidates' plans and abilities to handle issues during a campaign. As a result, issue-indexes are to be updated whenever new information becomes available.

Table 5 also shows the Election Eve forecasts. On average, these forecasts yielded a MAE of 1.8 percentage points and correctly predicted the winner in each of the three elections. These results suggest that the issue-index model can track candidates' campaign efforts. For example, comparing the 2004 forecasts for Bush in early September and on Election Eve, one might speculate that Bush did well in addressing issues for which voters favored him. The data revealed that, in sum, five new issues were raised in polls after the end of August 2004: (1) funding scientific and medical research, (2) controlling the spread of nuclear weapons, (3) family values, (4) guns, and (5) Israel and Palestinians. Voters favored Kerry only for the first issue; for the remaining four issues, they favored Bush. In addition, Bush was able to gain voter support for two issues ('foreign policy' and 'relations with other countries') for which Kerry was favored by early September.

### Relative performance of the issue-index model and the Iowa Electronic Markets

In recent elections, the number of polls has grown rapidly and new polls are published almost on a daily basis. As a result, the issue-index forecasts may change frequently. Thus, the forecasts of the issue-indexes were compared to forecasts from prediction markets, which provide daily updated forecasts.

Betting markets to predict election outcomes have an interesting history. Rhode & Strumpf (2004) studied historical betting markets that existed for the 15 presidential elections from 1884 through 1940 and found that these markets "did a remarkable job forecasting elections in an era before scientific polling" (2004:127). In 1988, the *Iowa Electronic Market* (IEM) was launched as a futures market in which contracts were traded on the outcome of the presidential election that year. Initially, the IEM, commonly viewed as a *prediction market*, provided more accurate election forecasts than trial-heat polls. In comparing IEM vote-share prices with 964 trial-heat polls for the five presidential elections from 1988 to 2004, Berg et al. (2008) found that IEM market forecasts were closer to the actual election results 74% of the time.

### Predicting the winner

We compared the relative performance of issue-indexes and the IEM's *vote-share* and *winner-take-all* markets. The vote-share markets provide a quantitative forecast of the two-party popular vote-shares achieved by the candidates. Winner-take-all markets provide a forecast of which candidate will win the popular vote. For the six elections from 1988 to 2008, Table 6 shows the hit rates of the issue-index heuristic, the issue-index model (forecasts calculated by cross-validation), and the two IEM markets for the last 150 days prior the Election Day.[1] For each day, the last traded price of the two IEM markets was used.

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[1] Forecasts for the 1992 winner-take-all markets were only available from 116 days prior to election day.

Both the issue-index heuristic and the model performed well and yielded higher hit rates than the vote-share markets. The winner-take-all markets, available from 1992 to 2008, outperformed the issue-index heuristic but were inferior to the issue-index model, which achieved 90% correct predictions. The results suggest that issue-indexes can contribute to predicting who will win.

*Predicting the vote-shares*

The relative performance of the IEM vote-share markets and the issue-index model were also compared in terms of their success in predicting the two-party shares of the popular vote. Across the 150 days in the forecasting horizon, the MAE over the six elections from 1988 to 2008 was similar: 2.3 percentage points. However, as shown in Figure 1, there were differences between both methods over time. While the issue-index model was more accurate early in the forecasting horizon, the IEM was superior closer to Election Day. The results suggest that issue-indexes are particularly helpful for long-term forecasting.

**- Figure 1: MAE of the issue-index model and the IEM vote-share markets (1988-2008) –**

# Discussion

The issue-index model continues the stream of research on using the index method for forecasting elections by incorporating information about how voters perceive the candidates to handle the issues seen as important in a particular campaign. Issues play a fundamental role in election campaigns. Campaign strategists try to make their candidate look competent on issues that are perceived as important and run campaigns to emphasize this issue advantage. If crime handling differentiates the candidates, crime will be emphasized by a campaign. In turn, the issue of crime will become more salient to the electorate. In recent years, an increasing number of polls have been directed at exploring voters' perceptions about issues, and the Internet has made this information more readily available. This enables voters to select the candidate they believe can most effectively handle the issues of concern to them.

In incorporating all available information about issues, the issue-index model assumes that the election outcome is the result of many different decision strategies used by individual voters. This view is supported by Petrocik (1996), who concluded that, based on his content analysis of news reports and voter reports of important issues, election outcomes follow the problem concerns of voters.

A candidate's issue-handling reputation is influenced by issue ownership of the candidate's party (Petrocik 1996). In addition, it might be influenced by relative candidate evaluations. That is, there might be simultaneity and common response qualities about the issue handling assessment and the vote intention. The candidate that is favored on one issue might also be favored (or less repudiated) on issues that normally favor the candidate of the other party. For example, in the 1992 elections, Clinton was viewed as better than Bush on almost all issues; including some on which Democrats almost never fare well, such as dealing with crime.

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Figure 2 shows how voters perceived the candidates' issue-handling competence for the elections from 1972 to 2008. Consistently, Democrats were seen as better in dealing with social welfare issues. Except for 1980, 1996 and 2000, voters favored the Republican candidate on foreign affairs and defense issues. Perceptions of economic and social issues were mixed.

**-- Figure 2: Perceived issue-handling competence of candidates (1972-2008) --**

Note that, as the number of issues increased for more recent elections, differences between the candidates became clearer. In the last two elections, Democrats were favored for economic and welfare issues. The Republicans gained back and kept their advantage for foreign policy and defense in a post 9/11 world. In 2008, voter support on social and other issues switched from Republicans to Democrats.

Candidates might be able to influence their issue-handling reputation by effective campaigning. If issue-handling reputation for a certain problem is about equal for both candidates, a candidate could increase his marketing effort to gain ownership of this issue. Candidates could raise and promote issues that favor them but which have not received attention in the public yet. Finally, candidates could adopt new or revised positions and diverge from traditional party views. By emphasizing such changes, a candidate might be able to change his issue handling reputation as perceived by voters. Issue-indexes can help candidates in identifying issues to focus on in their campaign.

Thereby, it seems beneficial to focus on a large number of issues. For the past three elections, the issue-index model provided more accurate forecasts than the big-issue model, which predicts the election outcome based on information about the single most important issue. In addition, the forecasts from the issue-index model were more stable.

Issue-indexes are simple to use and easy to understand. By using a simple heuristic, issue-indexes allow for predicting the popular vote winner without a need for analyzing historical data. In addition, issue-index scores can be used in combination with simple linear regression to allow for quantitative predictions. However, a disadvantage is the cost of summarizing knowledge to develop the model and to update it with new information.

Unfortunately, its simplicity may be the index method's biggest drawback. Summarizing evidence from the literature, Hogarth (in press) showed that people exhibit a general resistance to simple solutions. Although there is evidence that simple models can outperform more complicated ones, there is a belief that complex methods are necessary to solve complex problems.

Thus, it is not surprising that the index method has faced much skepticism and criticism. An early example is Burgess (1939), who described the use of the index method for predicting the success of paroling individuals from prison. Based on a list of 25 factors, which were rated either "favorable" (+1) or "unfavorable" (0), an index score was calculated for each individual to determine the chance of successful parole. This approach was questioned since Burgess (1939) did not assess the relative importance of different variables and no consideration was given to their magnitude (i.e. how favorable the ratings were).

The issue-index might face similar reservations as it does not (a) weigh the importance of issues and (b) measure by how much voters favor a candidate on a particular issue. However, the issue-index deliberately did not include such information for a number of reasons.

First, it is not clear that this would increase forecast accuracy. The empirical evidence summarized earlier does not support the use of differential weights over unit weights for many problems in the social sciences. Also, when addressing the concerns with the approach used by Burgess (1939), Gough (1962) did not obtain more accurate parole predictions.

Second, there is reason to believe that the relative importance of issues might not matter much. Based on results from a 1985 survey of U.S. voters, Petrocik (1996, p.830) concluded that for many voters "almost any problem is important". In this survey, respondents (divided into Republican and Democratic identifiers) had to rate the importance of 18 issues on a scale from zero (least important) to ten (most important). The average score was 7.8. Of all 36 ratings, 29 achieved a mean score of seven or higher.

Third, weighting the importance of issues and measuring the magnitude of candidate evaluations would boost the model's complexity, in particular in terms of collecting and analyzing data on issue importance. Furthermore, the importance of weights may vary over time. The beauty of the issue-index model is its ease of use.

Nonetheless, we encourage other researchers to address these issues. To support them in this endeavor, we have made our data publicly available. The results are expected to further improve existing knowledge on the relative performance of the index method and differential weighting schemes.

The issues model is not recommended as a stand-alone way to forecast elections as it ignores much relevant information. However, because it uses a different method and draws upon different information than traditional election forecasting models, it is expected that it may help to improve accuracy by combining it with forecasts from other methods (Graefe et al., 2010).

In general, the index model would be useful for many other problems involving a large number of variables, small data sets, and a good knowledge base; conditions that are common for many prediction problems in the social sciences. Examples include selection problems such as predicting which CEO a company should hire, where to locate a retail store, which product to develop, or whom to marry.

## Summary

The index method was applied to the ten U.S. Presidential Elections from 1972 to 2008 for providing a forecast based on voters' perceptions regarding how the candidates would handle the issues. In using a simple heuristic, the approach correctly predicted the popular vote winner in 9 of 10 elections. By tracking the issue polls that are now widely available, candidates can use this information to decide which issues they should stress in their campaigns.

By using a simple linear regression of the incumbent's relative index scores against the actual votes, forecasts were obtained of the popular two-party vote shares. The resulting model provided *ex ante* forecasts that were competitive with forecasts from eight econometric models for the three elections from 2000 to 2008. For the last six elections from 1988 to 2008, the issue-index model yielded a higher hit rate – and similar MAE – than the Iowa Electronic Markets. In addition, the issue index forecasts were

substantially more accurate and more stable than forecasts that relied only upon information on a single issue.

## Acknowledgments

## References

Abramowitz, A. I. (1988). An improved model for predicting presidential election outcomes, *PS: Political Science and Politics*, 2, 843-847.

Armstrong, J. S. (1985). *Long-range forecasting: From crystal ball to computer*, New York: John Wiley.

Armstrong, J. S. & Graefe, A. (2011). Predicting elections from biographical information about candidates, *Journal of Business Research,* 64, 699-706. DOI:10.1016/j.jbusres.2010.08.005.

Berg, J. E., Nelson, F. D. & Rietz, T. A. (2008). Prediction market accuracy in the long run. *International Journal of Forecasting,* 24, 285-300. DOI:10.1016/j.ijforecast.2008.03.007

Burgess, E. W. (1939). *Predicting success or failure in marriage*. New York: Prentice-Hall.

Campbell, J. E. & Wink, K. A. (1990). Trial-heat forecasts of the presidential vote, *American Politics Quarterly*, 18, 251-269.

Cuzán, A. G. & Bundrick, C. M. (2009). Predicting presidential elections with equally-weighted regressors in Fair's equation and the fiscal model, *Political Analysis* 17, 333-340. DOI: 10.1093/pan/mpp008

Cuzán, A. G. & Heggen, R. J. (1984). A fiscal model of presidential elections in the United States, 1880-1980, *Presidential Studies Quarterly*, 14, 98-108.

Czerlinski, J., Gigerenzer, G. & Goldstein, D. G. (1999). How good are simple heuristics? In: G. Gigerenzer, G. & Todd, P. M. (Eds.), *Simple heuristics that make us smart*. Oxford University Press, pp. 97-118.

Einhorn, H. J. & Hogarth, R. M. (1975). Unit weighting schemes for decision-making, *Organizational Behavior & Human Performance*, 13, 171-192.

Fair, R. C. (1978). The effect of economic events on votes for president, *Review of Economics and Statistics*, 60, 159-173.

Gigerenzer, G., & Goldstein, D. G. (1996). Reasoning the fast and frugal way: Models of bounded rationality. Psychological Review, 103, 650–669. DOI: 10.1037/0033-295X.103.4.650

Graefe, A. & Armstrong, J. S. (2010). Predicting elections from the most important issue: A test of the take-the-best heuristic, *Journal of Behavioral Decision Making*, DOI: 10.1002/bdm.710.

Graefe, A., Armstrong, J. S., Jones, R. J. & Cuzán, A. G. (2010). Combining forecasts: An application to U.S. presidential elections. *Working paper*, *presented at Bucharest Dialogues on Expert Knowledge, Prediction, Forecasting: A Social Sciences Perspective*, November 2010, Available at: tinyurl.com/combiningelections.

Gough, H. G. (1962). Clinical versus statistical prediction in psychology. In: L. Postman (Eds.), *Psychology in the making*. New York; Knopf, pp. 526-584.

Hogarth, R. M. (in press). When simple is hard to accept. In: P. M. Todd & Gigerenzer, G. (Eds.), *Ecological rationality: Intelligence in the world*. Oxford; Oxford University Press, pp.

Jones, R. J. & Cuzán, A. G. (2008). Forecasting U.S. Presidential Elections: A brief review, *Foresight*, Issue 10, 29-34.

Lichtman, A. J. (2008). The keys to the white house: An index forecast for 2008, *International Journal of Forecasting*, 24, 299-307. DOI:10.1016/j.ijforecast.2008.02.004

Petrocik, J. R. (1996). Issue ownership in presidential elections, with a 1980 case study, *American Journal of Political Science*, 40, 825.

Redlawsk, D. P. (2004). What voters do: Information search during election campaigns, *Political Psychology*, 25, 595-610. DOI: 10.1111/j.1467-9221.2004.00389.x

Rhode, P. W. & Strumpf, K. S. (2004).  Historic presidential betting markets, *Journal of Economic Perspectives*, 18, 127-142. DOI:10.1257/0895330041371277

Schmidt, F. L. (1971), The relative efficiency of regression and simple unit predictor weights in applied differential psychology, *Educational and Psychological Measurement*, 31, 699-714.

**Table 1: Final number of polls, issues, and index scores per election year**

| Election year | No. of Polls | No. of Issues | Total issue index score for | | Winner of the popular vote (R / D) |
| --- | --- | --- | --- | --- | --- |
| | | | Republican candidate (R) | Democratic candidate (D) | |
| 1972 | 9 | 24 | 17 | 7 | R |
| 1976 | 5 | 23 | 6 | 17 | D |
| 1980 | 15 | 23 | 10 | 13 | R* |
| 1984 | 34 | 37 | 27 | 10 | R |
| 1988 | 6 | 23 | 13 | 10 | R |
| 1992 | 60 | 36 | 9 | 27 | D |
| 1996 | 70 | 27 | 6 | 21 | D |
| 2000 | 68 | 41 | 19 | 22 | D |
| 2004 | 96 | 33 | 17 | 16 | R |
| 2008 | 64 | 47 | 16 | 31 | D |
| **Sum** | **427** | **314** | **Correct predictions** | | **9 out of 10** |

\* incorrect prediction

**Table 2: Example calculation of simple two-issue index scores**

| ISSUE | Poll | Voter support | | Index scores | |
|---|---|---|---|---|---|
| | | McCain | Obama | McCain | Obama |
| Health care | ABC News/Washington Post Poll. June 12-15, 2008 | 33 | 53 | | |
| | Diageo/Hotline Poll. June 5-8, 2008 | 24 | 54 | 0 | 1 |
| | **Mean** | **28.5** | **53.5** | | |
| Terrorism / | ABC News/Washington Post Poll. July 10-13, 2008 | 49 | 43 | | |
| Homeland Security | Time Poll. June 18-25, 2008 | 53 | 33 | 1 | 0 |
| | **Mean** | **51** | **38** | | |
| | **Issue-index scores (S)** | | | **1** | **1** |

**Table 3: Number of daily forecasts and hit rates of issue-indexes**

|  | 1972 | 1976 | 1980 | 1984 | 1988 | 1992 | 1996 | 2000 | 2004 | 2008 | All |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **No. of forecasts** | 88 | 124 | 150 | 150 | 150 | 150 | 150 | 150 | 150 | 150 | 1,412 |
| **Issue-index heuristic** | 1.0 | 1.0 | 0.0 | 1.0 | .54 | 1.0 | 1.0 | .70 | .11 | 1.0 | .72 |
| **Issue-index model** | 1.0 | 1.0 | 0.0 | 1.0 | .54 | 1.0 | 1.0 | 1.0 | .51 | 1.0 | .79 |

**Table 4: Out-of-sample forecasts of the issue-index model and actual votes for the incumbents**

| Election | Actual | 63 days prior to Election Day | | Election Eve | |
|---|---|---|---|---|---|
| | | Predicted | AE | Predicted | AE |
| **1972** | 61.8 | 53.4 | 8.4 | 54.1 | 7.7 |
| **1976** | 48.9 | 47.0 | 2.0 | 44.6 | 4.4 |
| **1980** | 44.7 | 52.9* | 8.2 | 53.5* | 8.8 |
| **1984** | 59.2 | 53.4 | 5.7 | 55.2 | 3.9 |
| **1988** | 53.9 | 51.5 | 2.4 | 52.4 | 1.5 |
| **1992** | 46.5 | 46.7 | 0.1 | 45.3 | 1.2 |
| **1996** | 54.7 | 57.7 | 3.0 | 58.1 | 3.4 |
| **2000** | 50.3 | 51.4 | 1.1 | 53.1 | 2.8 |
| **2004** | 51.2 | 48.8* | 2.4 | 51.5 | 0.3 |
| **2008** | 46.3 | 48.1 | 1.7 | 48.0 | 1.7 |
| **MAE** | | | **3.5** | | **3.6** |

*wrong prediction of the popular vote winner

## Table 5: Issue-index model, econometric models, and big-issue model:
## Absolute errors of out-of-sample forecasts
## (calculated by successive updating)

| Index model | Approximate date of forecast | Forecast error | | | MAE | St.dev of forecast error |
|---|---|---|---|---|---|---|
| | | 2000 | 2004 | 2008 | | |
| Issue-index model | Early September (63 days prior to Election Day)<br>Election Eve | 1.4 | 2.7 | 1.5 | 1.9 | 0.7 |
| **Econometric model** | | | | | | |
| Norpoth | January | 4.7 | 3.5 | 3.6 | 3.9 | 0.7 |
| Lockerbie | May / June | 10.0 | 6.4 | 4.5 | 7.0 | 2.8 |
| Fair | Late July | 0.5 | 6.3 | 2.2 | 3.0 | 3.0 |
| Abramowitz | Late July / early August | 2.9 | 2.5 | 0.6 | 2.0 | 1.2 |
| Lewis-Beck & Tien | Late August | 5.1 | 1.3 | 3.6 | 3.3 | 1.9 |
| Wlezien & Erikson | Late August | 4.9 | 0.5 | 1.5 | 2.3 | 2.3 |
| Holbrook | Late August / early September | 10.0 | 3.3 | 2.0 | 5.1 | 4.3 |
| Campbell | Early September | 2.5 | 2.6 | 6.4 | 3.8 | 2.2 |
| | **MAE** | **5.1** | **3.6** | **2.6** | **3.8** | **1.3** |
| **Heuristic** | | | | | | |
| Big-issue model | Early September (63 days prior to Election Day) | 6.8 | 0.8 | 3.1 | 3.6 | 3.0 |

**Table 6:  Hit rate of the issue-index heuristic and model
and the IEM vote-share and winner-take-all markets**

| | Election year (n=150 per election) | | | | | | Mean 1988-2008 (n=900) | Mean 1992-2008 (n=750) |
|---|---|---|---|---|---|---|---|---|
| | **1988** | **1992** | **1996** | **2000** | **2004** | **2008** | | |
| Issue-index heuristic | .54 | 1.0 | 1.0 | .70 | .11 | 1.0 | .72 | .76 |
| Issue-index model | .54 | 1.0 | 1.0 | 1.0 | .51 | 1.0 | .84 | .90 |
| IEM vote-share | .47 | .42 | .97 | .19 | .90 | 1.0 | .66 | .70 |
| IEM winner-takes-all | - | .78 | 1.0 | .44 | .95 | 1.0 | - | .83 |