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

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I.   Model History

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.[4] The IEM ran three winner-takes-all (WTA) markets to forecast congressional control configurations resulting from the 2022 U.S. mid-term elections. Contracts traded in WTA markets pay $1 if an associated event occurs and $0 otherwise. Contract prices should equal market consensus expected values[5] and, 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 market prices, we derive forecast seat distributions for the House and Senate. As the election approached, there was little reduction in the degree of uncertainty about the Senate outcome and increasing uncertainty about the House outcome.

II. 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.[6]
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.[7]
RS.22	Republicans hold outright Senate majority.
OS.22	Neither party holds outright majority.

Given information available at date t, each price reveals the probability of the outcome,

while measuring an area under a forecast seat distribution function. Thus, we can infer: (1) the

probability of each outcome; (2) the level of uncertainty in the outcome; and (3) a point on the

cumulative seat distribution.[8] Consequently, prices allow us to estimate forecast seat

distributions for each chamber.

III. 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. The following figures show how these normalized prices evolved during the 100 days

preceding the election.

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[6] Here, majority means more than 217 seats held by the party, and does not include aligned independents

[7] Here, majority means more than 50 seats or 50 seats plus the vice presidency held by the party, not aligned
    independents.

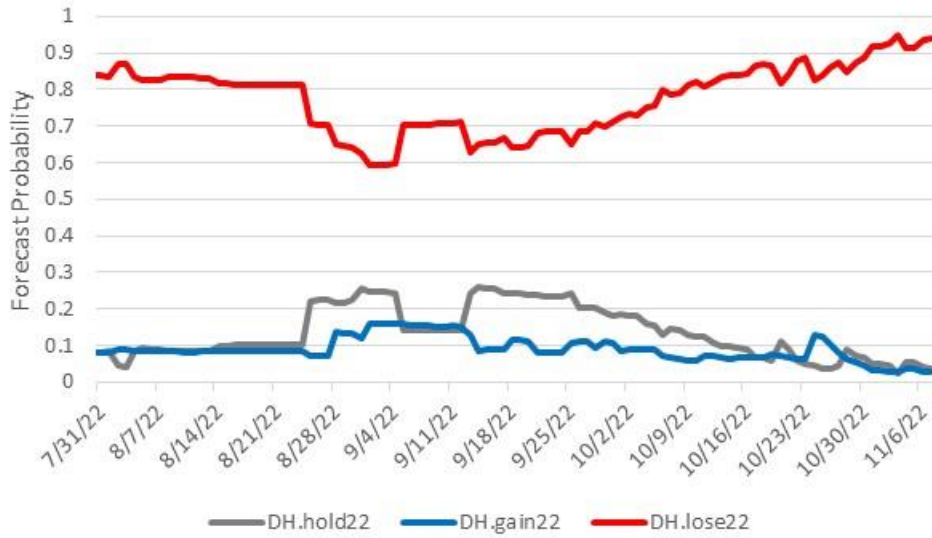[8] Note, neither independent in the Senate was up for reelection.

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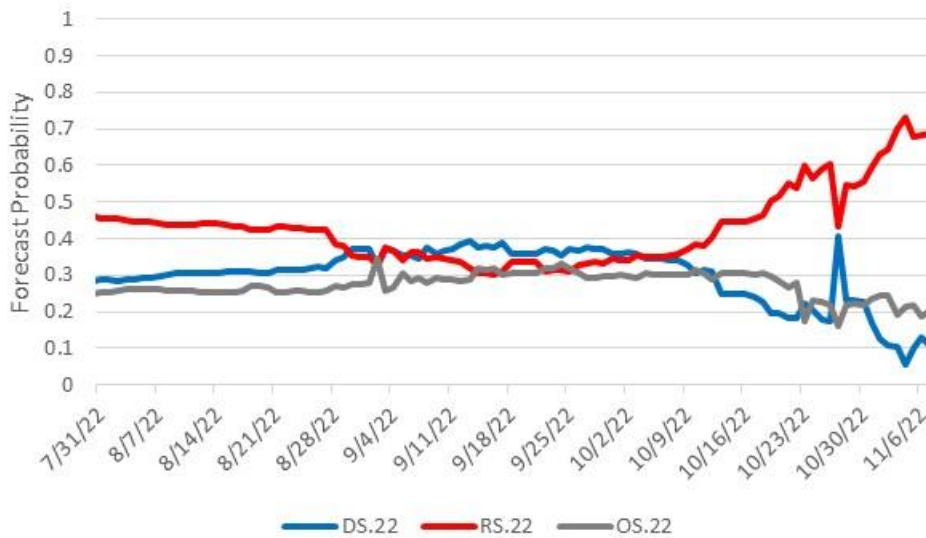

Figure 2: IEM Senate22 outcome probabilities forecast from contract bid/ask midpoints at midnight for the last 100 days before the election.

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 10/31. Figure 2 shows little

consensus on the Senate outcome until the Republican probability rose in the last 4 weeks. But,

it peaked at 73.2%, 4 days before 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.

IV. Lessons learned and 2024 model specification

The prices in the House22 market forecast the 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). Assuming an approximately normal forecast seat distribution, we estimate forecast distributions at each date t with mean $\hat{\mu}_t$ and standard deviation $\hat{\sigma}_t$. Based on these estimates, we plot 90% confidence intervals (CIs).[9] 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.

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[9] 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.
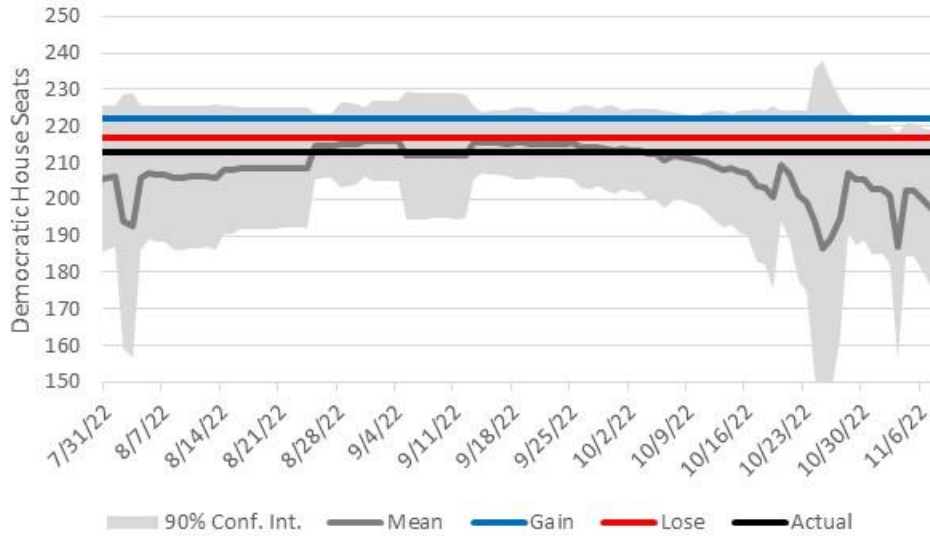
Figure 3: Daily pre-election forecast distribution means (Mean) and 90% confidence intervals for the number of Democratic House seats after the 2022 election. The actual number of seats taken (Actual) and the number needed to increase (Gain) or lose (Lose) the majority are shown for reference.

Since the two independents were not up for re-election, prices in the Senate22 market forecast the probabilities that Democrats would hold 50 or more seats (DS.22), 48 or 49 seats (OS.22), and 47 or fewer seats (RS.22). Again, we forecast seat distributions and plot CIs.
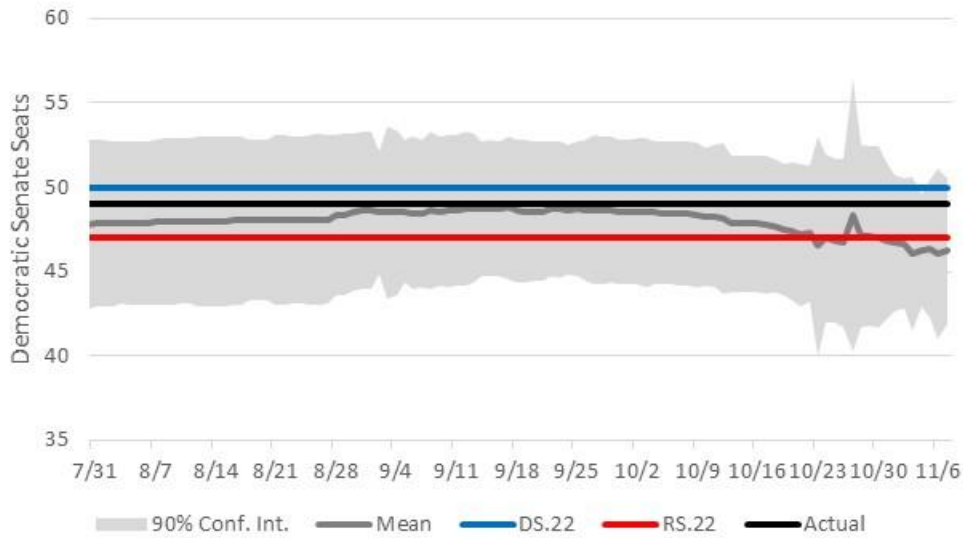
Figure 4: Daily pre-election forecast distribution means (Mean) and 90% confidence intervals for the number of Democratic Senate seats after the 2022 election. The actual number of seats taken (Actual) and the number needed to gain (DS.22) or lose (RS.22) the outright majority are shown for reference.

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

Game theoretic models of elections assert that there will be residual uncertainty through election day (e.g., McKelvy and Ordeshook (1976)). Estimating the distributions and CIs give us an idea about the degree of residual uncertainty at each point in 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 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 about the forecasts.

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V. References

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