

# Are Political Markets Really Superior to Polls as Election Predictors?\*

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Robert S. Erikson  
Columbia University  
[rse14@columbia.edu](mailto:rse14@columbia.edu)

Christopher Wlezien  
Temple University  
[wlezien@temple.edu](mailto:wlezien@temple.edu)

## *Abstract*

Election markets have been praised for their ability to forecast elections, and to forecast even better than the polls. This paper challenges that argument, based on an analysis of Iowa Electronic Market (IEM) data from recent presidential elections. We show that while vote-share market prices do forecast better than naïve one-to-one interpretation of poll results, polls that are properly discounted for the favorite's inflated lead outperform the market. Moreover, winner-take-all market prices predict poorly compared to reasonable win-projections based on the polls. Election markets generally see more uncertainty ahead in the campaign than the polling numbers warrant. The reasons for the poor performance of the IEM election markets are discussed.

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Election markets have recently emerged as an intriguing new tool for predicting elections. These markets—made possible by the internet—now present the possibility that electoral trends can be discerned well in advance by simply consulting the candidates’ latest market prices. Or at least, that is a popular belief.

Modern political markets originated with the 1988 launching by the Business School at the University of Iowa of its Iowa Electronic Market (IEM). The first IEM market was a “vote-share” market for the 1988 Bush-Dukakis presidential contest, in which internet traders electronically buy and sell futures contracts based on their forecasts of the candidates’ actual vote percentages. Since 1992, IEM offers both a “vote-share” market and a higher-volume “winner-take-all” presidential market, in which payoffs go to contracts on the popular vote winner.<sup>1</sup> Along the way, IEM has offered occasional markets on non-presidential races. Most recently, commercial political markets on the internet have entered the field. Most notable is the tradesport.com winner-take-all market on the 2004 US presidential election. Unlike IEM, which has a \$500 limit on individual investments, Tradesport.com has no limit on the amount invested, making it the thicker and arguably more efficient market.<sup>2</sup>

Election markets have drawn considerable favor in both the popular and academic press as an alternative to public opinion polls as a method of predicting elections. As James

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<sup>1</sup> In the IEM vote-share markets, one share of a candidate pays off in proportion to the candidate’s final vote share. For instance, one unit of a candidate who obtains 44 percent of the vote is worth pays 44 cents. A portfolio of one unit of each candidate pays exactly one dollar. A candidate’s unit price therefore represents the market’s expectation of the final vote. If a trader buys a candidate at, say, 40 cents per unit, and the candidate wins the 44 percent as in our example above, the profit is 4 cents on the dollar. If our trader buys at 40 and sells at 50, the profit is 10 cents on the dollar. In the IEM winner-take-all market, one share of a candidate pays off one dollar if the candidate wins and nothing if the candidate loses. A portfolio of one unit of each candidate pays exactly one dollar. A trader who buys one unit of a candidate at, say 40 cents on the dollar, wins either one dollar (a 60 cent profit) or nothing (a 40 cent loss) if the contract is held until market closing following the election. If our trader buys at 40 cents and sells at, say 60, the profit is 20 cents on the dollar. For further details, consult the IEM website, <http://www.biz.uiowa.edu/iem/>.

<sup>2</sup> These “modern” election markets were not the first. Before the development of scientific polling, high-volume Wall Street election markets were an important means of gauging election trends. See Rohde and Strumpf, 1994.

Surowiecki (2004: pp. 35-36) popularizes the argument in *The Wisdom of Crowds*, IEM traders’ “predictions of what the voters of the country will do are better than the predictions you get when you ask the voters themselves what they are going to do.” Across a wide spectrum of academia, one finds this view repeated—as if it has now entered the domain of common knowledge—that the daily prices in the election markets dominate public opinion polls in terms of forecast accuracy. From economists Justin Wolfers and Eric Zitzewitz (2004: p. 112), we learn that the IEM presidential election market has “outperformed large-scale polling organizations.” Echoing Wolfers and Zitzewitz as the source, Law professor Cass Sunstein (2004: p. 42) say of the IEM markets: “Most of the time, they have done better than professional polling organizations.” Political scientists have also begun to see election markets as superior to polls. Gregory Caldeira (2004: p. 779) puts this view to print, asserting that IEM prices “are amazingly stable and close to the final outcome, in contrast to polls, which bounce around, by day.”<sup>3</sup>

The theory of market superiority is seductive: Polls are distorted both by their inherent sampling error and their transient reactivity to short-term stimuli that expire before Election Day. That is, they at best capture preferences as of the day of the poll, i.e., “if the election were held today.” In contrast, disinterested investors in election markets, while certainly incorporating contemporary opinion trends, are capable both of discounting short-term movement in opinion and anticipating subtle electoral forces in advance of their actual impact on public opinion. (For a formalization of this argument, see Kou and Sobel, 2004). The success of election markets has even served as inspiration for expanding the realm of political

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<sup>3</sup> One readily finds the idea of election markets superiority to the polls in popular magazines. Consider the headlines, “Punters v. pollsters: Are betting markets a better guide to election results than the polls?” *The Economist*, April 14 2005 or “The ‘Election Futures’ Market: More Accurate than the Polls? As The U. of Iowa Goes, So Goes the Nation?” *Business Week*, November 11, 1996.

markets to predict political phenomena outside the electoral realm. Indeed, the idea of using markets for predicting terrorism and other international political events—while provoking public outrage from politicians—remains the subject of serious discussion in academic circles (Wolfers and Zitzewitz, 2004; Meirowitz and Tucker, 2004).

Of course, believers in election markets do not draw their enthusiasm solely from theory. They can and do also cite the available empirical evidence from studies that show that markets do in fact predict better than the polls. This evidentiary trail leads back to the organizers of the Iowa Electronic Market themselves, whose series of papers (Berg, Forsythe, Nelson, and Rietz, 2003; Berge, Nelson, and Rietz, 2003; Berg and Rietz, 2005) show that daily prices contain only half the forecast error of the daily polls. Indeed, three days out of four, a poll will be less accurate than the vote-share market price at predicting the election outcome. Someone who played the vote-share market based on the expectation that the division in the latest polls would translate one-to-one into the final vote division would lose decisively in the long run.

The substance of the IEM authors' test of the market versus the polls is accurate and not in dispute. The market price is superior to a naïve reading of the polls. For instance, if the incumbent leads 60-40 in the polls in May while the market says the incumbent will win with 55 percent, the market price is likely to be closer to the Election Day vote division. But is that the fair test of the polls? Election analysts know that it is naïve to believe that vote divisions in polls on any given day in advance of Election Day directly translate into the final vote outcome.<sup>4</sup> For instance, the hypothetical 60-40 lead in May is likely to fade over the course of the campaign. A fair test would ask: based on an assessment of the historical record of the polls, what would be the expected November vote division, given a 60-40 incumbent lead in

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<sup>4</sup> See Wlezien and Erikson (2002); Campbell (2000).

May, and does that offer a superior or inferior prediction compared to the May vote-share prices? Moreover, a thorough test of market superiority would also include an evaluation of the higher-volume winner-take-all market where the idea is to pick winners instead of point spreads. We could ask, for instance, what an analysis of polling history would show to be the odds of the incumbent winning in November given a 60-40 lead in May, and whether this prediction based on polls offers greater certainty than the May winner-take-all price.

This paper offers these further tests of the relative accuracy of the IEM presidential markets versus presidential election polls.<sup>5</sup> Our results put the polls in a much more favorable light than the claims of market enthusiasts. Based on our analysis, an investor with a modest knowledge of how trial-heat polls translate into Election Day outcomes would reap handsome profits from the IEM presidential market. The implication is that where candidate market prices depart from where the polls project that they should be, these deviations contain more noise than signal.

### ***Methodology: An Overview***

We apply two tests of the IEM presidential markets versus trial-heat polls as electoral predictors. First, we apply a new test to the vote-share market. Vote-share leads in trial-heat polls exaggerate the size of actual winning margins, so that it would be naïve to expect winning margins to hold up to Election Day. Accordingly, we discount poll margins by transforming raw poll vote divisions into projections of the Election Day outcome and compare these projections to prices. We find that these poll projections are superior to IEM prices. In three of the five presidential elections with IEM vote share markets, poll projections are more

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<sup>5</sup> Although IEM has conducted markets on other elections besides US presidential elections, testing must be limited to presidential markets because they are the only markets where the daily prices can be compared to a depth of parallel polling data.

accurate than market prices. In four of five elections (with one tie), the week's average poll projection dominates the daily market price.

Secondly, we assess the polls versus market prices in IEM's thicker winner-take-all markets. For this test, we start by converting our vote projections into probabilities of incumbent party victory, based on the projected vote share outcome and the days to the election. Then, we compare the incumbent win probabilities with the win prices in the IEM market to see which ones are closer to the actual outcomes. Here our test shows the polls systematically dominating market prices in all four elections with IEM winner-take-all contests. The implication is that markets are slower to recognize election winners than what can be learned by applying a reasonable understanding of polling history to the interpretation of current polls.

Performing the test of the vote-margin market requires empirical estimates of how—given the number of days before the election—raw poll results translate into expectations of the actual vote division. And the test of the winner-takes-all market requires empirically-based conversions of how expected vote margins translate into probabilities of incumbent victory and defeat. For these tasks, we use a data set of virtually all national presidential trial-heat polls conducted, starting with 1952.

Estimating the projected vote from poll results works as follows. For all days within 200 days of each election, starting with 1952, we record the two-party vote division in the latest trial poll. Where there exists more than one poll ending on a specific date, we pool the polls ending on that date. On dates for which we have no polls ending, we use the most recent poll from preceding days. Then for each day before the election (-1 to -200), we regress the

actual vote margin on the latest polls. The predictions from these 200 equations provide the vote projections.

In making these vote projections, we use only the historical data that would be available to observers of that election. Thus, to estimate the daily vote projections for each year 1988-2004, the regression equations incorporate only observations through the preceding presidential year. For instance, the 1988 equations incorporate only information from polls 1952-1984 while the 2004 equations are based on polls through 2000.

The generic vote projection equation is:

$$V_y = \alpha_t + \beta_t P_{yt} + e_{yt} \quad \text{Equation 1}$$

where  $V_y$  = the actual incumbent-party vote percent in year  $y$  minus 50 and  $P_{yt}$  = the corresponding poll vote division minus 50 in year  $y$  at day  $t$  of the campaign. Separate equations are drawn for each  $t$  from 1 to 200 days before the election for years 1952- $y_{Y-1}$  where  $y_{Y-1}$  is the presidential year preceding the election to be predicted in year  $Y$ . Note that for interpretive convenience, the vote division is measured as deviations from a tied 50-50 vote.

Given equation 1 based on electoral history, we compute the projected vote. This poll-based forecast for  $V_Y$ , the actual vote in year  $Y$ , from the current polls in year  $Y$  at date  $T$  is:

$$\hat{V}_Y = \alpha_T + \beta_T P_{YT} \quad \text{Equation 2}$$

If  $\alpha$  were zero and  $\beta$  were unity, the projection  $\hat{V}$  would be identical to the raw two-party vote division of the polls. But, as any student of political campaigns would know, early leads fade and incumbency sometimes matters. Thus, the daily  $\beta$  estimates are all well below 1.0, as early leads in the polls dissipate over time (see Wlezien and Erikson, 2002). And the  $\alpha$ 's are slightly positive early in the campaign, as incumbents perform better than their early poll

numbers, but slightly negative in the final run-up, as late polls overestimate incumbent party support.

The vote projection equations can be used not only to obtain an expectation of the vote but also the variance around that expectation. The estimated variance in the error term, or  $\sigma_t$ , can be used to estimate the daily forecast errors predicting  $V_Y$  in year  $Y$  from the out-of-sample  $P_{TY}$  in year  $Y$  and date  $T$ . We then insert the forecast error in the standard normal distribution to estimate the probability  $\Phi_{YT}$  of an incumbent victory in year  $Y$  based on the polls at time  $T$ .

$$\Phi_{YT} = \exp \left[ \sigma_t^2 \left( 1 + \frac{1}{n_t} + \frac{P_{YT}^2}{\sum P_{yt}^2} \right) \right] \quad \text{Equation 3}$$

Thus, for each date during the campaign we have two poll-based projections—the projection of the Election Day vote and the projection of the probability that the incumbent party candidate will win. Because our poll data are reported in terms of the beginning and end of the polling period rather than their release dates, we lag the polls’ projections two days when comparing them to market prices. Market prices are the daily closing prices in the vote-share and winner-take-all polls. The only complication in determining market prices is that where there are separate markets for the two major-party candidates, we ignore any third options (e.g., Perot) in determining the relative market prices. For instance, if the winner-take-all market prices for a day in 1992 are 0.30 for Bush, 0.60 for Clinton, and 0.10 for Perot, we would ignore Perot and treat the net price as  $0.30/0.90 = 0.33$  for Bush.

Armed with market prices and poll-based projections, our task is to compare the accuracy of each. For each date of five campaigns with an active IEM market, we compare prices with projections in terms of their match with the election outcome. We start with the vote-share market, comparing the accuracy of vote-share prices for the incumbent candidate

with the accuracy of the projected vote, lagged two days from the final date of polling. We then turn to the winner-take-all market, comparing the accuracy of winner-take-all prices for the incumbent party candidate with the accuracy of the projected probability of an incumbent party win, based on our analysis of polls ending two days earlier.

### **The IEM Vote Share Markets**

We start with the IEM vote share market. Just as the IEM organizers claim, daily prices in this market more accurately reflect the final election outcomes than do the raw poll divisions. Figure 1 shows this. For each of five elections, the market prices are persistently closer to the actual outcome than the raw division in the latest polls. The mean absolute error for market prices was a mere 2.41 percentage points compared to 4.46 for the division in the latest polls for the same date. The market's error was the smaller of the two 75 percent of the time. Table 1, which shows the yearly details, makes clear that the market advantage was decisive over all 5 elections.

-- Figure 1 and Table 1 about here --

The reason for this seeming victory of markets over the polls is that the market discounted the size of leads in the polls, especially when the lead was by the out-party, as in 1988 and 2000. This is exactly how poll results should be interpreted. Poll leads tend to dissipate and early in the campaign, polls inflate the support for the out-party. We will show that when we adjust for these factors, the polls outperform the vote-share market as an election predictor.

Our task is to project the vote based on the incumbent party's share of the two-party vote in the latest poll and the date of the poll. As stated in the previous section, we do this by regressing the actual incumbent vote on the latest poll results for each date of the campaign,

using data from previous election years. With 200 dates to cover (from 1 to 200 days before the election), this is 200 x 5 or 1000 equations. We have separate sets of 200 equations for each election because each new election expands the moving wall of prior information. For 1988, the information set is all polls 1952-1984. By 2004, the set expands to all polls 1952-2000.<sup>6</sup>

-- Figure 2 about here --

In practical terms, these different equations for different years are very similar. Figure 2 shows the changing parameters of the regression equation from 200 days to 1 day before the election, as information for projecting the 2004 election. The first two panels present the constant term and the regression coefficient for the incumbent party percent of the two-party “vote” in the latest polls, all for years 1952-2000. Note that the regression coefficient starts below 0.4 and ends up at about 0.8, with the polls gaining weight over time. The intercept is generally positive, especially during the summer, as a corrective for the poll’s tendency to deflate the incumbent party’s support. Late in the campaign, however, the intercept turns slightly but not significantly negative, as if the late polls begin to artificially inflate the incumbent party’s support. (To interpret the intercept, recall that the dependent variable is measured as a deviation from 50 percent.) The third panel shows the root mean squared error, which reflects the error in predicting the vote from the polls. The error declines over the course of the campaign, as the polls become increasingly informative of the outcome.

Figure 3 compares the market prices with the poll projections where the equations predicting the vote from date specific polls in past elections are used to project the vote. For instance, Figure 2’s parameters are plugged into the 2004 polls to project the 2004 vote on a

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<sup>6</sup> These data were originally collected for a larger project analyzing campaigns and the polls. See Wlezien and Erikson (2002). For each date, all polls ending that date are pooled to form a poll of polls. The polls are averaged, weighting by the number of respondents with a major party preference.

daily basis from the daily polls. As with the comparison of the market with the raw polls, the polls are lagged two days from their final date in the field.

-- Figure 3 and Table 2 about here --

When we use the daily projected vote from the polls rather than the daily raw poll predictions, the market's seeming advantage for forecasting elections vanishes. Indeed, in three of the five elections, the advantage goes to the projected polls. In 55 percent of the cases, the projected poll results are closer to the actual vote than the market price for that date. Whereas the market price's mean absolute error is 2.41 percentage points, the mean error of the projected vote is a slimmer 2.13. Table 2 presents the details.

We can pursue this matter further. It should be evident that our measure of the projected vote, while more sophisticated than the raw division of the poll results, is cruder than it has to be. This is because it is based solely on the most recent polls with no consideration of polling polls' history. One could remark that *despite* the crudity of the measure, the projected vote generally is superior to the market prices. The dominance of the polls comes into sharper view when we substitute a more sophisticated index—the weekly average of vote projections which smooths out the occasional wiggles in the polls, much of which is survey error (Wlezien and Erikson, 2002).

Figure 4 compares daily market prices to the week's average poll projection of the Election Day vote. On 63 percent of the dates, the market price was farther from the actual vote than was the seven-day average of the projected polls. The mean 7-day average of the projected polls is closer to the outcome than the daily market prices in 4 of the 5 elections, losing only in 2000 by a fraction of a point. Whereas the market is off by 2.4 points on

average, the 7-day average of the poll projection is off on average by only 1.7 point, for about a 30 percent improvement over the market.

-- Figure 4 about here --

We can glean some details from the yearly graphs. In 1988, the market correctly ignored the convention-season Dukakis bubble (when he famously led Vice-President Bush in one poll by 17 percent) but generally discounted Bush's lead once it became evident in the polls. In 1992, the market overestimated Bush's strength until the very last days of the campaign. In 1996 the market was more bullish on Clinton's vote margin early and late in the campaign but more accurate than the poll projections for the middle dates of the 1996 summer. The 2000 election saw the market's best performance, as it ignored Gore's brief lead in the polls but then briefly and inexplicably surged to Gore just as Gore was fading in the polls. In 2004, while the polls consistently showed a close election with a slight Bush edge, the market tended to overvalue Bush in the spring but undervalue him in the summer. By fall, both the polls and the market had the race pretty much correct.

By theory, the market's posited advantage over the polls would be greatest early in the campaign when there is a longer time interval until the election for trends to develop that the market can anticipate that contemporary polls cannot. Figure 5 shows the relationship between vote-share prices and seven-day vote projections by time in the campaign, merging observations for different elections. The first panel shows that early in the campaign—more than 90 days before the election—a considerable scatter of vote-share prices around the seven-day average of vote projections. This is as if, early in the campaign, the market anticipates the nature of future shocks to the vote that contemporary polls are not equipped to show. Meanwhile, as the third panel shows, late in the campaign—within 30 days of the election—

the share prices begin to fall in line with vote projections, as if the market tracks the polls now that there are few shocks to come. Do the market's departures from the poll projections early in the campaign signal that the market sees future events that the polls cannot see?<sup>7</sup>

-- Figures 5 and 6 about here --

Markets actually perform most poorly relative to the polls in the early stages of the campaign. Figure 6 shows this by displaying the average error of vote-share prices and vote projections over the timeline of the campaign. Early on, markets respond to information that is—judging by the actual vote—often quite wrong. Only toward the end of the campaign does the market catch up to the polls. For markets to catch up makes considerable sense, because toward the campaign's end they can efficiently absorb the wealth of poll information without being distracted by other possible electoral forces. As Election Day approaches, there is little new for the market to anticipate, correctly or incorrectly.

What do we learn about the vote-share market? Election markets have been touted as augers because they are capable of taking into account information beyond the electorate's preferences at the moment as reflected in the polls. In other words, they supposedly incorporate not only current sentiment but also future shifts in sentiment that can be anticipated by knowledgeable observers. We have learned, however, that prices in the IEM vote share market are no better, and in fact a bit worse, at predicting the vote than are projections based on the day's most recent polls. Where the market holds to a view of the election at odds with the poll projections, it is somewhat more likely to be wrong than right. While the electorate's preferences can change from the time of the poll projections during the campaign, the market cannot be counted upon to anticipate what this trend is.

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<sup>7</sup> As the campaign progresses, the markets and poll projections converge in their forecasts. This is largely due to markets responding to the polls and a lesser amount to the polls realizing changes that the market anticipates. See the "Discussion" section below.

As a final comment on the vote share market, let us consider the profit one could make from knowing that savvy projection from the polls are better estimates of the final vote spread than the market's prices. Suppose for instance, one set up a robotic trading program to always buy vote-share stock in the candidate whose poll-based prospects appear better than the market price. (Suppose also that this market were thick enough that one's trading actions did not affect market prices.) Let us say that every day the market is open, one buys one unit of the candidate who our poll analysis suggests is underpriced. Alas, the profit rate would be only about 1.4 percent of investment. The meagerness of the profit is due to the conservative nature of the vote-share market. On average, one purchases a unit of a candidate at a price of about 50 cents (a market expectation of winning half the votes). Considering the average edge of markets over the polls of about 0.7 points, the expected return for a \$0.50 investment is about \$0.507 for a somewhat meager 1.4 percent profit. However, although the rewards from our market strategy accrue slowly, they should be quite steady. Based on a *t*-test of over 11 on the weekly average of the projected poll's net advantage over the market price—the difference in absolute errors—the probability of a net loss from our poll-based program trading strategy is infinitesimally low.

### **Winner-take-all markets**

With candidate shares either paying off at full value or no value on Election Day, the winner-take-all market offers both greater risk and reward than the vote-share market. The trader's challenge is also more difficult in the winner-take-all market: Rather than wager based on their expectation of the final vote, they must also consider the variance around this expectation in order to assess the probabilities of a Democratic and Republican victory. Our

vote projections include a measure of the variance around the expectation, as shown in the third panel of Figure 2. Based on the degree of fit by which the date's regression coefficient predicts the vote from the polls, one can calculate the forecast error around the point predictions from the poll projections and in turn, estimate the probability that the candidate's margin is greater than zero (that is, 50 percent) and thus wins the popular vote, as per equation 3, above.

Figure 7 shows the winner-take-all prices and the daily projections of the probability of an incumbent party victory. The more erratic of the two series is the poll projection, as the bounces in this series reflect the shifting electoral odds that would be inferred by always projecting from the latest poll readings. Even with these bounces, however, the poll projections are more accurate than the winner-take-all market prices.

-- Figure 7 about here --

For the 1992 election, a good showing for the market or the polls is a score near zero—a low probability that incumbent Bush 41 would win. For the other three elections, a good showing is a score near one—a high probability of an incumbent party popular vote victory. In all four elections (recall there was no winner-take-all market in 1988), the poll-based winner projections dominate the market winner-take all prices.

The general explanation for the poll projections' dominance over the market prices is that the polls were ahead of the market in terms of projecting the winner. In 1992, once Clinton led in the polls, the polls projected a more certain win than the market foresaw. In 1996, the polls projected a Clinton victory with a near certainty that the market price did not match until very late in the campaign. In 2000, both the final poll projections and the late market prices failed to see the Gore "win" in the popular vote. During much of the campaign,

the poll projection was much more favorable to Gore's chances than was the market, allowing the poll projections to score a technical victory in 2000. For much of 2004, the polls persistently translated Bush 43's typical slight lead as an incumbent into a far greater likelihood of victory than the market projected.

The market's sluggish response to what should have been overwhelming poll numbers seems due its assigning of a wide variance to the expected vote. Put another way, in addition to the vote-share market being somewhat behind in estimating the point spread based on information of the moment (see the discussion of the vote-share market), the winner-take-all market overestimates the degree to which unexpected events can overtake the market projection of the point spread. In effect, the market greatly overvalues long-shots.

Figure 8 shows this. The top panels show the daily projected probabilities of incumbent-party victories as a function of the daily projected vote, merging years but sorting by days before the election. The three top panels resemble the typical S-shaped curves depicting a probability from an expectation. The fuzziness is due to different prediction equations for different years and dates. As one goes from early polls to late across the three top panels, we see that the S-curve becomes steeper, reflecting that polls are more predictive over time.

-- Figure 8 about here --

Meanwhile, the middle panels show the winner-take-all prices as a function of vote-share prices for the comparable time periods. The curves are well-behaved in the sense that for a given time-interval, the market's winner-take-all probability assessment is predictable from its vote-share expectation. Note, however, that the slopes of the market curves are less steep than their comparable poll-based curves. This is exactly what would happen if the market puts

a wide variance around its vote-share assessment. The market's degree of uncertainty about its own vote-share expectations is greater than the uncertainty about the poll projections. This is as if the market overestimates the degree to which unanticipated campaign shocks will upend expectations between then and Election Day.

It follows that the slope of the winner-take-all prices on the poll-based projections should be even less steep than the slope of the winner-take-all prices on the vote-share prices. This pattern is born out in the bottom panel. Especially in the early days of the campaign, when the polls project the verdict to be one-sided, the market is quite uncertain, with variation in the poll projections having little bearing on winner-take-all prices.

Figure 9 presents the 1 punch-line of this exercise. It displays the winner-take-all prices as a function of our objective probabilities based on the vote projections. For the early panel, based on data 91 days or more before the election, the prices bear virtually no relation to the probabilities that can be projected from the polls. Indeed, the market cautiously puts the odds at about 50-50 no matter how certain is the poll projection of the likely outcome. By the middle dates (31-90 days before the election, the responsiveness of the market to the poll probability projections improves slightly. By within 30 days of the election, the market moves almost all the way to the poll projections of the probabilities.

-- Figure 9 and Table 3 about here --

How decisive is this victory of the poll projections over the winner-take-all markets? A trader who would have picked the undervalued candidate in the market according to the poll projections would have made the winning choice an astounding 87 percent of the time. As Table 3 shows, the result is a rout in each year. Overall, a trader who had bought one unit of

the undervalued candidate (according to the poll projections) every day would have reaped a 15 percent profit on investment.

### **Discussion: Where Election Markets Go Wrong (and Right)**

So far we have documented that poll projections beat the IEM market. We have learned the source of the winner-take-all market's error to be an overestimation of the degree of surprise still to come during the campaign, so that the market persistently undervalues the current poll favorite's chances. The dominance of poll projections over the vote-share market, while less spectacular, requires explanation. Why did this market fail to do what by theory it is supposed to do—utilize information beyond the snapshot of current sentiment as revealed in the polls—to forecast elections accurately?

What moves the vote-share market? Does it respond to recent voter sentiment, as registered by the polls? Is there any evidence that the vote-share market anticipates actual shifts in voter preferences? To learn the answers to these questions, we regress both market prices and the projected vote on lagged prices and lagged vote projections.

Table 4 displays two equations predicting closing market prices. The first equation predicts Monday closing prices, where the time lag for the lagged variables is one week. The second predicts prices at alternate Mondays where the lag is two weeks. In the table, one sees that market prices respond to lagged prices (no surprise) but also lagged polls. In fact, a comparison of coefficients shows that over a period of two weeks lagged vote projection is competitive with lagged prices as a predictor of current prices.

From Table 4, there can be little doubt that market prices are influenced by the polls. Although IEM is sometimes touted precisely because traders supposedly ignore the polls, the

fact that prices respond to the polls is no indictment of the markets. Market prices should reflect poll those poll trends that are long-lasting.<sup>8</sup>

Note for future reference that Table 4 contains no “fixed” (dummy variable) effects for year. If fixed year effects are added, they are decidedly non-significant and incorporating fixed effects makes virtually no impact on the key coefficients. That is, election context does not matter for determining market prices, once one knows the lagged prices and lagged poll-based vote projections.

Table 5 presents results for parallel models of the weekly average of poll projections as a function of lagged projections and lagged prices. Just as we did with the price equations of Table 4, we use weekly and bi-weekly lags.<sup>9</sup> Here, in contrast with the price models, we show equations with and without fixed year effects, because year effects make a difference and offer clues to the strength and weakness of market prices for electoral forecasting. The attention-getting feature of Table 5 is the strong showing of lagged market prices as a predictor of poll-based vote projections. Their strength inspired us to predict vote projections from prices lagged not only one week or two weeks but even with a lag of four weeks. Thus, Table 5 has six equations—with three different lag lengths, with and without fixed year effects.

What do we learn from Table 5? First, there can be little doubt that market prices help to predict future polls. The proper interpretation of course is not of direct causation, with markets generating bandwagons in the polls. Rather, we should interpret the “effects” of

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<sup>8</sup> Polls shift in the short term due to sampling error and to real but short-term change such as so-called convention bounces. What matters for forecasting are long-lasting bumps in voter preferences that survive until Election Day. See Wlezien and Erikson (2002).

<sup>9</sup> We “observe” the poll projection weekly averages on Mondays (seven day lag) and alternative Mondays (14 day lag) where the polls’ actual end-date is two days earlier (leaving the field on Saturdays).

market prices to be that the election market anticipates change in voter preferences during the campaign, which becomes reflected in the polls.<sup>10</sup>

Secondly, we learn that fixed year effects are decidedly significant, and their presence greatly changes the coefficient for lagged market prices. In each instance, the price effect is about twice as high with fixed effects. This has the following interpretation. With fixed effects, price effects are all within-year, so that a strong effect for lagged market prices means that the stronger “effects” are time-serial: when a candidate’s stock in the market is seemingly overvalued given the poll numbers, a gain in the polls is likely to follow. The coefficients without year effects reflect this process as well, but are compromised by persistent year-to-year distortions in market prices.

Thirdly, when controlling for fixed effects, the “response” of the polls to market prices increases with the time lag. While the response over one week is impressive, it is even more impressive over two weeks, when incorporating fixed effects. When lagged over two weeks, market prices predict the poll-based projected vote slightly better than the lagged projected vote. When the lag is doubled again to four weeks, in a stunning “victory” market prices totally dominate the lagged dependent variable as a predictor of poll-based poll projections. The effect of lagged projections is in fact virtually zero and decidedly non-significant. This is as if the market does a great job of incorporating both polling information but also information about what will move the polls over the subsequent four weeks. It seemingly incorporates the polls so well, that over a four-week horizon, the polls add nothing that the market does not show.

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<sup>10</sup> Another way to demonstrate the market’s anticipation of short-term shifts in the projected vote is to regress market price as the dependent variable on lagged price, current poll projection, and future change (first difference) in the poll projection, using either 7 or 14 day lags. In each instance, the future vote shift is positive and significant.

Before we climb totally aboard the market bandwagon, however, let us mull a fourth observation from Table 5—the large year effects. These fixed effects (which are statistically significant only with lagged prices in the equation<sup>11</sup>) compensate for systematic error in the market prices. These “effects” actually represent market distortions—for market prices to predict poll-based projections, the prices must be adjusted for the market’s persistent tendency to overestimate or underestimate the incumbent’s vote in the particular year.

This leads to a fifth observation about Table 5. The sizeable year effects grow with the lag length. Over two weeks they are roughly twice those for one week. Over four weeks they display further growth, almost doubling once again. By inference, over longer lengths—such as between early polls and the final vote, they should be larger still. The regular growth of year effects with lag length is consistent with the market suffering from judgment biases that persist throughout the campaign. The market distortions from these year-specific persistent market biases more than offset the market’s ability to discern short-term electoral change before it registers in the polls.

Finally, consider our sixth and last observation from Table 5. Ideally we would test markets versus the polls cross-sectionally, with market prices and polls raced as predictors of election outcomes. With vote-share markets over only five elections, that is not possible. However, consider that in Table 5, we have a rough substitute in that the dependent variable—vote projections—measures the state of the election at a particular date in the campaign. The limitation is that the maximum time gap from polls and market to “vote” is four weeks or less while the market’s target is the election-day price. But the advantage is a working  $N$ . The

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<sup>11</sup> Although the year effects are not statistically significant when vote projections are modeled solely as a function of lagged projections, they do approach the traditional .05 cutoff level. The p-values are .06, .06, and .11 for lags of 7, 14, and 28 days respectively.

appropriate tests are the non-fixed effect equations, particularly over 28 days. We see that in a cross-sectional battle of predictors, the lagged vote projection still wins handily over lagged prices. Prices show their worth only when we control for market distortions from year effects. Unfortunately for forecasting purposes, it is difficult to estimate these yearly distortions in advance.<sup>12</sup>

The analysis of this section has provided some insight into why the vote-share prices predict less well than poll-based information. Whereas the market moves well in the short-term—in response to polls shifts past and future (anticipated)—it does a poor job of adjusting its biases about the fundamentals of the elections. While markets may anticipate electoral shifts (*first differences*) objectively, it does a poor job of projecting *levels* of electoral support. The market holds beliefs about the election’s fundamentals that persist even when they are not true.

This brief excursion can only serve as an introduction to understanding why the vote-share market does not live up to the claim of greater accuracy than the polls. For example, beyond persistent biases, another problem with market prices is that they seem prone to the erratic—seemingly random—movement that could be a sign of a thin market.<sup>13</sup> There may be some good news though in the fact that the market distortions seem to be on the decline. The distortions in the first three years of the IEM appear to be larger in magnitude than in 2000 and 2004. Whether this is a real trend, we will have to wait and see.

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<sup>12</sup> Adjusting for market distortion is not impossible. With sufficient observations over a campaign, one could observe how the polls perform relative to recent market projections. By our analysis, persistent market mistakes should be ignored, while a shift in the first-difference of prices relative to the polls should not be.

<sup>13</sup> One might argue that because the market prices display some evidence of autoregressive “error,” prices should be averaged like poll projections. However, if mean market prices provide an improved signal to investors, investors can take further advantage by exploiting short-term variation around the moving average.

## Conclusion

This paper has tested the claim that the new election stock markets offer superior predictions of election outcomes than the snapshots from public opinion polls. By our tests, election markets are not better than the polls for predicting elections. In fact, by a reasonable as opposed to naïve reading of the polls, the polls dominate the Iowa Electronic market as an election forecaster. This is true in the sense that a trader in the market can readily profit by “buying” candidates that informed reading of the polls say are undervalued. Where then do the markets go wrong? First consider the vote-share market. The histories of market prices show that traders tend to hold persistent beliefs about the vote division that contradict the polls and that these persistent beliefs are often wrong. Wrong beliefs get corrected only in the last days before the election, when the polls are difficult to deny. The winner-take-all market tracks the vote-share market nicely, but the winner-take-all prices reveal considerable hedging about the favorite candidate’s chances, as if the market expects more campaign surprises than occur in reality. The existence of persistent mistakes in the vote-share market compounded by the degree of uncertainty about the vote-share estimates makes the winner-take-all market a particularly poor forecasting tool. Based on the experience of the IEM, if the polls show a candidate to hold a decisive lead but the market is unconvinced, bet on the polls.

One could argue that these negative results are drawn from a limited number of election years with examples drawn from a toy market with thin volume and limits on trader spending. With time, the IEM record could improve. And full-blown market like tradesports.com might in the end achieve an efficiency that so far eludes the Iowa Electronic Market. Interesting though these possibilities might be, they are not the question. The claim has been made in the literature that the IEM market dominates the polls, and this claim has wide acceptance. This

claim can be considered true only if vote-share prices are naively compared to the polls without discounting for the likely decline in the size of the polls' vote margins. Very basic interpretations of the polls show them to be decisively better at predicting election vote divisions and—especially—the identity of election winners.

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**Table 1. Vote-Share Market Prices versus Vote-Share in Polls, 1988-2000.**

	Mean Absolute Error: Vote-Share Market Price	Mean Absolute Error: Latest Poll Vote-Share	Market Error as Proportion of Poll Error	Proportion of Days Market Price Beats Polls
1988	3.93	5.55	.71	.60
1992	5.68	7.06	.80	.67
1996	1.01	5.32	.19	.92
2000	0.84	3.08	.27	.88
2004	0.89	1.52	.59	.65
Total	2.41	4.46	.47	.75

Market price vote shares and poll vote shares are measured in terms of incumbent party share of the major-party vote. Poll data are from the latest date with poll ending at least two days earlier. Annual *N*s are 159 in 1988 and 198 in all other years.

**Table 2. Vote-Share Market Prices versus Poll-Based Projected of Election Day Vote-Share, 1988-2000.**

	Mean Absolute Error: Vote-Share Market Price	Mean Absolute Error: Latest Poll Vote-Share	Market Error as Proportion of Poll Error	Proportion of Days Market Price Beats Polls
1988	3.93	2.86	1.34	.28
1992	5.68	4.21	1.35	.25
1996	1.01	1.76	.57	.64
2000	0.84	1.16	.72	.62
2004	0.89	0.79	1.13	.41
Total	2.41	2.13	1.13	.45

Market price vote shares and poll vote shares are measured in terms of incumbent party share of the major-party vote. Poll data are from the latest date with poll ending at least two days earlier. Annual *N*s are 159 in 1988 and 198 in all other years.

**Table 3. Winner-Take-All Prices versus Poll-Based Projected of Probable Outcome, 1988-2000.**

	Mean Absolute Error: Vote-Share Market Price	Mean Absolute Error: Latest Poll Vote-Share	Market Error as Proportion of Poll Error	Proportion of Days Market Price Beats Polls
1992 ( <i>N</i> =116)	.38	.22	1.73.	.15
1996 ( <i>N</i> =198)	.29	.08	3.63	.01
2000 ( <i>N</i> =188)	.50	.43	1.16	.30
2004 ( <i>N</i> =154)	.45	.31	1.45	.09
Total ( <i>N</i> =656)	.41	.26	1.58	.13

Market winner-take-all prices and poll-based projections of outcome probability are measured in terms of the probability of an incumbent party win. Because the winner-take-all market pays off the popular-vote leader rather than the Electoral College winner, Gore is coded as the 2000 winner. As an example of scoring absolute error, the average market price for Bush 41 was .62 in 1988, producing a corresponding error in probability of .38 in the upper left cell.

**Table 4. Regressing Market Prices and on Lagged Prices and Projections**

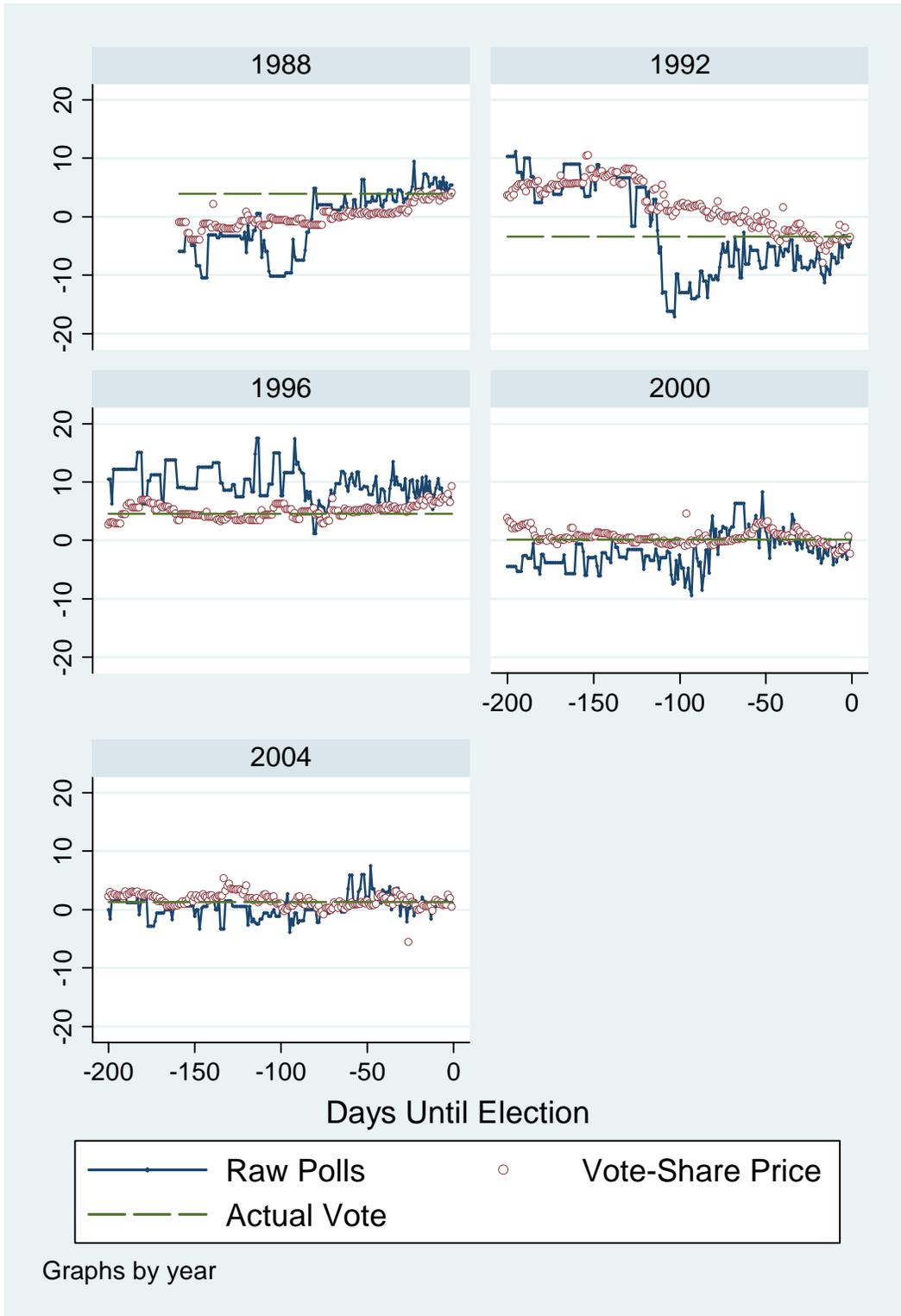
	lag = 1 week	lag=2 weeks
Lagged Market Price	0.67 (0.06)	0.58 (0.10)
Lagged Projected Vote	0.32 (0.06)	0.44 (0.11)
Adj. R squared	.83	.81
N	129	62

Data are the day's readings on Mondays one or two weeks apart, ending with the day before the election. The poll projections are from the week's average of poll projections of the incumbent-party vote, lagged two days. Market prices are prices of the incumbent party candidate.

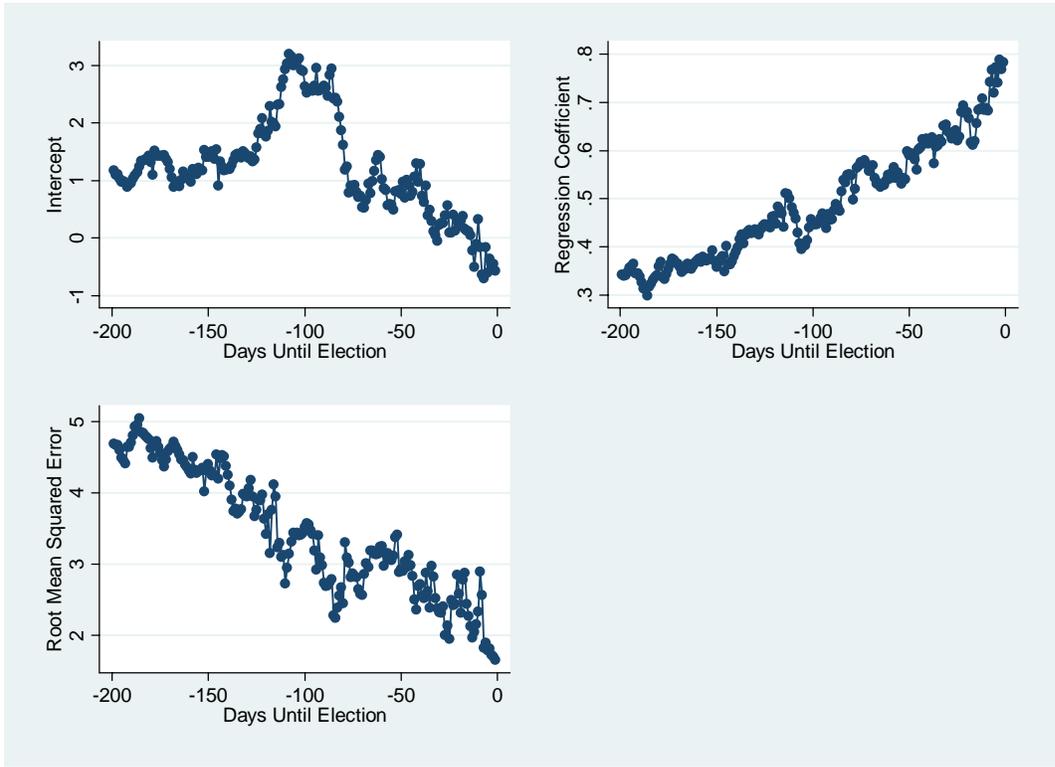
**Table 5. Regressing the Projected Vote on Lagged Projections and Lagged Daily Market Closing Prices: Showing Fixed Effects**

	lag = 1 week		lag=2 weeks		lag=4 weeks	
	No	Yes	No	Yes	No	Yes
Fixed Effects?						
Lagged Market Price	0.11 (0.05)	0.22 (0.06)	0.21 (0.11)	0.40 (0.11)	0.40 (0.23)	0.78 (0.19)
Lagged Projected Vote	0.87 (0.09)	0.70 (0.06)	0.73 (0.11)	0.39 (0.13)	0.58 (0.20)	0.01 (0.20)
Year Dummy						
1988		0.45 (0.27)		0.94 (0.53)		1.54 (0.84)
1992		-0.76 (0.26)		-1.34 (0.51)		-2.32 (0.80)
1996		0.51 (0.30)		1.28 (0.60)		2.30 (1.03)
2000		0.03 (0.25)		-0.04 (0.49)		-0.20 (0.78)
p-value of Year Effects		.0008		.0015		.0013
Constant	-0.05 (0.10)	0.12 (0.19)		0.10 (0.36)	-0.08 (0.220)	0.12 (0.58)
Adjusted R squared	.88	.89	.77	.82	.66	.81
N	129	129	62	62	29	29

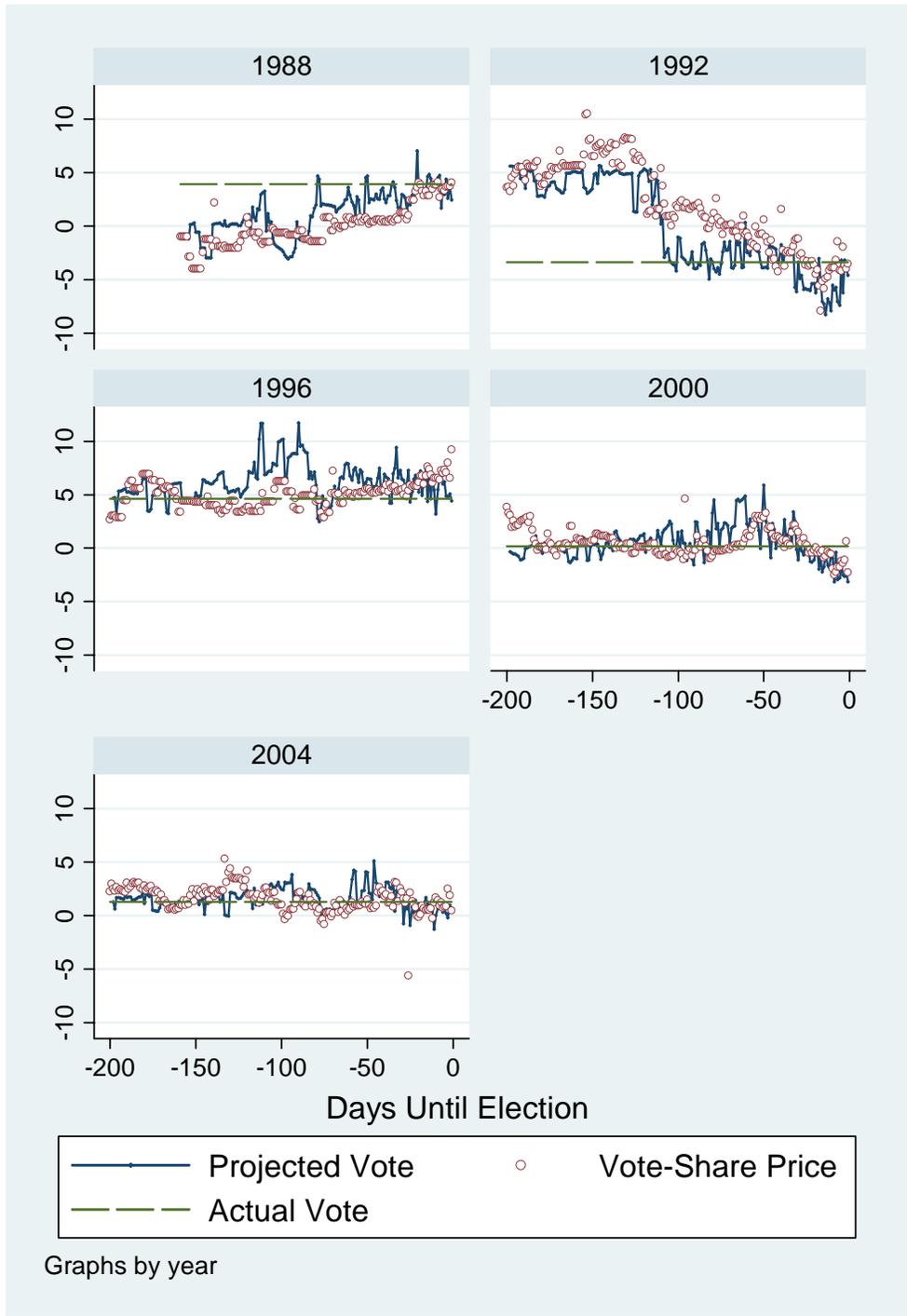
Data are the day's readings on Mondays one, two, or four weeks apart, ending with the day before the election. The poll projections are from the week's average of poll projections of the incumbent-party vote, lagged two days. Market prices are prices of the incumbent party candidate.



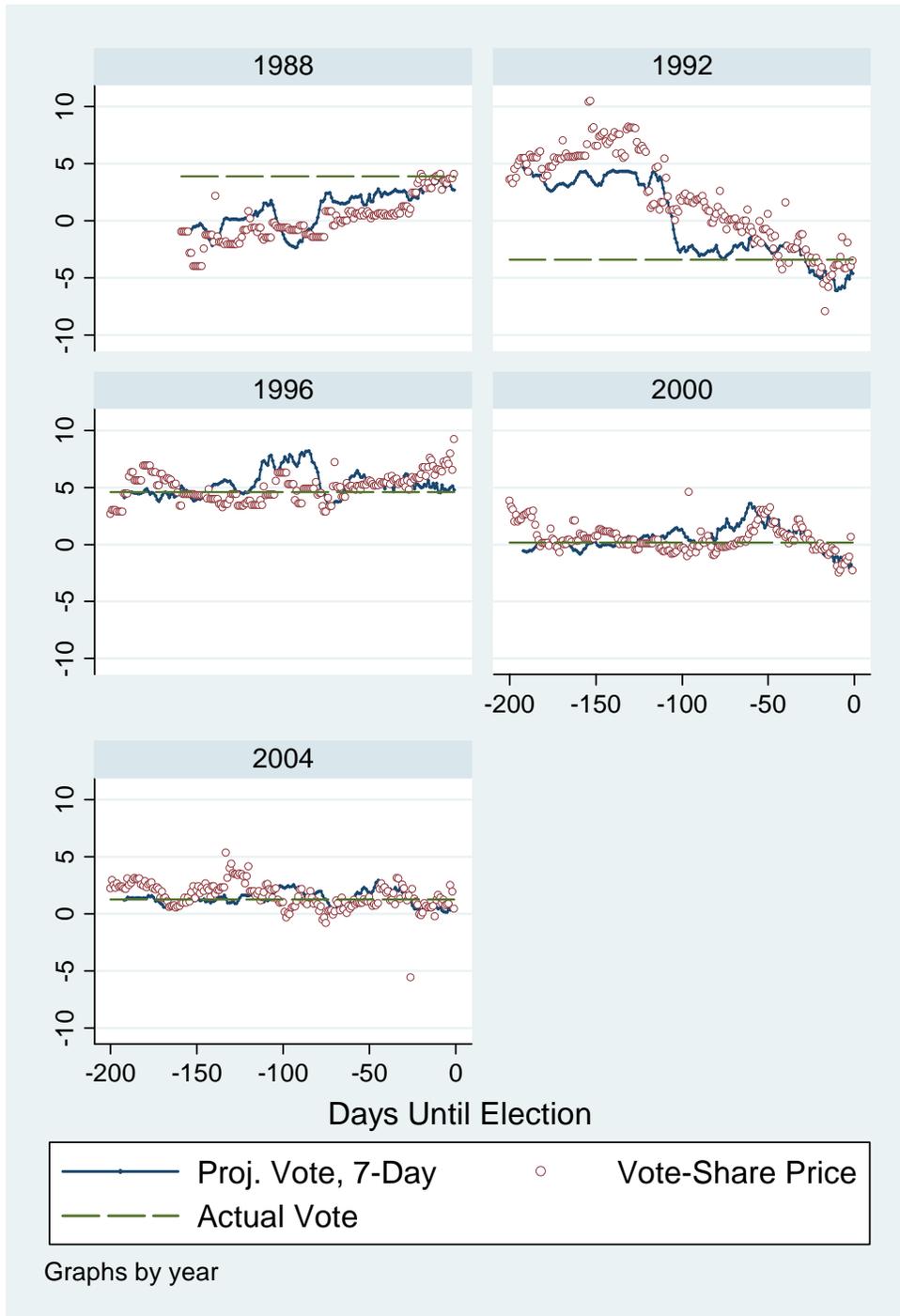
**Figure 1. Vote-Share Market Prices and Trial-Heat Poll Results by Days Until Election, 1988-2004.** Poll results are the two-party vote in the poll of polls ending two days earlier or (if no poll ending two days earlier) the latest poll date before that. Vote-share market prices for the two-party vote are based on the relative prices for the two major-party candidates only.



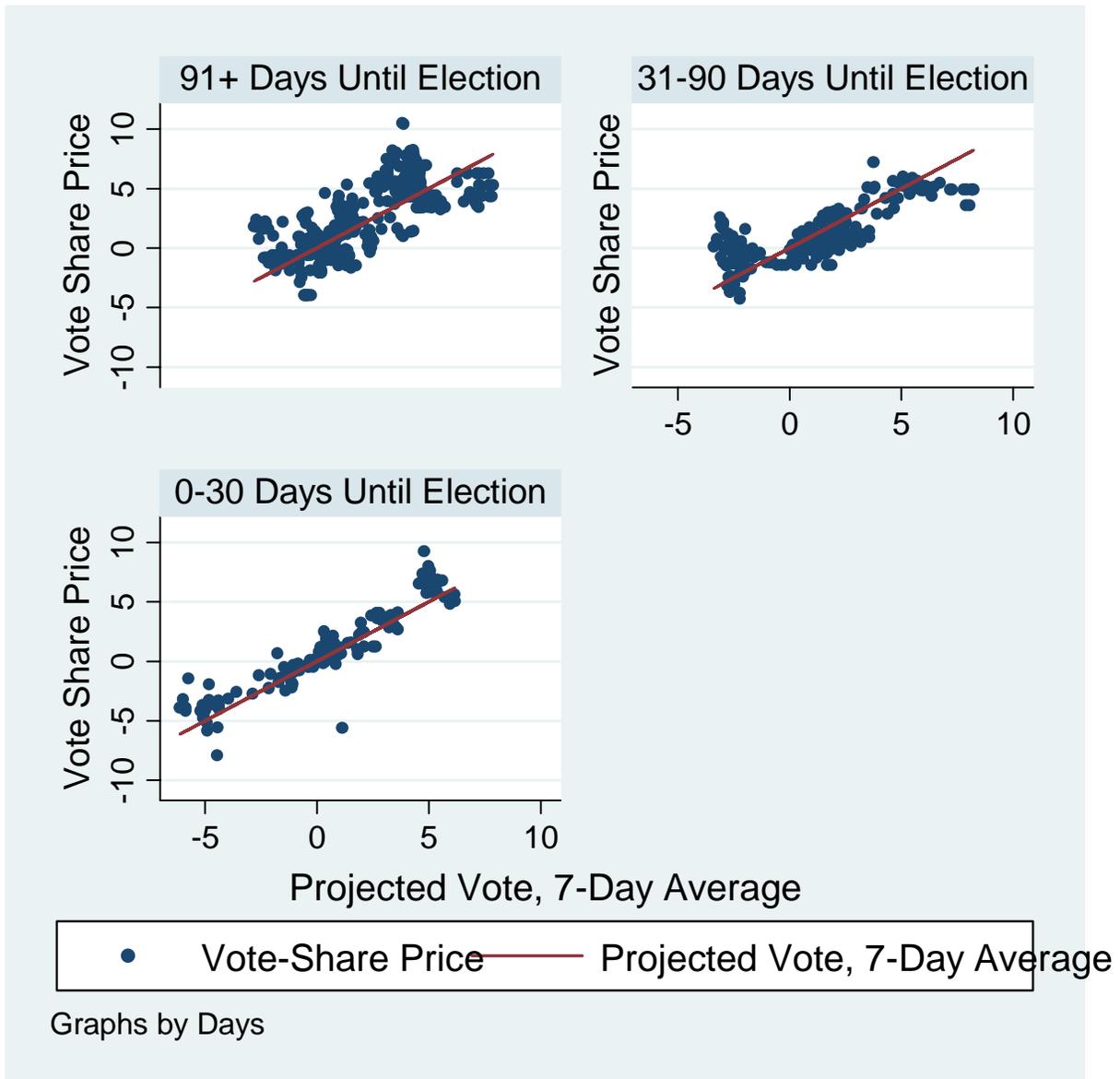
**Figure 2. Results of Regression Equations Predicting the Vote from the Polls for each date, 1 to 200 days before the election.** The first panel shows the intercept of the date's equation. The second panel shows the regression coefficient predicting the vote from the polls. The third panel shows the root mean squared error of the forecast. Observations are for years 1952-2000.



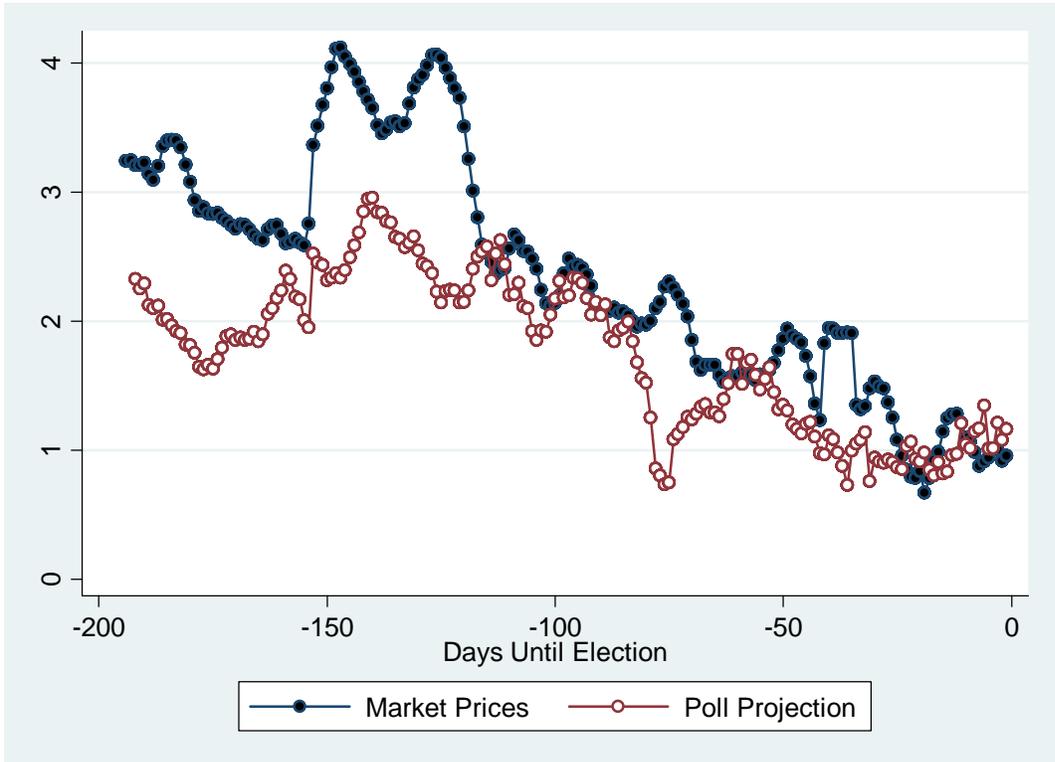
**Figure 3. Vote-Share Market Prices and Poll-Based Projections of Election Day Two-Party Vote by Days Until Election, 1988-2004.** Poll-Based Projections are from the poll of polls ending two days earlier or (if no poll ending two days earlier) the latest poll date before that. Projections are based on regression equations predicting the vote from the polls on date  $t$  for earlier elections 1952 to the previous presidential election year. Vote-share market prices for the two-party vote are based on the relative prices for the two major-party candidates only.



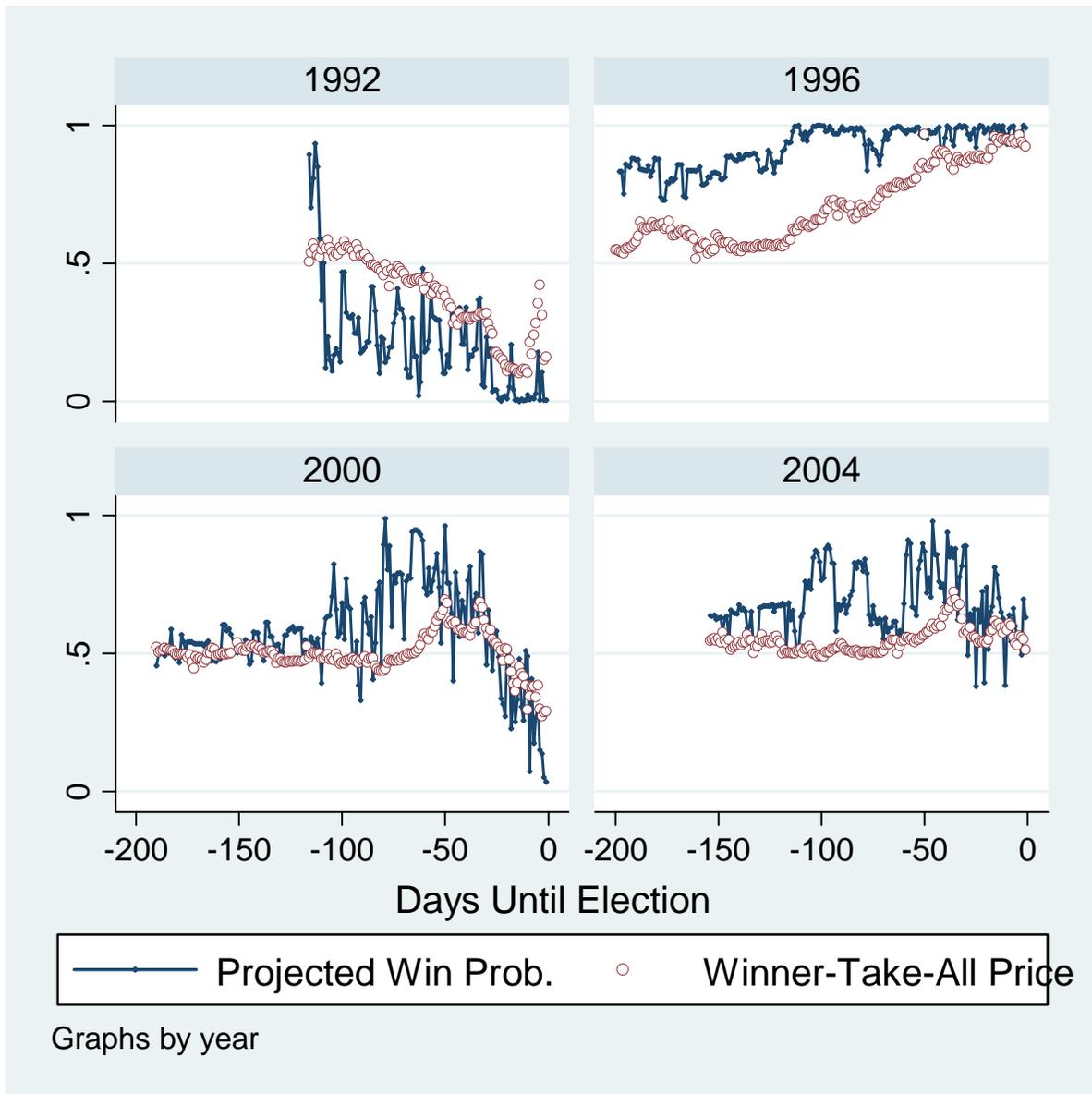
**Figure 4. Vote-Share Market Prices and Weekly-Averaged Poll-Based Projections of the Election Day Vote by Days Until Election, 1988-2004.** Poll-Based Projections are the seven-day average of the projections from the latest polls ending two days earlier, shown in Figure 3. Projections are based on regression equations predicting the vote from the polls on date  $t$  for earlier elections 1952 to the previous presidential election year. Vote-share market prices for the two-party vote are based on the relative prices for the two major-party candidates only.



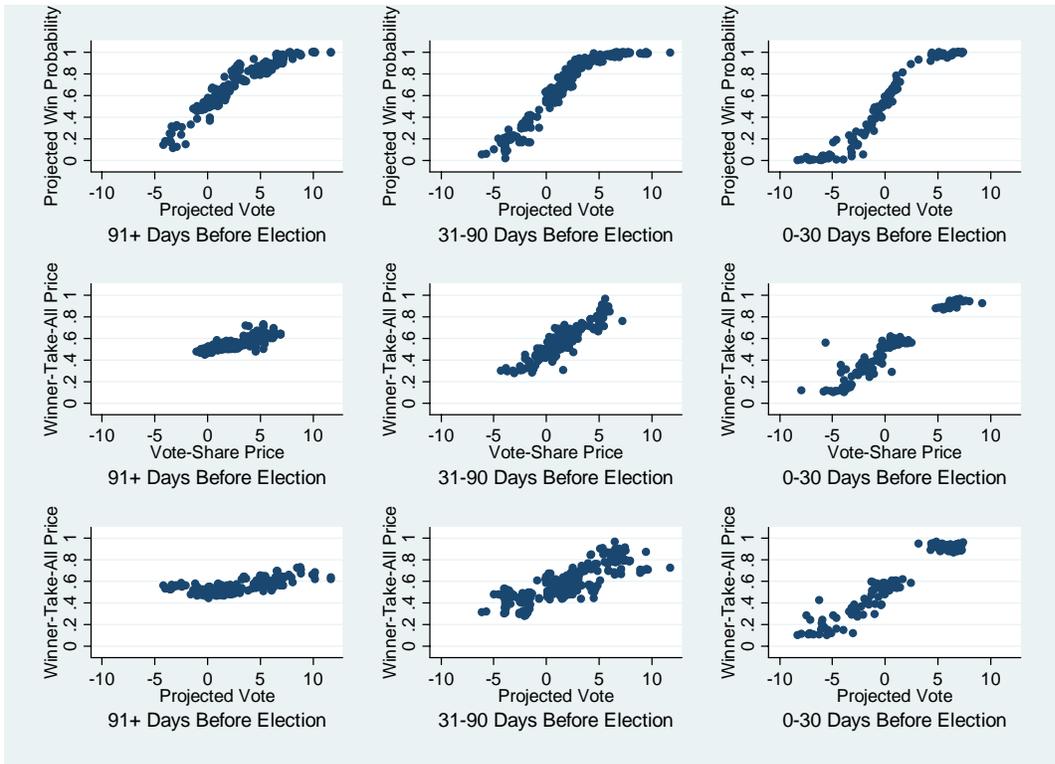
**Figure 5. Vote-Share Market Prices by Weekly-Averaged Poll-Based Projections of the Election Day Vote, 1988-2004, arrayed by days before the election.** Poll-Based Projections are the seven-day average of the projections from the latest polls ending two days earlier, as shown in Figure 3. Projections are based on regression equations predicting the vote from the polls on date  $t$  for earlier elections 1952 to the previous presidential election year. Vote-share market prices for the two-party vote are based on the relative prices for the two major-party candidates only. The diagonal line is a 45 degree line, not a regression line.



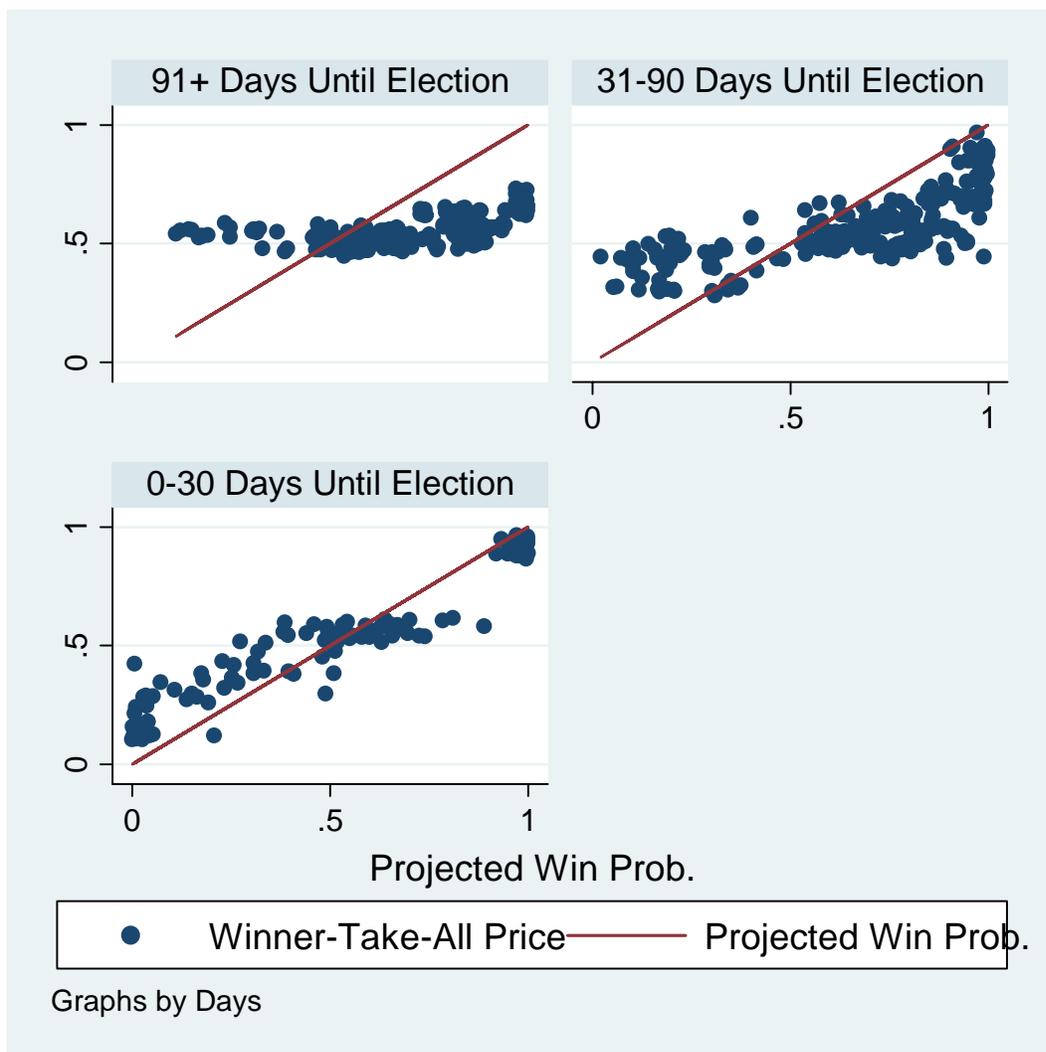
**Figure 6. Mean Absolute Error of Vote-Share Market Prices and of Weekly-Averaged Poll-Based Projections of the Election Day Vote, 1988-2004.** Poll-Based Projections are the seven-day average of the projections from the latest polls ending two days earlier, as shown in Figure 4. Projections are based on regression equations predicting the vote from the polls on date  $t$  for earlier elections 1952 to the previous presidential election year. Vote-share market prices for the two-party vote are based on the relative prices for the two major-party candidates only. Averages incorporate 1988 data beginning with the date 159 days before the election, which was date the 1988 vote-share market opened. For other years, the first data are reported for the date 192 days before the election.



**Figure 7. Market Winner-Take-All Prices and Poll-Based Projections of the Popular Vote Winner by Days Until Election, 1992-2004.** Poll-Based Projections are from the poll of polls ending two days earlier or (if no poll ending two days earlier) the latest poll date before that. Projections are based on regression equations predicting the vote from the polls on date  $t$  for earlier elections 1952 to the previous presidential election. The probability of an incumbent-party win is based on the expectation and the variance. Winner-take-all market prices are based on the relative prices for the two major party candidates only.



**Figure 8. Probability of Incumbent Party Win by Projected Vote (top panels); Winner-Take-All Prices by Vote-Share Prices (middle panels; and Winner-Take-All Share Prices by Projected Vote (bottom panels). Daily data for days when winner-take-all markets are open, 1992-2004.**



**Figure 9. Winner-Take-All Prices by Poll-Based Probabilities of an Incumbent Party win.** By days before election, all dates with a winner-take-all market price, 1992-2004. Diagonal lines are 45 degree lines, not regression lines.