

Iowa Electronic Markets Seat Distribution Forecasts for the 2022 U.S. House and Senate Elections: A Retrospective

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The Iowa Electronic Markets (IEM) are real-money, internet-based futures markets where contract prices reveal information about future events. Since 1988, the IEM has run election markets establishing a track record of accuracy.¹ Self-selected IEM traders invest their own money and trade contracts with payoffs tied to future election outcomes. This incentivizes accurate forecasting. Prices change when price-determining traders' beliefs change. Thus, IEM price dynamics

1. In related IEM Vote Share markets, election-eve vote-share forecasts average 1.34% absolute error in U.S. Presidential elections and 3.3% in other US elections according to the most recent data; see Joyce E. Berg, Thomas S. Gruca, and Thomas A. Rietz, "Designing Prediction Markets to Forecast Multi-Stage Elections: The 2022 French Presidential Election," *PS: Political Science & Politics* 55 (2022): 719–25. Prior research documents accuracy relative to individual polls; see Joyce E. Berg, Forrest D. Nelson, and Thomas A. Rietz, "Prediction Market Accuracy in the Long Run," *International Journal of Forecasting* 24 (2008): 283–98. There is some debate over accuracy relative to averages of polls; e.g., Andreas Graefe, "Embrace the Differences: Revisiting the PollyVote Method of Combining Forecasts for U.S. Presidential Elections (2004 to 2020)" *International Journal of Forecasting* 39 (2023): 170–77; or adjusted polls; e.g., Robert S. Erikson and Christopher Wlezien, "Are Political Markets Really Superior to Polls as Election Predictors?" *Public Opinion Quarterly* 27 (2008): 190–215. Here, we use winner-takes-all (WTA) markets which forecast outcome probabilities, not vote shares. IEM WTA prices generally reflect actual outcome frequencies with the possible exception of very high or low probability events, see Joyce E. Berg and Thomas A. Rietz, "Longshots, Overconfidence and Efficiency on the Iowa Electronic Market," *International Journal of Forecasting* 35 (2019): 271–87.

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aggregate information in a matter significantly different from polls, poll averages, or statistical models.

The IEM ran three winner-takes-all (WTA) markets to forecast outcomes resulting from the 2022 U.S. midterm elections. Contracts traded in WTA markets pay \$1 if an associated event occurs and \$0 otherwise. Aggregating traders' expectations, contract prices should equal market consensus expected values.² Hence, prices reveal forecast probabilities of events occurring (i.e., $p_t = q_t \cdot \$1 + (1 - q_t) \cdot \$0 = q_t$, where q_t is the event probability and p_t is the market price). From prices, we derive forecast seat distributions for the House and Senate. As the election approached, there was little reduction in uncertainty about the Senate outcome and increasing uncertainty about the House outcome.

2022 Model

We focus on two IEM markets associated with the 2022 US elections. The "House22" market offered three contracts:

Contract	Pay \$1 if
DH.gain22	Democrats gain seats in the House. ³
DH.hold22	Democrats hold a House majority, but do not gain seats.
DH.lose22	Democrats lose the House majority.

The "Senate22" market offered three contracts:

Contract	Pays \$1 if
DS.22	Democrats hold outright Senate majority. ⁴
RS.22	Republicans hold outright Senate majority.
OS.22	Neither party holds outright majority.

Given information available at date t , each price reveals the associated outcome probability, while measuring an area under a forecast seat distribution function.

2. See Berg and Rietz, "Longshots."

3. Here, majority means more than 217 seats held by the party and does not include aligned independents.

4. Here, majority means more than fifty seats or fifty seats plus the vice presidency held by the party and does not include aligned independents.

Table 1. Bids and Asks from the Senate22 Market at Midnight on Election Eve (November 7, 2022)

Contract	Bid	Ask	Midpoint	Normalized Midpoints
DS.22	\$ 0.061	\$ 0.140	\$ 0.101	\$ 0.104
RS.22	\$ 0.617	\$ 0.710	\$ 0.664	\$ 0.689
OS.22	\$ 0.170	\$ 0.229	\$ 0.200	\$ 0.207
Sum			\$ 0.964	\$ 1.000

Note: Also includes bid/ask midpoints, the sum of the midpoints, and normalized midpoints.

Thus, we can infer: (1) each outcome probability, (2) the level of uncertainty in the outcome, and (3) a point on the cumulative seat distribution.⁵ Consequently, prices allow us to estimate forecast seat distributions for each chamber.

2022 Forecast Accuracy

Following prior research, we use as the daily “price” the bid/ask midpoint at midnight. We then normalize by dividing by their sum to forecast probabilities of each outcome in the market. Table 1 contains an example. It shows bids and asks from the Senate22 market at midnight on election-eve (November 7, 2022). Midpoints are calculated as: $((\text{Bid} + \text{Ask})/2)$. Normalized midpoints, which we use as prices, are calculated as the individual midpoint divided by the sum of midpoints.

The following figures show how these normalized prices evolved during the 100 days preceding the election.⁶

Figure 1 shows a consistently high probability of Republican House control—the eventual outcome. However, it only rose above 90% for the first time on October 31, 2022. Figure 2 shows little consensus on the Senate outcome until the Republican probability rose in the last four weeks.⁷ But, it peaked at 73.2%, four days before

5. Note, neither independent in the Senate was up for reelection.

6. Since prices aggregate trader information, price movements arise from new election-relevant information. Joyce E. Berg, Christopher Penney, and Thomas A. Rietz, “Partisan Politics and Political Prospects: Evidence from the Iowa Electronic Markets,” *PS: Political Science and Politics* 48 (2015): 573–78, analyze the connection between information events and price movements.

7. A rigorous analysis of this trend is beyond our scope here. However, October news articles focused on several key Senate races: Georgia, Nevada, and Pennsylvania. For example, Shane Goldmacher, Reid J. Epstein, and Jonathan Weisman, “4 Weeks Out, Senate Control Hangs in the Balance in Tumultuous Midterms,” *The New York Times* (October 8, 2022), <https://www.nytimes.com/2022/10/08/us/politics/senate-midterm-elections.html>, state “whichever party wins two of those three would be strongly favored to be in the majority.” Both parties advertised heavily in these states and traders may have been responding to the resulting tightening of races.

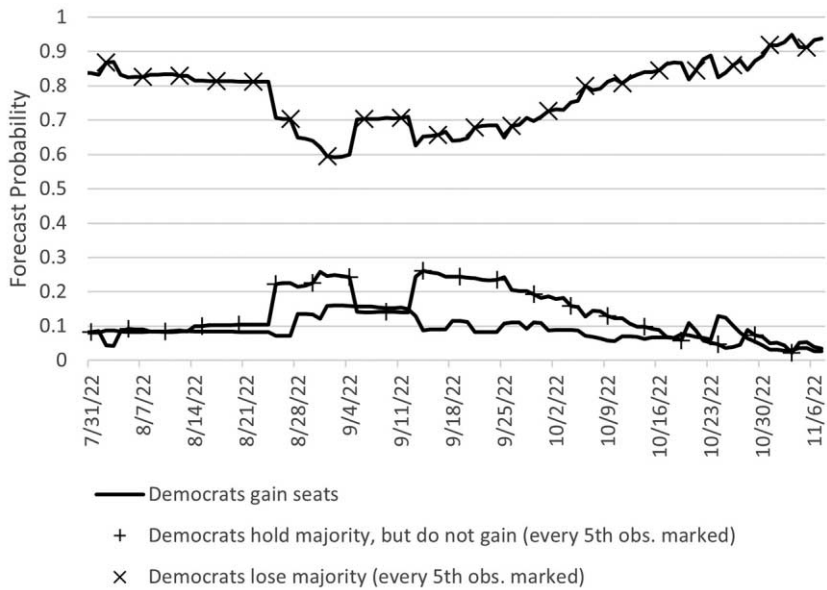


Figure 1. IEM House22 outcome probabilities forecast from contract bid/ask mid-points at midnight for the last 100 days before the election.

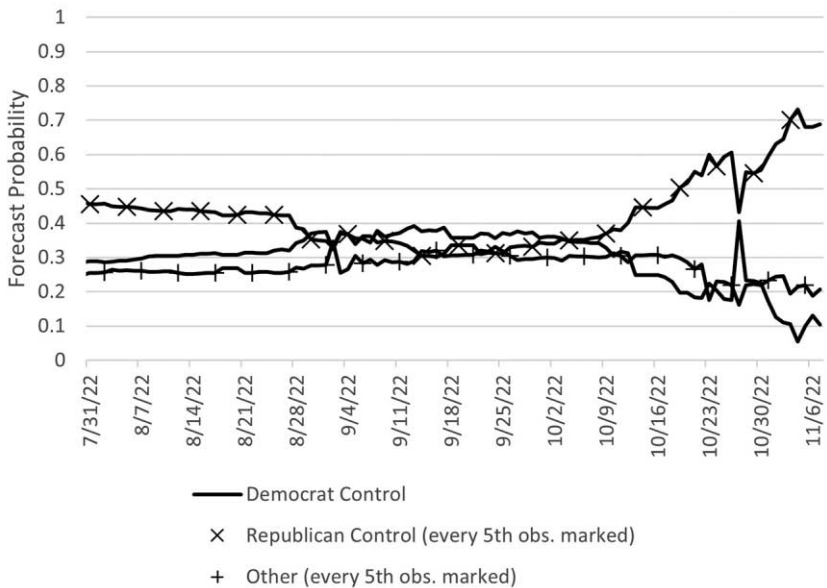


Figure 2. IEM Senate22 outcome probabilities forecast from contract bid/ask mid-points at midnight for the last 100 days before the election.

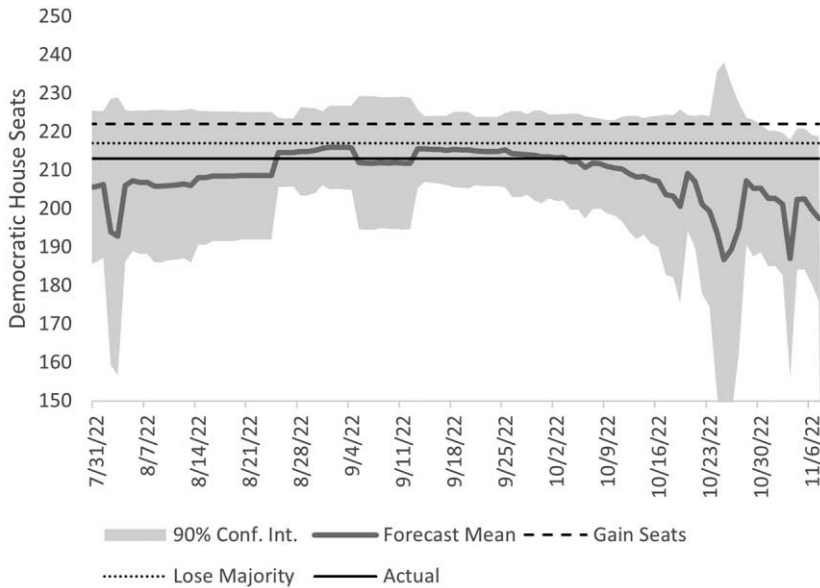


Figure 3. Daily pre-election forecast distribution means (Forecast Mean) and 90% confidence intervals for the number of Democratic House seats after the 2022 election. The actual number of seats taken (Actual) and the number needed to increase (Gain Seats) or lose the majority (Lose Majority) are shown for reference.

the election, and forecasts displayed increasing volatility as the election approached. The eventual outcome was “OS.22” which was forecast to occur with a 21.7% probability on election eve. These graphs hide high levels of uncertainty in the forecast of seat distribution, which we turn to in the next section.

Lessons Learned and 2024 Model Specification

House22 market prices forecast probabilities that Democrats would hold more than 222 seats (DH.gain22), between 218 and 222 seats (DH.hold22), and less than 218 seats (DH.lose22). These three prices give two independent points on a forecast seat distribution. Assuming an approximately normal forecast seat distribution, this is sufficient to infer the distribution’s mean, $\hat{\mu}_t$, at date t and standard deviation, $\hat{\sigma}_t$. Then, we plot 90% confidence intervals (CIs) as $\hat{\mu}_t \pm 1.65\hat{\sigma}_t$.⁸

As with Figure 1, Figure 3 shows Democrats retaining House control remained within the realm of possibility very close to the election. Further, CIs unexpectedly widened as the election approached, indicating increasing uncertainty.

8. While we know that the seat distribution cannot be normally distributed, this gives a handy benchmark for readers to understand the degree of uncertainty in the forecast distribution.

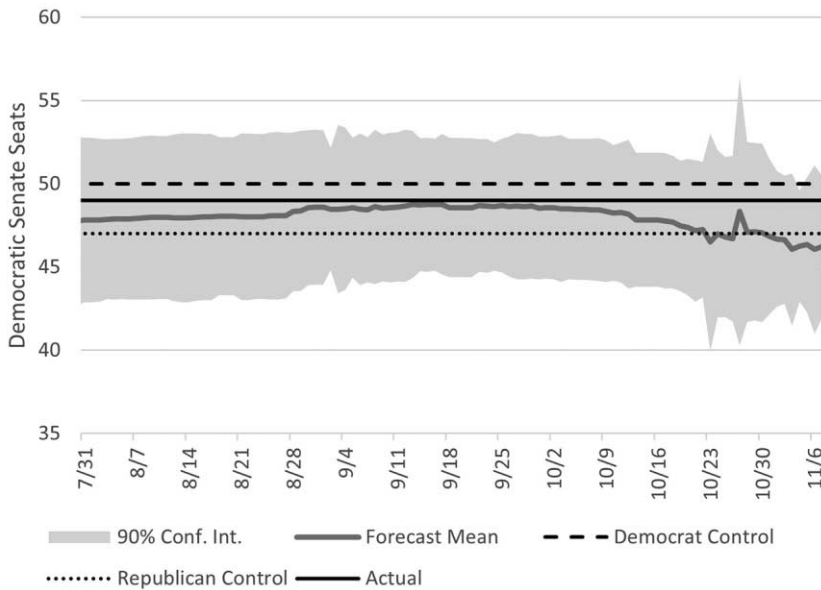


Figure 4. Daily pre-election forecast distribution means (Forecast Mean) and 90% confidence intervals for the number of Democratic Senate seats after the 2022 election. The actual number of seats taken (Actual) and the number needed for Democratic (Democrat Control) or Republican (Republican Control) outright majorities are shown for reference.

Since no independents were up for re-election, Senate22 prices forecast probabilities that Democrats would hold fifty or more seats (DS.22), forty-eight or forty-nine seats (OS.22), and forty-seven or fewer seats (RS.22). Again, we forecast seat distributions and plot CIs.

As with Figure 2, Figure 4 shows Democrats gaining outright Senate control remained within the realm of possibility throughout. Further, CIs stayed relatively constant as the election approached, indicating little decrease in uncertainty.

Game theoretic models of elections imply residual uncertainty through election day.⁹ Estimating the distributions and CIs help us understand the degree of residual uncertainty through time. Results suggest high levels of uncertainty that did not fall as the 2022 Congressional elections approached, making accurate forecasting difficult. This should not be surprising as ever-more sophisticated national campaign strategies continually shift resources across individual races. Dynamic optimization

9. For example, see Richard D. McKelvey and Peter C. Ordeshook, “Symmetric Spatial Games Without Majority Rule Equilibria,” *The American Political Science Review* 70 (1976): 1172–84.

of campaign spending can make “safe” seats vulnerable and turn close races into dead heats resulting in harder-to-predict elections. In the future, the IEM may consider changes that would allow us to more precisely estimate the forecast distributions and convey the implied degree of uncertainty. For example, additional contracts that pay off based on a specific range of seat outcomes (e.g., Democrats hold 210–215 seats) would identify more points on the distribution.

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