

Understanding Biden's Exit and the 2024 Election: The State Presidential Approval/State Economy Model

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ABSTRACT

Our 2020 analysis correctly forecasted Joe Biden's victory and the outcome of every state except Georgia. That forecast relied on economic data from 125 days prior to Election Day and presidential approval data from 104 days (or more) before the election. Since 2000, our model would have correctly forecasted the winner in 95% of all states. We updated our State Presidential Approval/State Economy Model for 2024. This article summarizes the model and its historical accuracy as well as new data updates. We then generate forecasts for the overall two-party popular vote, each state's outcome, and the Electoral College winner for the 2024 US presidential election. One hundred days prior to Election Day, our model forecasts a split two-party popular vote (50.3% for Trump, 49.7% for Harris) but a notable Trump advantage in the Electoral College, with slightly less than a three-in-four chance that Trump wins the election. This Republican advantage 100 days prior to Election Day sheds light on Biden's abrupt decision to drop out of the race and suggests that if Harris wins, she will have overcome extremely challenging fundamentals, and/or that Donald Trump and the Republican Party will have squandered a sizeable Electoral College advantage.

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Using economic data from 125 days prior to the election and presidential approval data from 104 days (or more) before the election, in 2020, we correctly forecasted Joe Biden's victory and the outcome of every state except Georgia (Enns and Lagodny 2021a). We updated our State Presidential Approval/State Economy Model for 2024. This article summarizes the forecast model and its historical accuracy as well as new data updates that we have made. We then generate forecasts and associated uncertainty estimates for the overall two-party popular vote, the outcome in each state, and the Electoral College winner

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for the 2024 US presidential election. One hundred days prior to Election Day, our model forecasts a split two-party popular vote (50.3% for Trump, 49.7% for Harris) but a notable Trump Electoral College advantage, giving him slightly less than a three-in-four chance at winning the presidency. This early Republican advantage sheds light on Biden's abrupt decision to drop out of the race and suggests that if Kamala Harris wins, she will have overcome extremely challenging fundamentals, and/or that Donald Trump and the Republican Party will have squandered a sizeable Electoral College advantage.

THE STATE PRESIDENTIAL APPROVAL/STATE ECONOMY MODEL

A key contribution of our approach involves estimating the percentage of those who approve of the president in *each state*. Although presidential approval is a known predictor of election outcomes, even state-level forecasts have relied on national-level estimates of presidential approval (Hummel and Rothschild 2014; Jérôme and Jérôme-Speziari 2016). Following our earlier work (Enns and Koch 2013; Enns, Lagodny, and Schuldt 2017), we used multilevel regression with poststratification (MRP) to estimate state-level public opinion from national surveys (Gelman and Little 1997; Lax and Phillips 2009; Pacheco 2014). MRP has been used increasingly in election polling and forecasts, with a high degree of accuracy (Daley 2024; English 2023; *The Economist* 2024).

MRP is a three-step approach that involves estimating a multilevel model to identify the relationship between demographic categories and the probability of survey response (in this case, indicating approval of the president's handling of the job of president); using these estimates to predict the probability of approval for each demographic-geographic "type" (e.g., African American females, age 30–44, with some college education, in Texas); and then using census data to post-stratify (i.e., weight) the responses to match state population values. Poststratification data are from the US Census and the American Community Survey (see [online appendix 1](#) for a detailed overview of the poststratification data). Our original MRP model included age (18–29, 30–44, 45–64, 65+); education (no high school degree, high school degree, some college, college graduate or more); race (white, Black, other); sex (male, female); and an indicator for each survey, state, and region (Northeast, Midwest, South, West, or Washington, DC). Given the increasing importance of Latino voters in US presidential elections (Abrajano and Alvarez 2010; Fraga, Velez, and West 2024; García Ríos et al. 2017), we added to the MRP model an indicator of whether a respondent is Hispanic.¹

We also were able to obtain additional historical data from the Roper Center for Public Opinion Research and the Inter-University Consortium for Political and Social Research (ICPSR), adding 12 more historical surveys. Our forecast now includes individual-level data from 89 surveys conducted in June and July of election years with 111,178 total respondents (Enns et al. 2024) (see [online appendix 5](#) for detailed survey information). The average annual sample size was 9,265, with a minimum of 5,326 in 1988 and a maximum of 14,230 in 1992.

After using MRP to estimate the percentage in each state of those who approve of the president, we multiplied the approval rating by -1 when the incumbent was a Republican because we coded vote share as the percentage of the vote going to the

Democratic candidate (of the two-party vote). This step ensured that higher values for the incumbent president always corresponded with more support for the Democratic candidate. We followed Hummel and Rothschild's (2014) strategy for national-level approval and subtracted a constant from the approval ratings. Hummel and Rothschild (2014) subtracted a constant so that when approval equals zero, it is roughly equivalent to having no incumbent advantage. We identified the constant value based on the value that maximizes model fit for the years prior to the election being forecasted.

Presidential election outcomes also reflect economic conditions. We used the Federal Reserve Bank of Philadelphia's monthly State Coincident Indexes to measure economic conditions in *each state*. These data begin in January 1979; therefore, 1980 was the first election included in the analysis. This index uses four separate economic components: "nonfarm payroll employment, average hours worked in manufacturing by production workers, the unemployment rate, and the sum of wages and salaries with proprietors' income (two components of personal income) deflated by the consumer price index (US city average)" to measure current economic conditions in each state.² Although *leading* economic indicators might be preferable to *coincident* indicators for election forecasts (Erikson and Wlezien 2008, 2021), state leading indicators are not available after February 2020 because the Philadelphia Fed suspended release of these data due to measurement complications from the COVID-19 pandemic. Similar to Erikson and Wlezien (2016), we calculated the average monthly percentage change in coincident indicators through June of the election year, weighting months closer to the election more heavily. This weight means that economic shifts closer to the election influence the measure more, based on evidence that voters place more emphasis on recent economic changes than those at the beginning of the presidential administration (Erikson and Wlezien 2008). We selected the specific weight based on the weight parameter that best fits the data in previous elections. See [online appendix 2](#) for a detailed discussion of the weight parameter and coincident economic indicator measurement.

To capture historical voting patterns, the model includes each state's deviation from the national vote in the past election (Campbell, Ali, and Jalalzai 2006; Hummel and Rothschild 2014). To account for the boost that candidates tend to receive in their home state, we coded the state of the Democratic candidate 1, the state of the Republican candidate -1, and all other states 0. If both candidates were from the same state, such as Hillary Clinton and Donald Trump in 2016, all values were zero.³ The model also included the lagged value of the presidential candidates' home state. We expected this coefficient to be negative because it accounts for the return to typical voting levels in that state in the subsequent election (Berry and Bickers 2012; Hummel and Rothschild 2014). Candidates also tend to receive a boost in the home state of the vice-presidential candidates; therefore, we included a variable indicating their home state coded the same way. The lagged value of the vice-presidential candidates' home-state variable is not significant, perhaps because the magnitude of the boost is smaller; therefore, we did not include the lag of this variable in the model.

Similar to Hummel and Rothschild (2014), to control for the influence of popular third-party candidates, we included the percentage of votes obtained in each state for the election *after*

they ran. We included third-party candidates four years after they ran to account for their impact on the estimated influence of each state's deviation from the national vote in the past election in the model. If the third-party candidate had a differential influence across the states in the prior election, this influence would affect the lagged value of each state's deviation from the national vote. By including the percentage of votes received by third-party candidates in the prior election, the overall estimate for state deviation from the national vote was purged from the third-party effect, making this variable a more consistent predictor of vote outcomes. Because John Anderson's state vote share was correlated with two-party vote share (which we confirmed with a likelihood ratio test), controlling for Anderson's vote share in each state in 1984 ensured that our estimated relationship between lagged two-party vote share deviation and current two-party vote share was not biased. Consistent with Hummel and Rothschild (2014), despite Ross Perot's impressive vote share in 1992, the percentage of votes he received in each state did not appear to influence two-party vote share ($p=0.22$); therefore, we did not include his 1992 vote share in 1996. We found evidence that Perot's 1996 vote share improved model fit, so we included the 1996 vote share in the 2000 model. Again, by including vote share in the *subsequent* election, we included information available only before the fact in our forecasts.

For 2024, we made three updates to our approach. Our forecast now accounts for the unique Electoral College vote allocation in Maine and Nebraska. These states allocate two electoral votes to the state popular-vote winner and one electoral vote based on the presidential vote in each congressional district (i.e., two districts in Maine and three districts in Nebraska). To estimate the Electoral College vote in these districts, we calculated the difference between each congressional district's 2020 presidential vote and the statewide vote. We then took the 2024 statewide forecast and adjusted each district by the same amount of difference as in 2020. For example, in 2020, Biden received 40.2% of the two-party vote in Nebraska and 53.3% of the two-party vote in Nebraska's District 2 (a difference of 13.1%).⁴ Our 2024 forecast for District 2 in Nebraska uses our 2024 statewide forecast and adds 13.1%. We did this for each district in Nebraska and Maine. This approach assumes that the difference between district vote and state vote has not changed. Although an imperfect assumption, it is much better than assuming each district has the same vote as the overall state. In practice, the five Electoral College votes from these districts have not influenced election outcomes, but our updated approach provides a more accurate representation of the Electoral College process.

Vice President Kamala Harris's entrance as the Democratic presidential candidate raises the question of whether our measure of incumbent presidential approval will be less successful than if Biden had remained in the race.⁵ The 1988 and 2000 elections, when Vice President George Bush and Vice President Al Gore were the incumbent-party candidates, suggest a clear answer. These elections were our model's second and third least accurate forecasts (1992, when Perot obtained 19% of the vote as a third-party candidate, was our least successful forecast). To evaluate whether different approval ratings of Bush and Gore influenced our forecast accuracy, we measured the difference between net approval of the president and vice president during June and July in those election years; that is, (% approve of the president–% disapprove)–(% approve of the vice president–% disapprove). We

then adjusted the presidential approval measure in each state by this amount. Data limitations necessitated this blunt approach, but shifting our estimate of incumbent presidential approval based on whether the current vice president is more or less popular than the president has several desirable properties. First, because we were comparing evaluations of the incumbent president and vice president asked in the same way in the same surveys, responses were directly comparable. Second, because we were evaluating differences in net approval ratings, results were not influenced by “do not know” or “unsure” responses, which might be higher for the vice president given less public visibility. Third, because both individuals were in the current presidential administration, differences in approval likely reflect meaningful differences in evaluations of the individuals. If responses to these questions reflect evaluations of the overall presidency or party, we would not expect the public to evaluate the president and vice president differently.

At a minimum, this measure provides a directional signal of whether using only presidential approval without an adjustment would overestimate or underestimate the vice president's electoral fortunes. We thus had a clear decision criterion for whether to incorporate this adjustment into the model. If our 1988 and 2000 forecasts improve, we should use the same approach to adjust for differences between approval of Harris and Biden in 2024. If the forecasts do not improve, we should not. This adjustment decreases our one-step-ahead (i.e., before-the-fact) forecast error in 1988 by 12.5% (missing seven states instead of eight) and in 2000 by 40% (missing six states instead of 10). Given the notable improvement, we followed the same approach in 2024, adding the difference between Harris's and Biden's approval to our estimates of state presidential approval.⁶

Our third update was the removal of a dummy variable to account for the potential unique influence of Southern states on presidential vote. Historically, even when including each state's prior vote in the model, Southern states were more likely to vote Republican.⁷ However, McKee et al. (2024) documented shifting population and voting patterns in the South, suggesting that this Southern effect may no longer hold. Indeed, [online appendix 3](#) demonstrates that in recent elections—after conditioning on individual state voting history—adding a binary indicator for Southern states no longer adds explanatory power to the model. We thus opted for a more parsimonious approach and omitted the Southern states variable from our 2024 forecast model.

HISTORICAL ACCURACY

Table 1 presents the estimated relationships between the variables in the State Presidential Approval/State Economy Model and the percentage of Democratic votes based on the two-party vote share in each state and Washington, DC, from 1980 to 2020.⁸ The relationships are in the expected direction, they are estimated with substantial precision, and the model fit is impressive. The Adjusted R^2 indicates that the model accounts for 90% of the variation in state presidential vote. Ideally, forecast models are parsimonious (Lewis-Beck 2005). With eight variables, the model is more parsimonious than other state-level forecasts, which range between 12 and 19 variables (Campbell, Ali, and Jalalzai 2006; Hummel and Rothschild 2014; Jérôme and Jérôme-Speziari 2016; Jérôme et al. 2021).

Table 1
Predicting State Presidential Vote, 1980–2020

Predictors	Estimates
State Deviation from the National Vote t_{-1}	0.82* (0.02)
Presidential Approval	0.33* (0.02)
Cumulative Coincident Economic Indicators	1.43* (0.27)
Presidential Candidate Home State	2.47* (0.81)
Presidential Candidate Home State t_{-1}	-3.49* (0.82)
Vice-Presidential Candidate Home State	1.87* (0.74)
Anderson	-0.35* (0.07)
Perot	-0.60* (0.06)
Constant	49.38* (0.17)
N:	561
Adjusted R ²	0.90
Standard Error of the Estimate	3.46

Notes: * $p < 0.05$. Dependent variable is the percentage Democrat of the two-party vote. All variables measured at the state level. Standard errors are in parentheses. N=11 Elections X (50 states+DC). Third-party-candidate information is included in the election only after they ran.

This model performed remarkably well in 2020, correctly predicting Biden’s Electoral College win as well correctly forecasting the winner in 49 of 50 states plus Washington, DC. The model also provided an accurate forecast of the overall popular vote, which was based on a state population weighted average of the forecasted state outcomes. The two-party popular-vote forecast was 54.5% for Biden (i.e., slightly more than 2 percentage points higher than the actual two-party outcome). As a point of comparison, the reported vote intentions in the preelection interviews from the American National Election Study (ANES) produced a two-party weighted

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result identical to our forecast.⁹ This identical result is especially notable because the ANES has been referred to as “the gold standard survey for scientific research on American voting behavior” (Ko et al. 2025, 66) and it included 8,280 preelection interviews from August 18 to November 2, the day before Election Day (DeBell et al. 2022, 5).¹⁰ Although the ANES is not intended to forecast elections, it is still remarkable that more than 8,000 reported vote intentions up to Election Day yielded the same outcome as our forecast based on data from more than 100 days prior to Election Day.

Although the 2020 US presidential election was our first forecast, it is possible to use our model to generate one-step-ahead (or before-the-fact) forecasts for previous elections. These forecasts use information available only prior to the historical election; therefore, they provide a direct assessment of what the model would have forecasted if estimated in July of that election year.¹¹ The 1984 one-step-ahead forecast is based on a regression model using only 1980 data and 1984 variables measured in July or earlier. The 1988 one-step-ahead forecast is based on the regression model from 1980 and 1984 with 1988 variables, and so on. The 2024 estimates are based on the values in table 1 (1980–2020) and corresponding variables in 2024, measured 100 days or more before Election Day.¹²

Our prior research demonstrates that our one-step-ahead forecasts would have produced consistently more accurate state- and national-level forecasts than previously published forecasts (Enns and Lagodny 2021a, 2021b). The updated model correctly predicts the winner in 91% of all states from 1984 to 2020. The one-step-ahead mean absolute error is 3.4 percentage points. The largest error was in Arkansas in 1992, when the model underestimated Bill Clinton’s support by 16 percentage points. Since 2000, our one-step-ahead forecasts have correctly predicted 95% of all states with a mean absolute error of 2.8 percentage points. In this context, we discuss our 2024 forecast in the following section.

2024 FORECAST

Our 2024 presidential approval data are from two surveys that we conducted with Verasight, a Bright Line Watch survey, two Gallup surveys, and two AP-NORC surveys.¹³ The total sample size for 2024 was 10,510 respondents. Our forecast is based on the results in table 1. Recall that survey and economic data were collected 100 days or more and 127 days or more prior to Election Day, respectively. Kamala Harris announced Tim Walz as her running mate on August 8; therefore, the home state of the Democratic vice-presidential candidate was known only 91 days in advance. This information affected our forecast only for Minnesota.

To estimate the popular-vote winner, we forecasted the two-party vote share for each state and Washington, DC, and then calculated the state population weighted average. The model forecasts an almost even split, with 49.7% for Harris and 50.3% for Trump. Of course, uncertainty exists around these estimates, suggesting that the popular vote was a statistical tie 100 days prior to Election Day.

To estimate the range of uncertainty around this result (and the others that we report), we conducted 70,000 simulations that incorporate three types of uncertainty. First, we used CLARIFY (Tomz, Wittenberg, and King 2003) to simulate 10,000 parameters for each variable in the model (see table 1). These simulated parameters incorporated uncertainty based on the variance of the parameter estimates and were used to generate 10,000 forecasts. In addition to this prediction error, we needed to account for uncertainty in the model. To account for this error, we generated a normally distributed variable with 10,000 observations with a

mean of zero and a standard deviation equal to the root mean square error for the model. We then added this error to the 10,000 forecasts that incorporated prediction error. As a result, our simulations incorporated equation and model uncertainty. We also accounted for potential error in the selection of the weight parameter used to estimate the cumulative weighted average of the percentage change in economic conditions. In 2020, we showed that due to the extreme month-to-month economic shifts because of the COVID-19 pandemic, the forecast was sensitive to the weight parameter selected. Although this was no longer the case in 2024, to maintain a consistent approach, we repeated the process described previously seven times: once with the selected weight parameter, three times with the next-highest weight parameters, and three times with the next-lowest weight parameters, leading to 70,000 simulated outcomes.¹⁴

Of course, it is the Electoral College that determines the winner, and Trump holds a notable advantage. Figure 1 shows the results of the 70,000 simulations described previously. The

than a one-in-four chance. An exact tie, although mathematically possible, is extremely unlikely—occurring approximately once in every 500 simulations.

Figure 2 reports the percentage of simulations in which Trump or Harris wins each state based on data from 100 days prior to Election Day. If a candidate is forecasted to win in more than 55% of simulations, we categorized the state as leaning; if more than 75% of simulations indicate a win, we categorized the state as a likely victory; and if a candidate wins in more than 98% of simulations, we labeled the state solid. We would consider a state in which neither candidate won more than 55% of simulations to be a toss-up, but this outcome did not occur in our forecasts. It is important to note that even when a particular candidate wins more than 55% of simulations, the actual vote margin can be extremely close. The model forecasts 17 states to be within 5 percentage points of 50% and 10 states to be within 2.5 percentage points. Figure A-2 in online appendix 4 reports the specific estimate and associated uncertainty for each state.

If Trump wins all of the states that currently lean in his direction, we expect he will reach 312 Electoral College votes.

x-axis indicates the number of electoral votes forecasted for Harris. The y-axis indicates the proportion of simulations that forecasted that Electoral College outcome; therefore, taller bars indicate that, according to our model, that outcome is more likely to occur. Blue bars reflect simulations that correspond with a Harris victory; red bars correspond with a Trump victory. The model forecasts that Trump has slightly less than a three-in-four chance of winning the election (approximately 73%), leaving Harris with slightly more

If Trump wins all of the states that currently lean in his direction, we expect he will reach 312 Electoral College votes. However, if the final 100 days of the election produce only a 2-percentage-point shift in a few key states, this outcome will change. Harris should prioritize Michigan, Georgia, Pennsylvania, and Wisconsin. Our model suggests that if Trump wins two of those states, he likely will win the election. Trump also has a path to victory via Pennsylvania and Nevada.

Figure 1

2024 Electoral College Forecast: 70,000 Simulations Indicate a Notable Advantage for Trump 100 Days Prior to Election Day

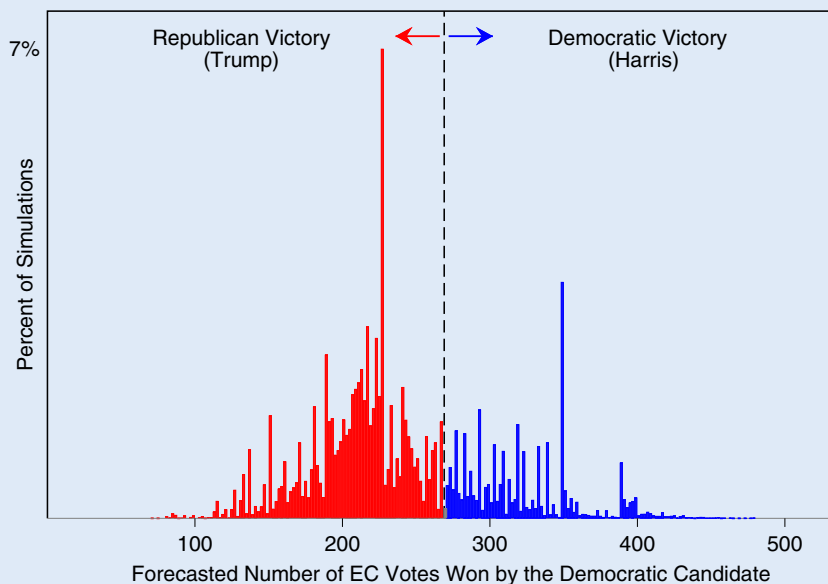
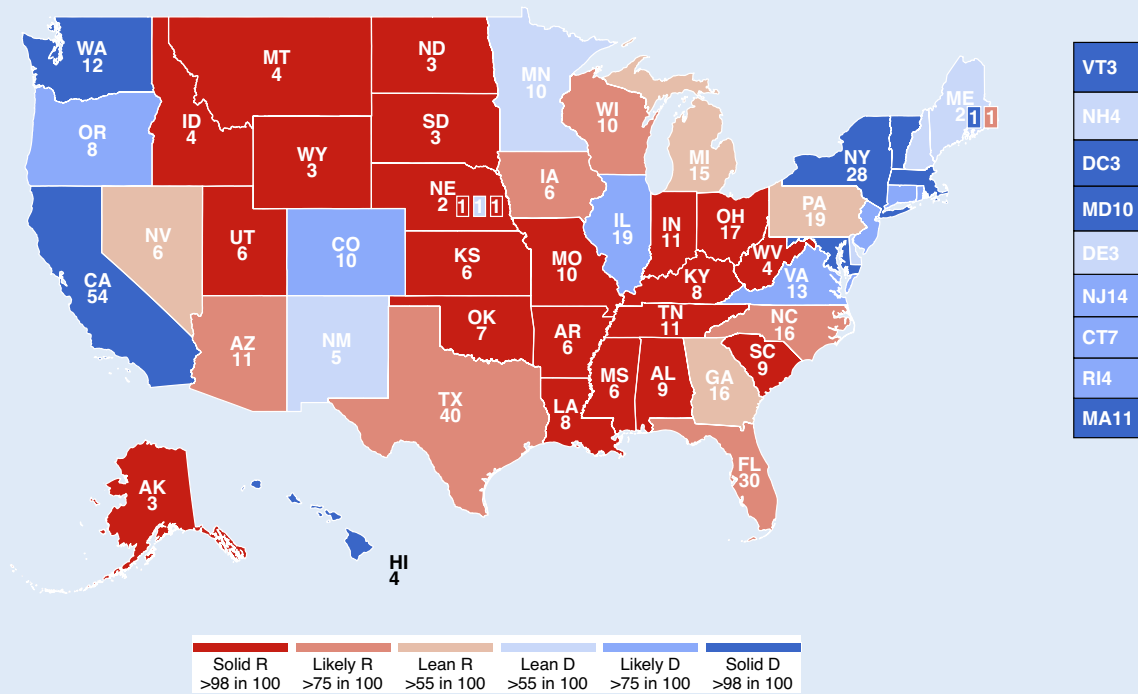


Figure 2

Percentage of Simulations in Which Trump or Harris Wins Each State Based on Data from 100 Days Prior to Election Day



The figure reports the percentage of simulations in which Trump or Harris wins each state, not the forecasted two-party vote share. Although several states are forecasted to have a two-party vote share close to 50%, the percentage of simulations where either Trump or Harris is forecasted to win always exceeds 55%. R corresponds with Trump, the Republican candidate. D corresponds with Harris, the Democratic candidate. Numbers by each state indicate the number of Electoral College votes.

IMPLICATIONS FOR UNDERSTANDING BIDEN’S EXIT AND THE POTENTIAL IMPACT OF TRUMP AND HARRIS ON THE FINAL OUTCOME

On July 8, 2024, President Joe Biden wrote to congressional Democrats: “I am firmly committed to staying in this race, to running this race to the end, and to beating Donald Trump” (*The Washington Post* 2024). Less than two weeks later, Biden dropped out (Miller, Long, and Superville 2024). Representative Nancy Pelosi reportedly told Biden that he could not win (Lee, Gangel, and Zeleny 2024). Our forecast indicates that Pelosi was right. Given Biden’s low approval ratings and economic conditions, our model forecasted less than a one-in-10 chance of a Biden victory if he had stayed in the race. Even *after* accounting for Harris’s

(Enns and Richman 2013). The accuracy of past forecasts reinforces these findings. We also learn when election outcomes deviate from forecasts. The differences between expectations and outcomes highlight how campaign-specific factors can play important roles in the final outcome (Erikson 2001). The fundamentals 100 days prior to Election Day favor Trump. Yet, some of Trump’s “closest advisers and strongest supporters are starting to worry” that he is undermining his campaign (Gorman 2024) and a number of House Republicans have critiqued the choice of JD Vance, who is historically unpopular (Rakich 2024), as a running mate (Schnell 2024). If Kamala Harris wins the election, we will not know exactly why, but we will know that her victory surmounted conditions so disadvan-

If Harris wins the election, we will not know exactly why, but we will know that her victory surmounted conditions so disadvantageous to the Democratic Party that the incumbent president dropped out of the race.

approval ratings, which are notably higher than Biden’s, the Democrats face an uphill battle.

US presidential elections largely depend on the fundamentals (Gelman and King 1993), which are knowable far in advance

tageous to the Democratic Party that the incumbent president dropped out of the race. She will have added major momentum to the Democratic campaign, and/or Donald Trump and the Republican Party will have squandered a sizeable advantage.

SUPPLEMENTARY MATERIAL

To view supplementary material for this article, please visit <http://doi.org/10.1017/S1049096524000994>.

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DATA AVAILABILITY STATEMENT

Research documentation and data that support the findings of this study are openly available at the *PS: Political Science & Politics* Harvard Dataverse at <https://doi.org/10.7910/DVN/PBGF0F>.

CONFLICTS OF INTEREST

The authors declare that there are no ethical issues or conflicts of interest in this research. ■

NOTES

- Whether a respondent identifies as Hispanic was consistently asked in our survey data beginning only in 1996; therefore, this information cannot be included in MRP estimates prior to 1996. [Online appendix 1](#) provides additional MRP details and information on the robustness of results to alternate multilevel model specifications.
- Definitions and data are available at www.philadelphiafed.org/research-and-data/regional-economy/indexes/coincident.
- In 2019, Trump declared Florida to be his official residence. Given the recency of the move and Trump's long-time association with New York, our 2020 model coded his "home state" as New York. Because Trump now has a much stronger association with Mar-a-Lago in Florida, for 2024, we coded his home state as Florida.
- Official Report of the Nebraska Board of State Canvassers (2020). <https://sos.nebraska.gov/sites/default/files/doc/elections/2020/2020-General-Canvass-Book.pdf>
- We are grateful to the anonymous reviewers who pointed us in this direction.
- When there is no incumbent president or vice president in the race, such as with John McCain and Barack Obama in 2008 and Hillary Clinton and Donald Trump in 2016, we would like to make a similar adjustment to account for potential differences between approval of the president and approval of the incumbent-party's candidate. Unfortunately, this is not possible because there are no survey questions that allow a direct comparison of approval of these individuals with approval of the incumbent president.
- We coded Southern states as those in the Confederacy: Alabama, Arkansas, Georgia, Florida, Louisiana, Mississippi, North Carolina, South Carolina, Tennessee, Texas, and Virginia.
- Two-party vote share, %Democratic Vote/(%Democratic Vote+%Republican Vote), is standard in election forecasts (Campbell 2016). The Republican vote share is simply the inverse of all results shown. As noted previously, the 2020 forecast included an indicator for Southern states that is no longer included in our model (see [online appendix 3](#)).
- The 2020 ANES unweighted preelection estimate (55.48%) and the weighted and unweighted postelection reported vote (i.e., 55.99% and 57.80%, respectively) were all less accurate (Ko et al., 2025, Table 3 and Table 2).
- One preelection interview was recorded on November 3. Ko et al. (2025) also noted that the gold-standard argument for the ANES has been challenged.
- The one-step-ahead/before-the-fact forecast is thus more conservative than the "jackknife" approach, which uses data from before and after the historical election being forecasted.

- In each case, the values of the election-year variables for each state are multiplied by the one-step-ahead coefficients and added to the constant to generate predicted values (\hat{y}) for each state. These predicted values represent the forecasted percentage of the Democrat vote.
- Full survey details are in [online appendix 5](#). The Office of Research Integrity and Assurance at Cornell University determined that the human-participant research protocol qualifies for exemption from the Institutional Review Board (Protocol No. IRB0148701).
- Economic conditions in 2024 are much more stable than in 2020; therefore, the seven different weight parameters produce minimal effects on the overall forecast. We nevertheless followed our 2020 approach and incorporated them into our simulated uncertainty estimates.

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