

Appendix

State-Level Forecasts for the 2024 U.S. Presidential Election: Trump Back with a Vengeance?

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A Data and variables

A.1 Data sources

The necessary data to create the models were gathered from the sources below.

- **Midterm election results.** Midterm election results for almost all U.S. House, U.S. Senate, gubernatorial and state legislative (lower and upper houses) races since 1978 were retrieved from various sources.
 - U.S. House elections, 1978–2018: [MIT Election Data and Science Lab \(2024a\)](#).
 - District of Columbia non-voting House delegate elections (shadow representatives excluded), 1978–2022:
 - [1978 U.S. House of Representatives election in the District of Columbia](#).
 - [1982 U.S. House of Representatives election in the District of Columbia](#).
 - [1986 U.S. House of Representatives election in the District of Columbia](#).
 - [1990 U.S. House of Representatives election in the District of Columbia](#).
 - [1994 U.S. House of Representatives election in the District of Columbia](#).
 - [1998 U.S. House of Representatives election in the District of Columbia](#).
 - [2002 U.S. House of Representatives election in the District of Columbia](#).
 - [2006 U.S. House of Representatives election in the District of Columbia](#).
 - [2010 U.S. House of Representatives election in the District of Columbia](#).
 - [2014 U.S. House of Representatives election in the District of Columbia](#).
 - [2018 U.S. House of Representatives election in the District of Columbia](#).
 - [2022 U.S. House of Representatives election in the District of Columbia](#).
 - U.S. Senate elections, 1978–2018: [MIT Election Data and Science Lab \(2023\)](#).
 - U.S. Senate elections, 2022: [Leip, Dave \(2023\)](#).
 - District of Columbia Senate elections (shadow senators), 1990–2022: [United States Senate elections in the District of Columbia](#).
 - Gubernatorial elections, 1978–2018: [Algara and Amlani \(2021\)](#) (“Raw County-Level Vote Data for U.S. Gubernatorial Election Outcomes, 1865–2020”).
 - Gubernatorial elections, 2022: [2022 United States gubernatorial elections](#)
 - Washington, D.C., mayoral elections (treated as equivalent to gubernatorial races):
 - [1978 Washington, D.C., mayoral election](#).
 - [1982 Washington, D.C., mayoral election](#).
 - [1986 Washington, D.C., mayoral election](#).
 - [1990 Washington, D.C., mayoral election](#).
 - [1994 Washington, D.C., mayoral election](#).
 - [1998 Washington, D.C., mayoral election](#).
 - [2002 Washington, D.C., mayoral election](#).
 - [2006 Washington, D.C., mayoral election](#).
 - [2010 Washington, D.C., mayoral election](#).
 - [2014 Washington, D.C., mayoral election](#).
 - [2018 Washington, D.C., mayoral election](#).

- 2022 Washington, D.C., mayoral election.
- State legislative elections, 1978–2014: [Klarner \(2018\)](#).
- State legislative elections, 2018:
 - Most elections: [2018 United States state legislative elections](#). See below for exceptions.
 - Arkansas legislative elections, 2018: [Arkansas Secretary of State \(2024\)](#) (see [Election Night Reporting](#)).
 - Kansas legislative elections, 2018: [Kansas Secretary of State \(2024\)](#) (pdf).
 - Hawaii legislative elections, 2018: [State of Hawaii Office of Elections \(2024\)](#) (pdf).
 - Idaho legislative elections, 2018: [Idaho Secretary of State \(2024\)](#).
 - Indiana legislative elections, 2018: [Indiana Secretary of State \(2024\)](#) (see [Election Night Reporting](#)).
 - Iowa legislative elections, 2018: [USA Today \(2018a\)](#). Votes for unopposed candidates were retrieved from the [Iowa Secretary of State \(2024\)](#).
 - Massachusetts legislative elections, 2018: [Secretary of the Commonwealth of Massachusetts \(2024\)](#).
 - Missouri legislative elections, 2018: [Missouri Secretary of State \(2024\)](#) (pdf).
 - North Dakota legislative elections, 2018: [USA Today \(2018b\)](#) (House), [USA Today \(2018c\)](#) (Senate).
 - Oklahoma legislative elections, 2018: [Oklahoma State Election Board \(2023\)](#).
 - Rhode Island legislative elections, 2018: [State of Rhode Island, Board of Elections \(2024a\)](#).
 - South Dakota legislative elections, 2018: [South Dakota Secretary of the State \(2018\)](#).
 - West Virginia legislative elections, 2018: [West Virginia Secretary of the State \(2018\)](#) (see [Election Night Reporting](#)).
- State legislative elections, 2022:
 - Most elections: [2022 United States state legislative elections](#). See below for exceptions.
 - Rhode Island legislative elections, 2022: [State of Rhode Island, Board of Elections \(2024b\)](#).
- Council of the District of Columbia elections, 1994–2022: [District of Columbia Board of Elections \(2024\)](#).
- **Partisan composition of state legislatures.** Partisan composition data were retrieved from the website of the [National Conference of State Legislatures](#).
- **Presidential election results.** Election results and electoral vote data were retrieved from the [MIT Election Data and Science Lab \(2024b\)](#).
- **Primary election results.** For the 1980–1996 period, election results were retrieved from [Cook \(2000\)](#). For the 2000–2024 period, elections results were retrieved from Wikipedia (see [2000 Republican Party presidential primaries](#); [2004 Democratic Party presidential primaries](#); [2008 Democratic Party presidential primaries](#); [2012 Republican Party presidential primaries](#); [2016 Republican Party presidential primaries](#); [2020 Democratic Party presidential primaries](#); [2024 Republican Party presidential primaries](#)).
- **President’s job approval ratings.** For the 1980–2004 period, approval ratings were retrieved from [The U.S. Officials Job Approval Ratings \(JAR\) Collection](#) (see [Beyle, Niemi and Sigelman 2002](#)). For the 2008–2020 period, approval ratings were retrieved from Gallup. For the 2024 election, approval ratings were retrieved from the [Race to the WH](#) website. See Figure A1. We used all available pre-election state-level presidential approval data to compute the average

incumbent approval rating for each state and each election (i.e. the average of approval ratings measured six months before each of the previous elections). For example, let's imagine we are computing the approval value for state i in 2024. We would use all available approval data between 1980 and 2020 to do so. However, imagine we only have state-level data for state i between 1996 and 2020. We would then (1) compute the state-level average over the 1996–2020 period, (2) compute the national-level average over the 1996–2020 period (national data are available for each election year), and (3) compute the average deviation between state-level and national-level approval ratings between 1996 and 2020. In order to compute the missing value for the 1980 election, we would then simply add the national-level approval rating in 1980 to the average deviation over the 1996–2020 elections. We would then do the same for the 1984, 1988 and 1992 missing values in state i . We could then compute the 2024 value using all values going back to 1980.

- **Unemployment.** Unemployment data (for each state) were retrieved from the [U.S. Bureau of Labor and Statistics](#).

Figure A1. Job approval data, 1980–2024

	1980	1984	1988	1992	1996	2000	2004	2008	2012	2016	2020	2024
Alabama	Blue	Blue	Blue	Blue	Blue	Blue	Blue	Orange	Orange	Orange	Orange	Yellow
Alaska	Green	Green	Green	Green	Blue	Blue	Green	Orange	Orange	Orange	Orange	Yellow
Arizona	Blue	Blue	Blue	Blue	Blue	Blue	Blue	Orange	Orange	Orange	Orange	Yellow
Arkansas	Blue	Blue	Blue	Blue	Blue	Blue	Blue	Orange	Orange	Orange	Orange	Yellow
California	Blue	Blue	Blue	Blue	Blue	Blue	Blue	Orange	Orange	Orange	Orange	Yellow
Colorado	Green	Green	Green	Green	Blue	Blue	Blue	Orange	Orange	Orange	Orange	Yellow
Connecticut	Blue	Blue	Blue	Blue	Blue	Blue	Blue	Orange	Orange	Orange	Orange	Yellow
Delaware	Blue	Blue	Blue	Blue	Blue	Blue	Blue	Orange	Orange	Orange	Orange	Yellow
District of Columbia	Green	Green	Green	Green	Green	Green	Green	Orange	Orange	Orange	Orange	Yellow
Florida	Blue	Blue	Blue	Blue	Blue	Blue	Blue	Orange	Orange	Orange	Orange	Yellow
Georgia	Green	Green	Green	Green	Blue	Blue	Blue	Orange	Orange	Orange	Orange	Yellow
Hawaii	Blue	Blue	Blue	Blue	Blue	Blue	Blue	Orange	Orange	Orange	Orange	Yellow
Idaho	Green	Green	Green	Green	Blue	Blue	Blue	Orange	Orange	Orange	Orange	Yellow
Illinois	Blue	Blue	Blue	Blue	Green	Blue	Blue	Orange	Orange	Orange	Orange	Yellow
Indiana	Blue	Blue	Blue	Blue	Blue	Blue	Blue	Orange	Orange	Orange	Orange	Yellow
Iowa	Green	Green	Green	Green	Blue	Blue	Blue	Orange	Orange	Orange	Orange	Yellow
Kansas	Blue	Blue	Blue	Blue	Blue	Blue	Blue	Orange	Orange	Orange	Orange	Yellow
Kentucky	Blue	Blue	Blue	Blue	Blue	Blue	Blue	Orange	Orange	Orange	Orange	Yellow
Louisiana	Green	Green	Green	Blue	Blue	Blue	Blue	Orange	Orange	Orange	Orange	Yellow
Maine	Blue	Blue	Blue	Green	Blue	Blue	Blue	Orange	Orange	Orange	Orange	Yellow
Maryland	Blue	Blue	Blue	Blue	Blue	Blue	Blue	Orange	Orange	Orange	Orange	Yellow
Massachusetts	Green	Green	Green	Green	Blue	Blue	Blue	Orange	Orange	Orange	Orange	Yellow
Michigan	Green	Green	Green	Green	Blue	Blue	Blue	Orange	Orange	Orange	Orange	Yellow
Minnesota	Blue	Blue	Blue	Blue	Blue	Blue	Blue	Orange	Orange	Orange	Orange	Yellow
Mississippi	Blue	Blue	Blue	Blue	Blue	Blue	Blue	Orange	Orange	Orange	Orange	Yellow
Missouri	Green	Green	Green	Green	Blue	Blue	Blue	Orange	Orange	Orange	Orange	Yellow
Montana	Blue	Blue	Blue	Blue	Blue	Blue	Blue	Orange	Orange	Orange	Orange	Yellow
Nebraska	Blue	Blue	Blue	Blue	Blue	Blue	Blue	Orange	Orange	Orange	Orange	Yellow
Nevada	Green	Green	Green	Green	Blue	Blue	Blue	Orange	Orange	Orange	Orange	Yellow
New Hampshire	Blue	Blue	Blue	Blue	Blue	Blue	Blue	Orange	Orange	Orange	Orange	Yellow
New Jersey	Blue	Blue	Blue	Blue	Blue	Blue	Blue	Orange	Orange	Orange	Orange	Yellow
New Mexico	Green	Green	Green	Blue	Blue	Blue	Blue	Orange	Orange	Orange	Orange	Yellow
New York	Blue	Blue	Blue	Blue	Blue	Blue	Blue	Orange	Orange	Orange	Orange	Yellow
North Carolina	Blue	Blue	Blue	Blue	Blue	Blue	Blue	Orange	Orange	Orange	Orange	Yellow
North Dakota	Green	Green	Green	Green	Blue	Blue	Blue	Orange	Orange	Orange	Orange	Yellow
Ohio	Blue	Blue	Blue	Blue	Blue	Blue	Blue	Orange	Orange	Orange	Orange	Yellow
Oklahoma	Green	Blue	Blue	Blue	Blue	Blue	Blue	Orange	Orange	Orange	Orange	Yellow
Oregon	Green	Green	Green	Green	Blue	Blue	Blue	Orange	Orange	Orange	Orange	Yellow
Pennsylvania	Blue	Blue	Blue	Blue	Blue	Blue	Blue	Orange	Orange	Orange	Orange	Yellow
Rhode Island	Blue	Blue	Blue	Blue	Blue	Blue	Blue	Orange	Orange	Orange	Orange	Yellow
South Carolina	Blue	Blue	Blue	Blue	Blue	Blue	Blue	Orange	Orange	Orange	Orange	Yellow
South Dakota	Green	Green	Green	Blue	Blue	Blue	Blue	Orange	Orange	Orange	Orange	Yellow
Tennessee	Blue	Blue	Blue	Blue	Blue	Blue	Blue	Orange	Orange	Orange	Orange	Yellow
Texas	Blue	Blue	Blue	Blue	Blue	Blue	Blue	Orange	Orange	Orange	Orange	Yellow
Utah	Green	Green	Green	Blue	Blue	Blue	Blue	Orange	Orange	Orange	Orange	Yellow
Vermont	Blue	Blue	Green	Blue	Blue	Blue	Blue	Orange	Orange	Orange	Orange	Yellow
Virginia	Blue	Blue	Blue	Blue	Blue	Blue	Blue	Orange	Orange	Orange	Orange	Yellow
Washington	Green	Green	Blue	Blue	Blue	Blue	Blue	Orange	Orange	Orange	Orange	Yellow
West Virginia	Blue	Blue	Blue	Blue	Blue	Blue	Blue	Orange	Orange	Orange	Orange	Yellow
Wisconsin	Green	Green	Green	Blue	Blue	Blue	Blue	Orange	Orange	Orange	Orange	Yellow
Wyoming	Blue	Blue	Blue	Blue	Blue	Blue	Blue	Orange	Orange	Orange	Orange	Yellow

Notes. **Blue.** U.S. Officials Job Approval Ratings Collection. **Green.** Computation of the missing data by the authors. Approval ratings were simulated using known annual data (Gallup) and historical deviations from the national level for each state (from known data). **Orange.** Gallup data. **Yellow.** Race to the WH.

A.2 Variables

The following variables were used to construct the models:

– **Two-party incumbent vote**

The two-party vote share in each state including the District of Columbia obtained by the incumbent party. The incumbent party candidate was a Democrat in 1980, 1996, 2000, 2012, 2020 and 2024, and a Republican in 1984, 1988, 1992, 2004, 2008 and 2020.

– **Previous incumbent vote**

The two-party vote share in each state including the District of Columbia obtained by the incumbent party in the previous presidential election.

– **Midterm election results**

The two-party vote share received by the incumbent party in each state during U.S. House, U.S. Senate, gubernatorial, and state legislative (lower and upper houses) midterm elections. For the District of Columbia, we used election results for non-voting delegates in the U.S. House, shadow senators in the U.S. Senate, D.C. Council members, and mayoral races (as a substitute for gubernatorial elections). There is no equivalent for state Senate elections in D.C.

– **Partisan composition of state legislatures**

States in which both the lower and upper chambers of the legislature are controlled by the same party as the party of the president as of January (1980–2020) or April (2020–2024) of the election year are coded 1. States in which the legislature is controlled by the party of the challenger candidate are coded 0. When control of the legislature is divided (split)—i.e., the lower chamber is controlled by one party and the upper chamber by the other—a value of 0.5 is given to the state. Note that the local government of the District of Columbia has a legislative branch (i.e., the Council of the District of Columbia) since 1973. This legislature is unicameral. The Council has always been dominated by the Democratic Party (see [List of members of the Council of the District of Columbia](#)). Hence, the District of Columbia is always coded 1 when the incumbent candidate is a Democrat and 0 otherwise. Note also that the legislature of Nebraska is officially unicameral and non-partisan since the mid-1930s (although the legislators generally identify with a party). Since the legislature is officially non-partisan, determining party control is not as easy as for the other states. However, over the 1980–2024 period, it appears that the legislature was always dominated by the Republican Party. At the time of the 1996 presidential election, the Speaker of the Nebraska legislature was a Democrat but we were not able to find any indication of “Democratic” control at one point or another. Hence, Nebraska is always coded 1 when the incumbent candidate is a Republican and 0 otherwise. We expect “in-party” control of the state legislature (i.e., a state legislature controlled by the party of the president) to be positively associated with the vote share of the incumbent party candidate because it serves as a potentially strong indicator of local party strength and partisan leanings. Furthermore, the relationship between presidential and state elections has been noted in previous work (see [Campbell 1997](#), 189–190) and this linkage could already be found in 19th-century American politics (see [Engstrom and Kernell 2014](#), 138).

– **Unemployment change**

The change in the local (i.e., state-level) unemployment rate from the election quarter (i.e., the fourth quarter) of the previous election year and the second quarter of the election year. For example, the value of the unemployment variable for the 2024 forecast was obtained by computing

the difference between the unemployment rate in the second quarter (i.e., the average unemployment rate in April–May–June) of 2024 and the fourth quarter (i.e., the average unemployment rate in October–November–December) of 2020. A positive change in state unemployment (i.e., more unemployment) should negatively affect the vote share of the incumbent party candidate.

– **President’s job approval ratings**

The president’s job approval rating at the state level six months before the election. For the incumbent party candidate, the higher the president’s popularity is, the higher the electoral premium should be. However, the impact of popularity should not be the same in every election: we expect the impact of this variable to depend on whether or not the incumbent is seeking another term. Therefore, we interact job approval ratings with a binary variable indicating whether the incumbent president is seeking reelection (INCPRES). Presidential approval ratings capture all aspects of the president’s leadership, including how the incumbent administration responds to crisis situation. Between 1980 and 2004, the approval data come from the JAR database which brings together a variety of approval questions (using different scales). Responses were collapsed into “percent positive” and “percent negative” categories. The standard job performance question (referred to as type 1 in the JAR database) was used when available—that is, in the majority of cases—with the type 6 (excellent, good / only fair, poor) or type 10 (excellent, pretty good / only fair, poor) rating scales. Otherwise we used the type 4 question asking respondents to make a retrospective assessment of the whole term (see the codebook of the [JAR database](#) for more details). From 2008 to 2020, we used the Gallup approval question, which reads as follows: “Do you approve or disapprove of the way [president’s name] is handling his job as president?” (possible answers: approve, disapprove, no opinion). We simply take the share of respondents who approve of the way the president is handling his job. For the 2024 election, we use the Race to the WH weighted state-level averages of approval ratings from different polls.

– **Incumbent president running**

Binary variable coded 1 if the incumbent president is running for a second term and 0 otherwise.

– **Partisan pattern indexes**

The partisan pattern indexes takes into account the characteristics of the partisan cycle in each state. The first index codes states having significant partisan domination since 1952¹ and the other one codes states having significant partisan domination since 1980, which includes recent southern Republican strongholds. More precisely, the first index gives for each state over the 1952–2020 period the rate of success for each party when this rate was at least 72 percent for the Democrats and 89 percent for the Republicans (this variable takes a value of 0 otherwise). The second index gives for each state over the 1980–2020 period the rate of success for each party when this rate was at least 73 percent for the Democrats and 82 percent for the Republicans (this variable takes a value of 0 otherwise). It was first assumed that a party needed to win at least 13 elections out of 18 in a state since 1952 (meaning a 72 percent success rate threshold), for that state to enter the ‘stronghold’ category. We then reconsidered this minimal threshold by looking at the patterns of electoral success for each party over the 1952–2020 period. A total of 20 states reach the 72 percent threshold for the Republicans, while this is the case for only 6

¹Although the 1952 election has been described as a classic example of a “deviating” election, one in which voters temporarily ignored their party identification to support an opposition candidate, [Trende \(2012\)](#) has made a convincing case for why this election might be one of the strongest examples of realignment in American presidential politics. In fact, according to [Trende \(2012, 184\)](#), “the 1952 and 1992 elections fit the ‘critical election’ definition as well, if not better, than years like 1968 and 2008.” Among other things, [Trende \(2012, 184–185\)](#) notes that “1952 is clearly a breakthrough election for the Republicans in many ways. They carried several Southern states with a generally inoffensive candidate on the Democratic ticket, a tendency that continues unbroken to this day. Republicans were reborn in the Mountain West. They finally laid solid claim to the white working class, and the suburbs moved to the fore.”

states for the Democrats over the 1952–2020 period. Hence, we chose a more restrictive definition of ‘strongholds’ for the Republican Party by keeping states with a minimal success rate of 89 percent, that is 16 out of 18 elections. A total of 11 states fall in the stronghold category for the Republicans (the Democrats never reached the 89 percent threshold except in the District of Columbia and Hawaii). We made this choice in order to take into account the asymmetry between Democrats and Republicans. The electoral foundation of Democratic strongholds is weaker than that of Republican strongholds. We followed the same procedure for the 1980–2020 period. ‘new’ Democratic strongholds were defined as those won by the Democratic Party in 8 out of 11 elections (11 states), while ‘new’ Republican strongholds were defined as those won by the Republican Party in 9 out of 11 elections (11 states).

- Democratic strongholds, 1952–2020: DC, HI, MA, MD, MN, and RI.
- Democratic strongholds, 1980–2020: CA, CT, DE, IL, ME, NJ, NY, OR, VT, WA, and WI.
- Republican strongholds, 1952–2020: AK, AZ, ID, IN, KS, MT, ND, NE, OK, SD, and WY.
- Republican strongholds, 1980–2020: AL, AR, KY, LA, MO, MS, NC, SC, TN, TX, and UT.

When the partisan leaning of the state is the same as that of the incumbent party candidate, it carries a positive sign; otherwise, it carries a negative sign. In sum, this means that the incumbent party candidate will be rewarded in states that are ideologically similar and punished in states that are ideologically dissimilar. The partisan index for more recent strongholds was constructed in the same way, except for the fact that the rate of success was calculated over the 1980–2020 period.

– **Challenger’s vote in primaries**

The vote share per state won by the nominee of the challenger party during the primaries. Here we assert that the higher the score of the challenger nominee is, the more threatened the incumbent party candidate could be.

– **Anderson 1980, Perot 1992, Perot 1996**

Binary variables coded 1 for each election in which an independent or third-party candidates made a strong national electoral performance (i.e., at least five percent of the total popular vote) and 0 otherwise. These include the 1980 (John Anderson: 6.6 percent), 1992 (Ross Perot: 18.9 percent) and 1996 (Ross Perot/Reform: 8.4 percent) elections. See Figure [A2](#).

– **Highest scores**

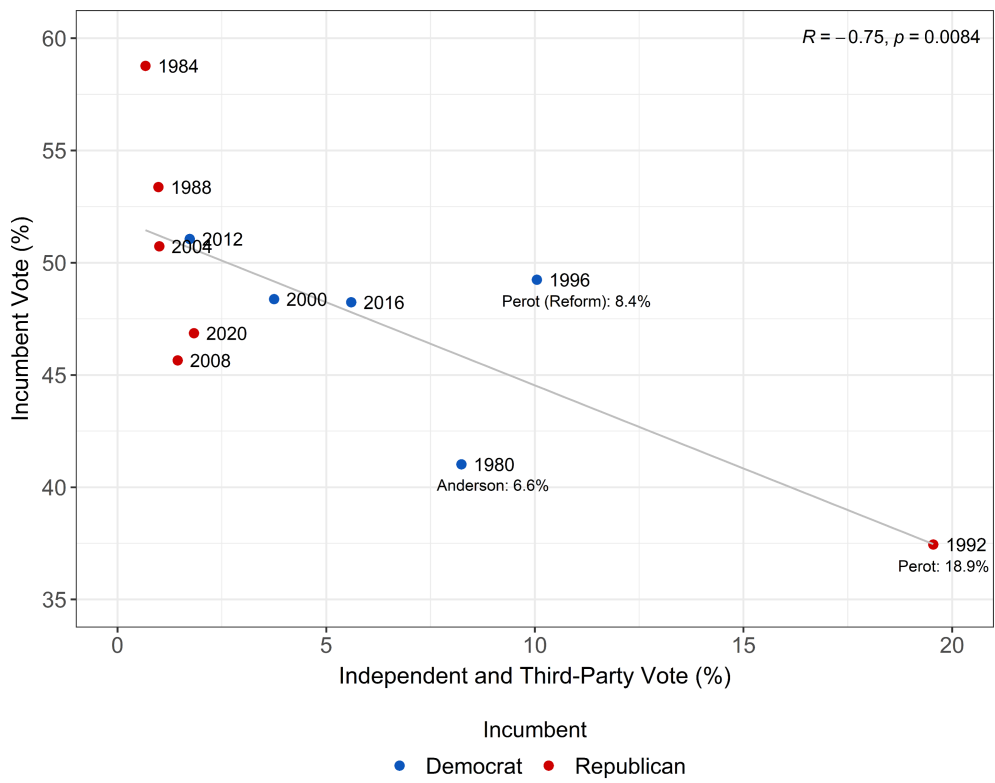
Binary variables scored 1 in states where Democrats or Republicans have had almost consistently high scores (i.e., scores above their average national score) over multiple election cycles and 0 otherwise. States with above-average scores for the Democratic Party are coded 1 when the incumbent candidate is a Democrat and all other states are coded 0. Similarly, states with above-average scores for the Republican Party are coded 1 when the incumbent candidate is a Republican and all other states are coded 0.

- Democrats since 1996: MA, MD, NJ, NY, and RI.
- Republicans since 1980: AK, ID, NE, UT, and WY.

– **District of Columbia**

Binary variables scored 1 in the District of Columbia when Democrats or Republicans are incumbents and 0 otherwise. A high premium is expected when Democrats are incumbents while Republicans should pay a high cost in the reverse case.

Figure A2. Association between incumbent and independent/third-party national vote shares, 1980–2020



B Multicollinearity

In order to check for the presence of multicollinearity issues among the independent variables of our models, we computed variance inflation factors (VIF). It is indeed possible that presidential approval ratings are highly collinear with other indicators of party strength in the state (either partisan composition of state legislatures or the partisan pattern indexes). We do not find any serious multicollinearity issue (see Table B1). Note that the high VIF value for the “incumbent running” variable in both models is due to the inclusion of an interaction term between that variable and job approval ratings.

Table B1. Variance Inflation Factors

Variables	VIF	
	Extended Model	Simplified Model
Previous incumbent vote	5.43	3.06
Midterm election results	3.03	
Partisan composition of state legislatures	2.08	
Unemployment change	1.98	
President’s job approval ratings	3.50	3.09
Incumbent president running	18.45	12.82
President’s job approval \times Incumbent running	16.64	13.87
Partisan pattern indexes		
Partisan pattern index 1952–2020	2.36	2.03
Partisan pattern index 1980–2020	1.47	1.27
Challenger’s vote in primaries	1.53	1.37
Third-party support		
John Anderson 1980	2.07	
Ross Perot 1992	1.26	
Ross Perot 1996	1.52	
Highest scores		
Highest scores: Incumbent Republican	1.89	
Highest scores: Incumbent Democrat	2.98	
District of Columbia		
District of Columbia: Incumbent Democrat	2.29	
District of Columbia: Incumbent Republican	2.04	
State fixed effects	<i>not shown</i>	<i>not shown</i>
Mean	2.73	2.41

C Winning probability at the state level

The winning probability of a candidate in a given state (or, more precisely, the probability of crossing the 50 percent mark) is obtained by computing the complementary cumulative density function (CCDF). First, to find the probability that the two-party vote share is less than or equal to the threshold X (here 50) in a distribution with a mean (μ) equal to the predicted two-party vote share and a standard deviation (σ) equal to that of the estimated model, we need to convert the X value to a z -score (i.e., the distance of X from μ expressed as a standard deviation). Equation 1 shows how to do this:

$$z = \frac{X - \mu}{\sigma} \tag{1}$$

Second, looking at a standard normal cumulative distribution function (CDF) table, we find the area to the right of the z -score. Finally, to find the area to the left of the z -score, we use the complement rule and compute $1 - \text{CDF}$ (i.e., the CCDF) which gives us the probability a candidate will cross the 50 percent mark in a given state. In Stata, all of this can be achieved by using the following line of code (and inserting the proper values for μ and σ): `display 1 - normal((50 - μ)/ σ).`

Imagine that the forecast for the incumbent party candidate in a state is 45 percent of the two-party vote and that the standard deviation of the model is 3. We wish to know what is the probability that the incumbent party candidate will cross the 50 percent mark in the state. Using Equation 1, we find that the z -score is approximately equal to 1.67. This z -score is associated with a 0.95 probability (or a 95 percent chance) of falling below or at the 50 percent mark. In other words, the incumbent candidate only has a 0.05 probability (or a 5 percent chance) of crossing the 50 percent mark.

D Detailed results, 2024

Table D1 shows the popular vote and Electoral College before-the-fact forecasts for each candidate (Kamala Harris v. Donald Trump) in each state obtained from the extended model. Forecasts from the simplified model are shown in Table D2.

Table D1. Forecasts by state: Kamala Harris v. Donald Trump, 2024 presidential election – Extended model

State	Popular vote		Electoral vote		Probability ^a
	Harris	Trump	Harris	Trump	
Alabama	35.16	64.84		9	0.00
Alaska	36.72	63.28		3	0.00
Arizona	42.36	57.64		11	0.87
Arkansas	32.08	67.92		6	0.00
California	58.83	41.17	54		99.70
Colorado	48.61	51.39		10	33.22
Connecticut	56.05	43.95	7		97.02
Delaware	57.12	42.88	3		98.67
District of Columbia	91.50	8.50	3		100
Florida	45.32	54.68		30	7.28
Georgia	46.97	53.03		16	17.32
Hawaii	59.58	40.42	4		99.86
Idaho	27.77	72.23		4	0.00
Illinois	53.98	46.02	19		89.22
Indiana	36.83	63.17		11	0.00
Iowa	40.84	59.16		6	0.22
Kansas	36.03	63.97		6	0.00
Kentucky	32.79	67.21		8	0.00
Louisiana	37.35	62.65		8	0.00
Maine	50.43	49.57	4		55.31
Maryland	62.49	37.51	10		99.99
Massachusetts	62.68	37.32	11		100.00
Michigan	46.92	53.08		15	16.87
Minnesota	48.66	51.34		10	33.79
Mississippi	38.79	61.21		6	0.02
Missouri	35.50	64.50		10	0.00
Montana	32.94	67.06		4	0.00
Nebraska	32.62	67.38		5	0.00
Nevada	45.73	54.27		6	9.19
New Hampshire	47.76	52.24		4	24.30
New Jersey	55.22	44.78	14		94.80
New Mexico	49.34	50.66		5	41.84
New York	57.69	42.31	28		99.16
North Carolina	43.88	56.12		16	2.84
North Dakota	26.00	74.00		3	0.00
Ohio	42.46	57.54		17	0.95
Oklahoma	28.73	71.27		7	0.00
Oregon	52.92	47.08	8		81.82
Pennsylvania	47.07	52.93		19	18.11
Rhode Island	57.72	42.28	4		99.18
South Carolina	39.67	60.33		9	0.07

Continued on next page

Table D1 – *Continued from previous page*

State	Popular vote		Electoral vote		Probability ^a
	Harris	Trump	Harris	Trump	
South Dakota	32.09	67.91		3	0.00
Tennessee	35.14	64.86		11	0.00
Texas	41.55	58.45		40	0.43
Utah	32.32	67.68		6	0.00
Vermont	60.95	39.05	3		99.97
Virginia	50.09	49.91	13		51.12
Washington	53.54	46.46	12		86.48
West Virginia	30.45	69.55		4	0.00
Wisconsin	47.23	52.77		10	19.43
Wyoming	24.17	75.83		3	0.00
Nationwide	–	–	197	341	–

Table D2. Forecasts by state: Kamala Harris v. Donald Trump, 2024 presidential election – Simplified model

State	Popular vote		Electoral vote		Probability ^a
	Harris	Trump	Harris	Trump	
Alabama	35.26	64.74		9	0.01
Alaska	38.45	61.55		3	0.16
Arizona	42.68	57.32		11	3.07
Arkansas	31.77	68.23		6	0.00
California	58.16	41.84	54		98.15
Colorado	48.24	51.76		10	32.68
Connecticut	55.73	44.27	7		92.84
Delaware	56.58	43.42	3		95.36
District of Columbia	86.02	13.98	3		100
Florida	44.63	55.37		30	8.49
Georgia	47.60	52.40		16	26.95
Hawaii	57.89	42.11	4		97.81
Idaho	29.09	70.91		4	0.00
Illinois	53.44	46.56	19		81.05
Indiana	37.27	62.73		11	0.06
Iowa	40.11	59.89		6	0.57
Kansas	37.09	62.91		6	0.05
Kentucky	33.00	67.00		8	0.00
Louisiana	36.71	63.29		8	0.03
Maine	50.83	49.17	4		58.40
Maryland	62.19	37.81	10		99.91
Massachusetts	61.67	38.33	11		99.86
Michigan	46.36	53.64		15	17.63
Minnesota	46.71	53.29		10	20.05
Mississippi	38.68	61.32		6	0.19
Missouri	36.59	63.41		10	0.03
Montana	33.42	66.58		4	0.00
Nebraska	33.38	66.62		5	0.00
Nevada	44.89	55.11		6	9.59
New Hampshire	47.86	52.14		4	29.24
New Jersey	54.30	45.70	14		86.38
New Mexico	49.03	50.97		5	40.22
New York	56.62	43.38	28		95.47
North Carolina	44.42	55.58		16	7.68
North Dakota	25.86	74.14		3	0.00
Ohio	41.66	58.34		17	1.66
Oklahoma	28.33	71.67		7	0.00
Oregon	52.32	47.68	8		72.37
Pennsylvania	46.90	53.10		19	21.42
Rhode Island	57.29	42.71	4		96.88
South Carolina	39.87	60.13		9	0.48
South Dakota	30.84	69.16		3	0.00
Tennessee	34.50	65.50		11	0.00
Texas	41.97	58.03		40	2.01
Utah	33.31	66.69		6	0.00
Vermont	60.58	39.42	3		99.66
Virginia	49.99	50.01		13	49.85
Washington	52.55	47.45	12		74.29
West Virginia	29.74	70.26		4	0.00

Continued on next page

Table D2 – *Continued from previous page*

State	Popular vote		Electoral vote		Probability ^a
	Harris	Trump	Harris	Trump	
Wisconsin	46.74	53.26		10	20.24
Wyoming	23.91	76.09		3	0.00
Nationwide	–	–	184	354	–

E Prediction errors by election year and state, 1980–2020

Figure E1. Out-of-sample mean absolute errors by election year and state, 1980–2020 – Extended model

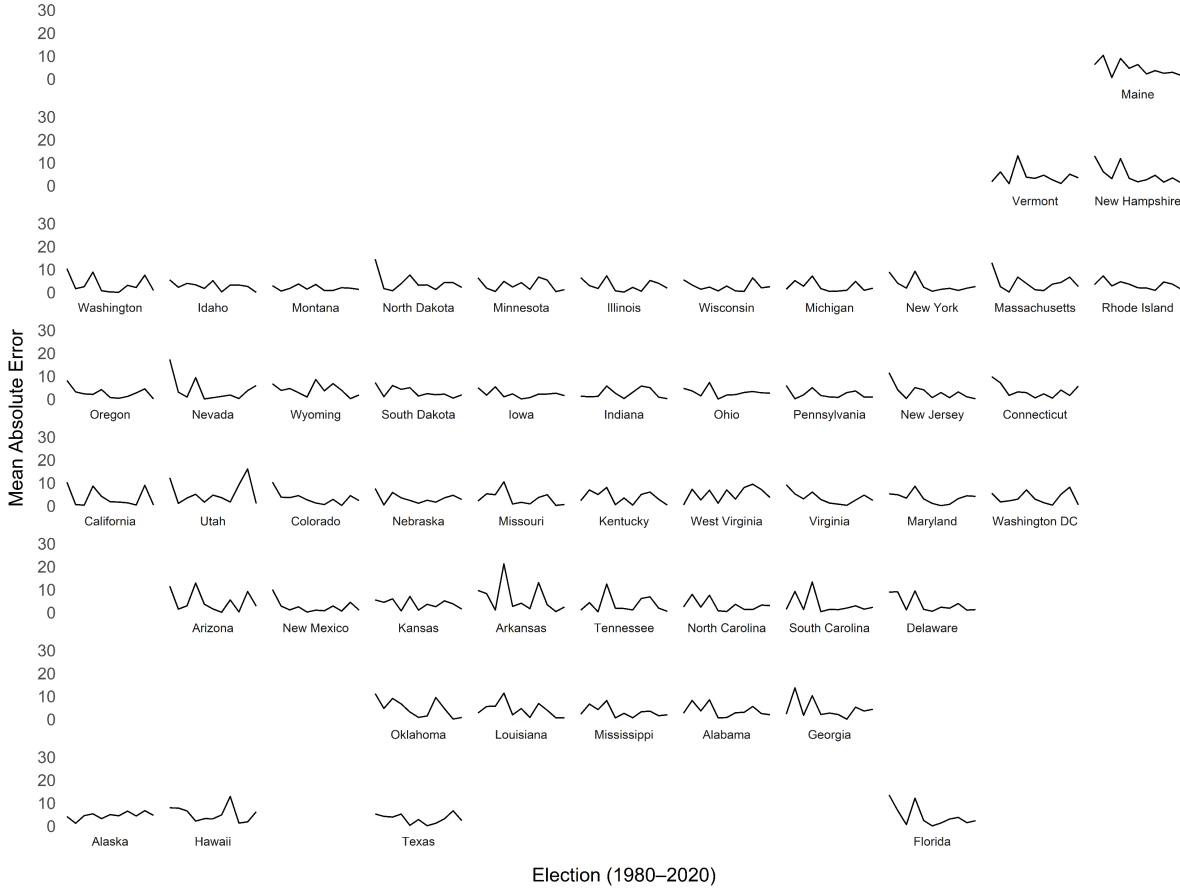
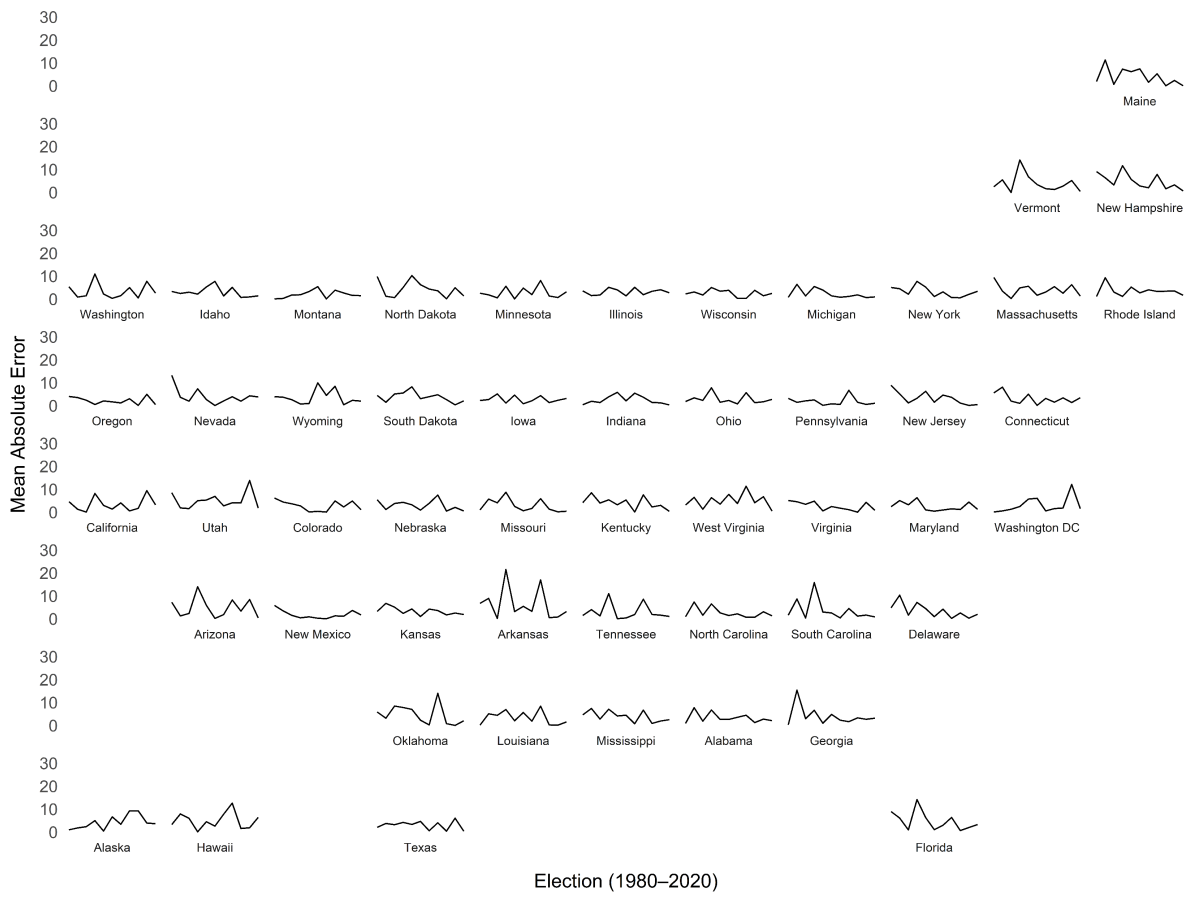


Figure E2. Out-of-sample mean absolute errors by election year and state, 1980–2020 – Simplified model



F Before-the-fact forecasts, 2000–2020 – Extended model

Figure F1. Predicted and actual outcomes, 2000 presidential election

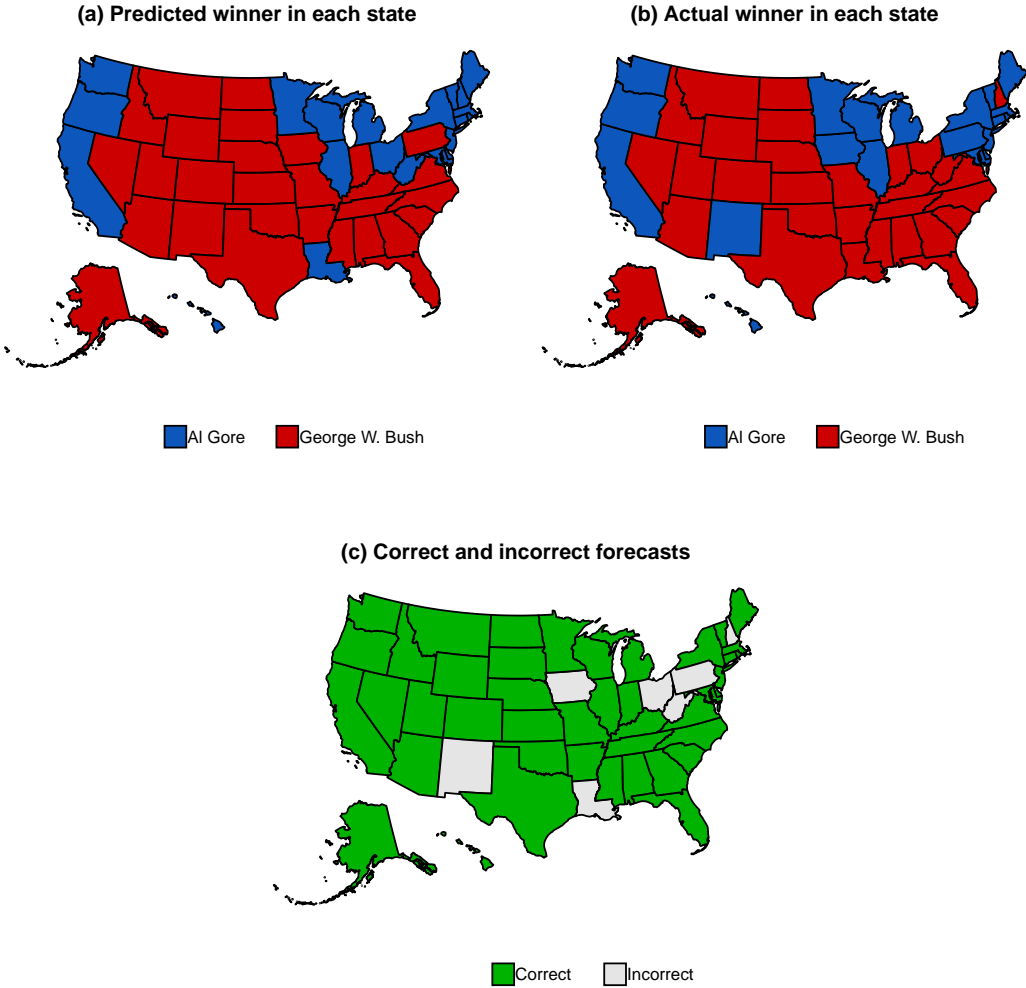


Figure F2. Predicted and actual outcomes, 2004 presidential election

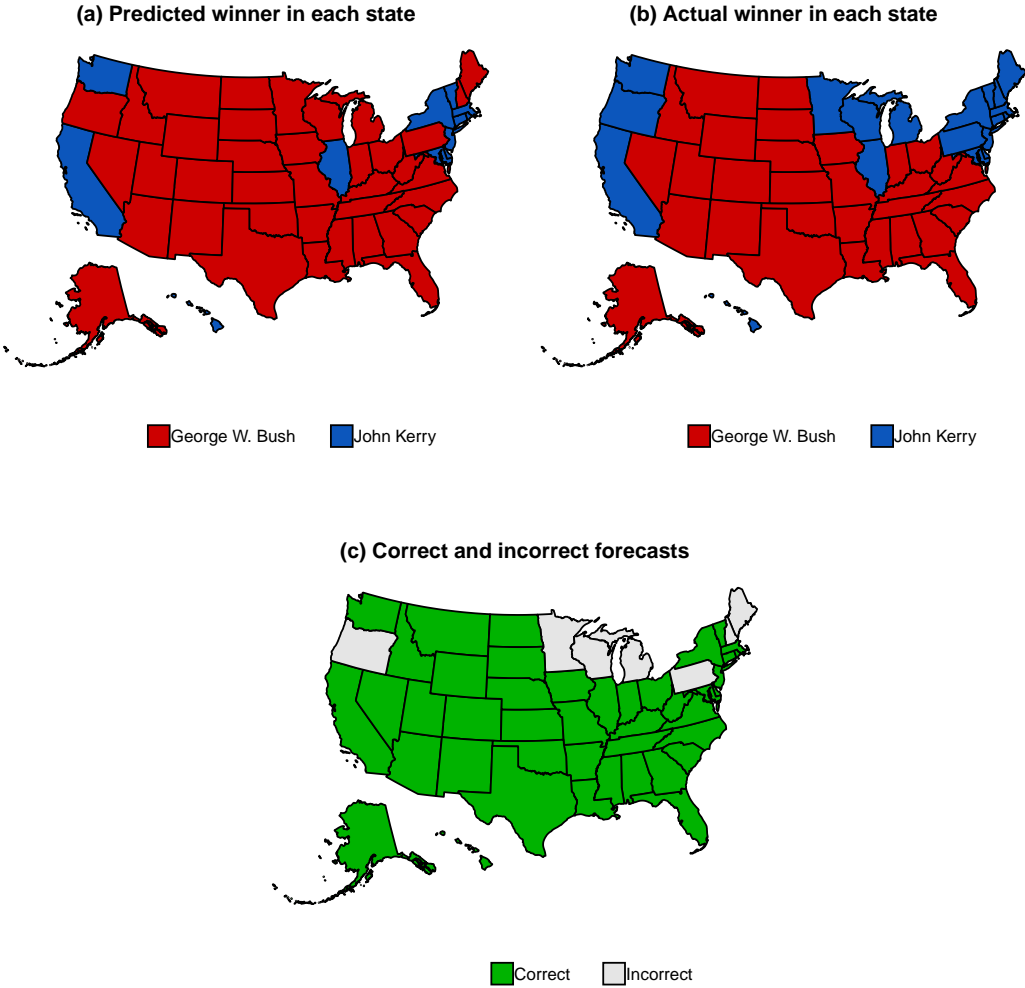


Figure F3. Predicted and actual outcomes, 2008 presidential election

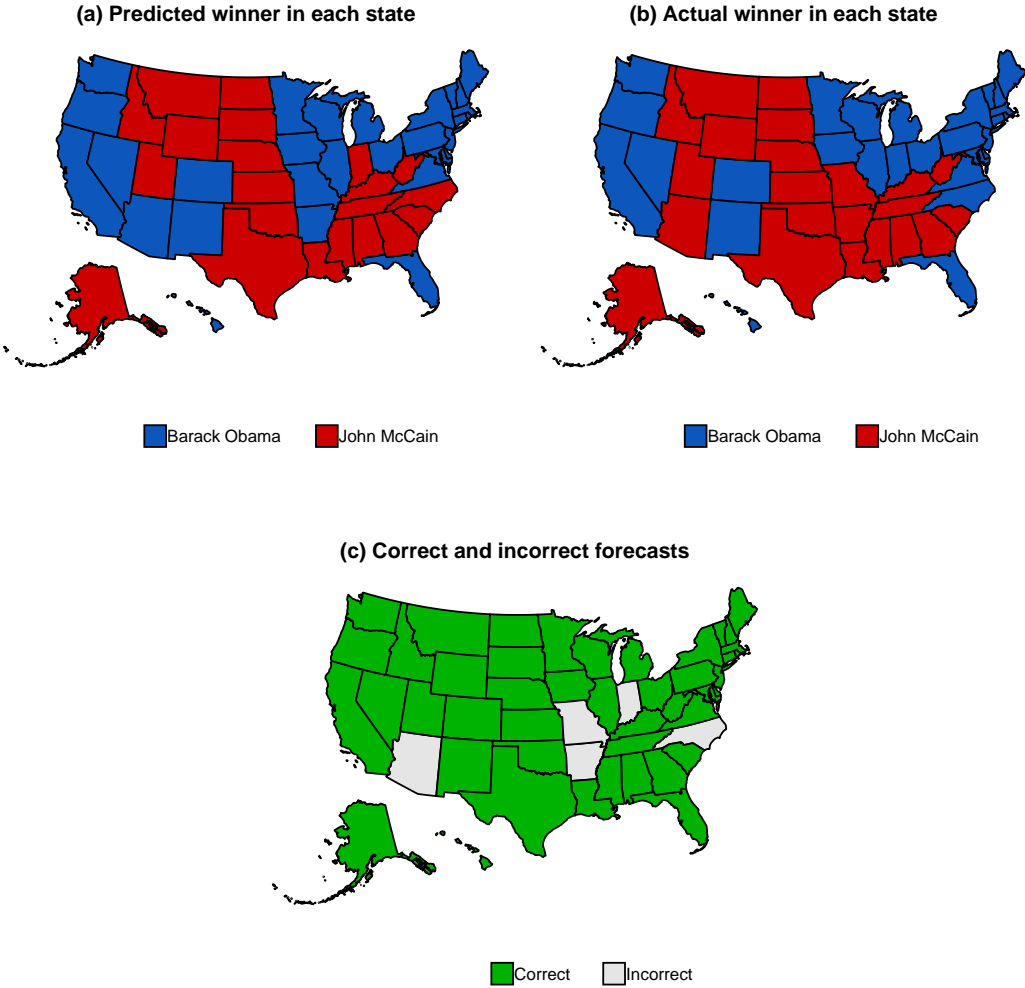


Figure F4. Predicted and actual outcomes, 2012 presidential election

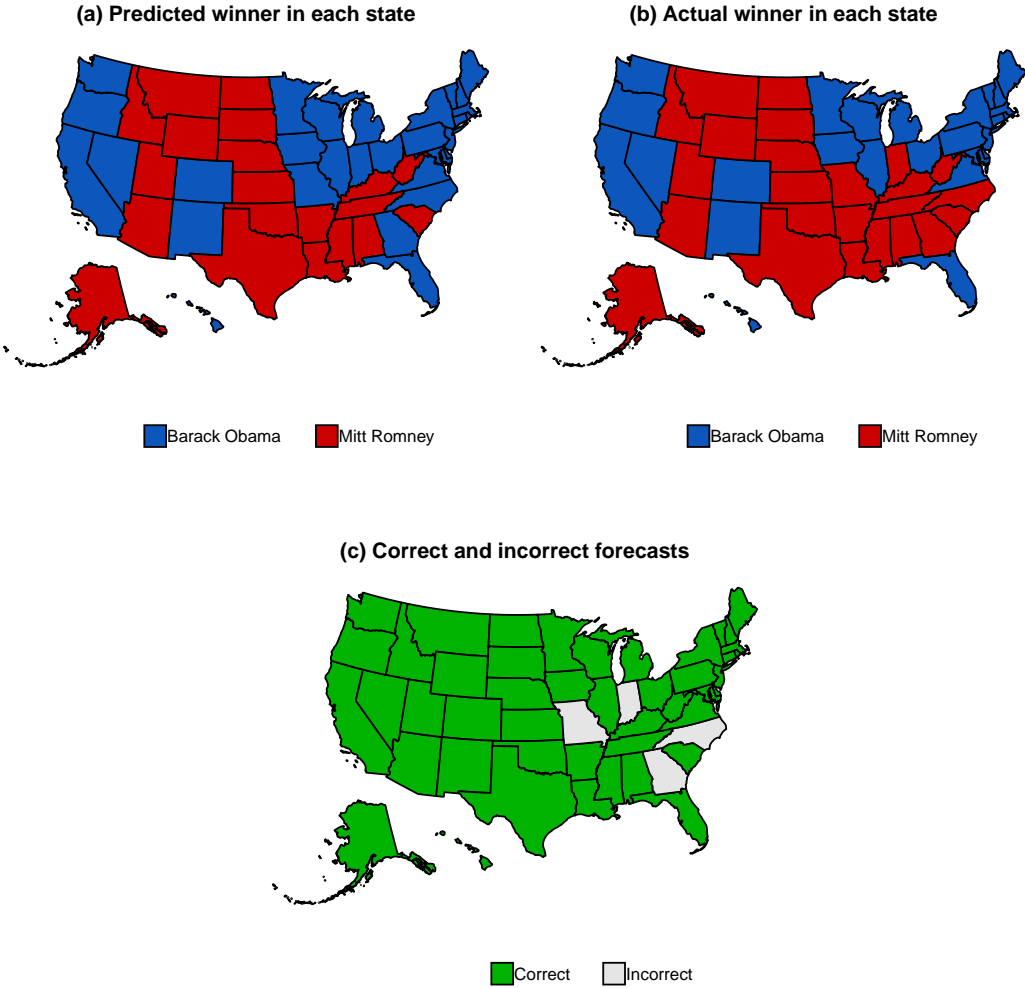


Figure F5. Predicted and actual outcomes, 2016 presidential election

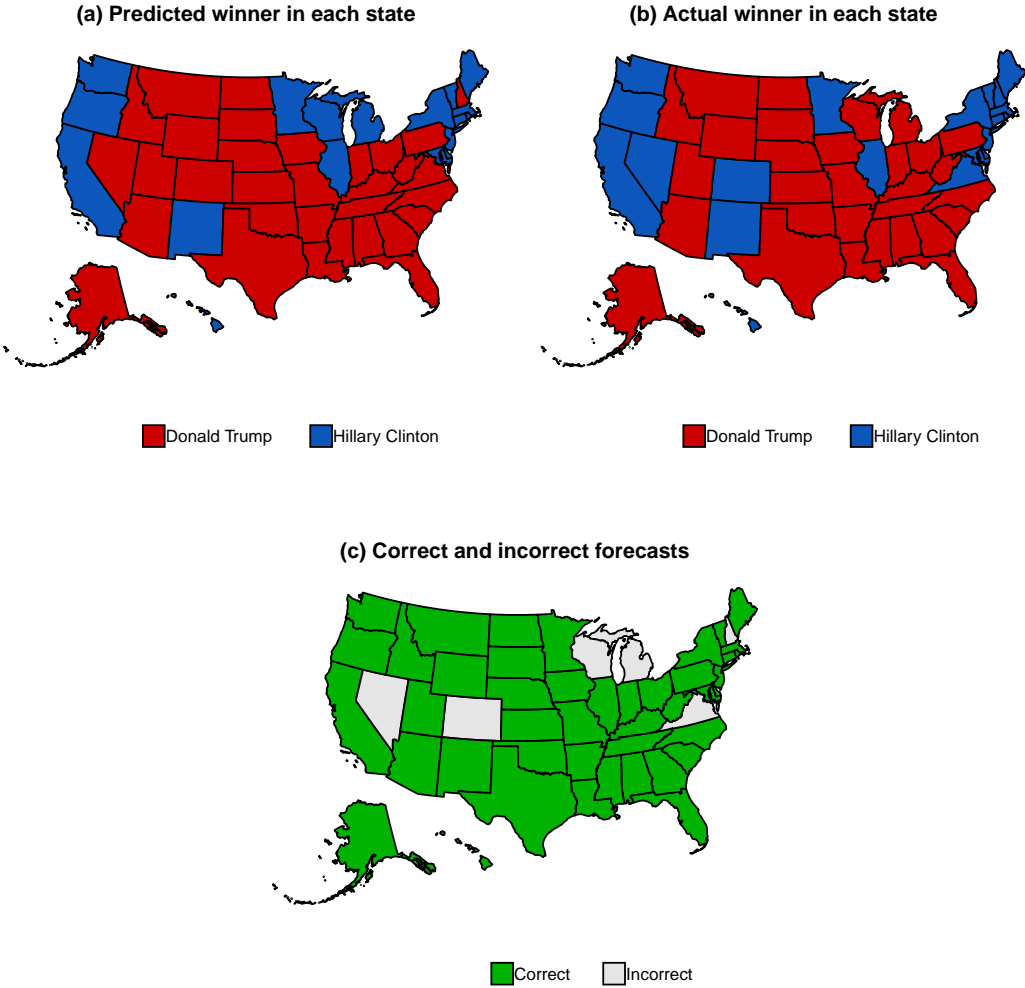
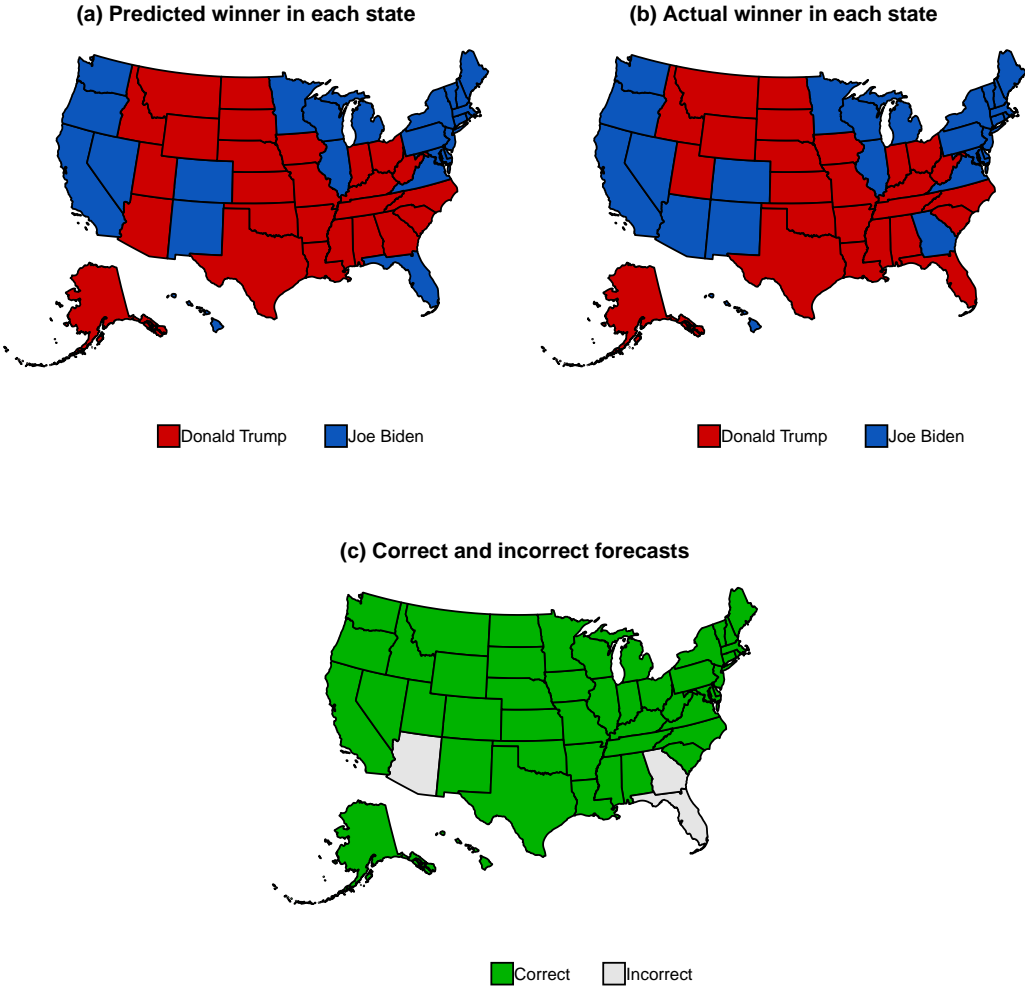


Figure F6. Predicted and actual outcomes, 2020 presidential election



G Before-the-fact forecasts, 2000–2020 – Simplified model

Figure G1. Predicted and actual outcomes, 2000 presidential election

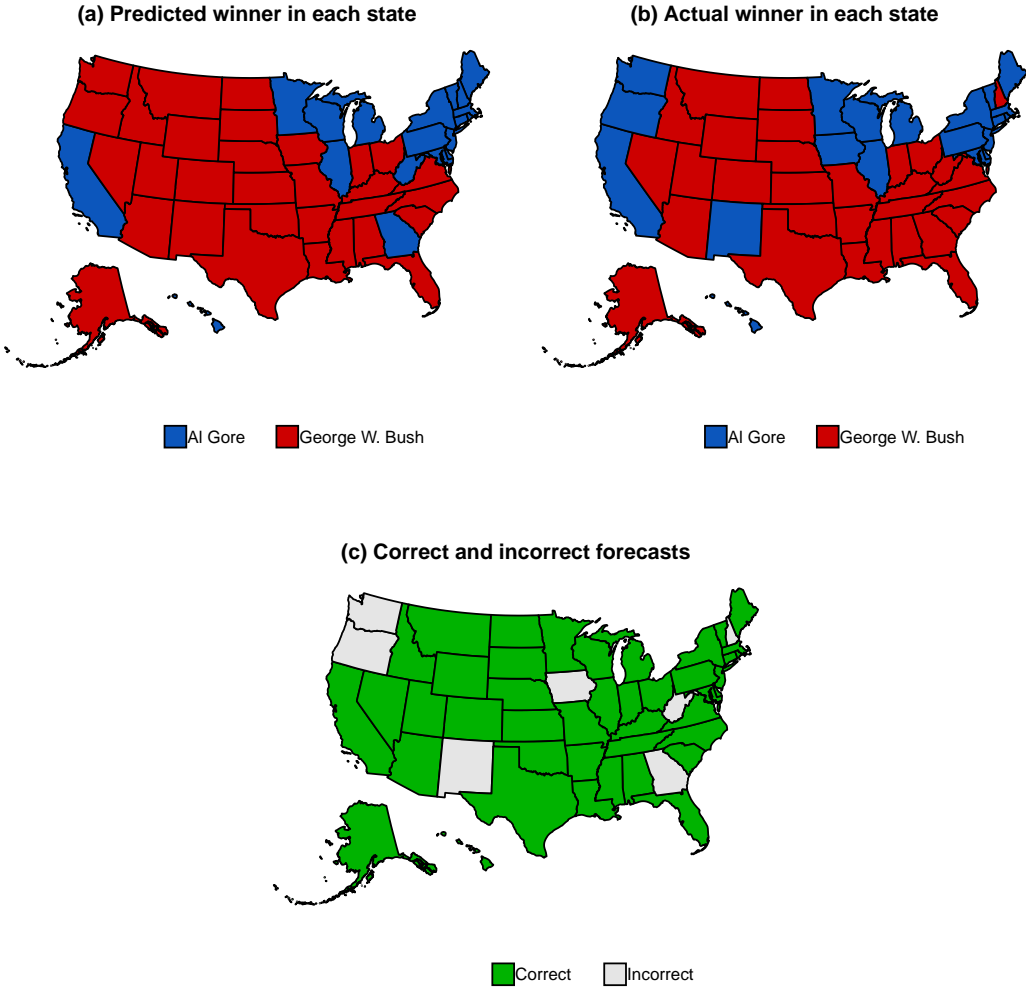


Figure G2. Predicted and actual outcomes, 2004 presidential election

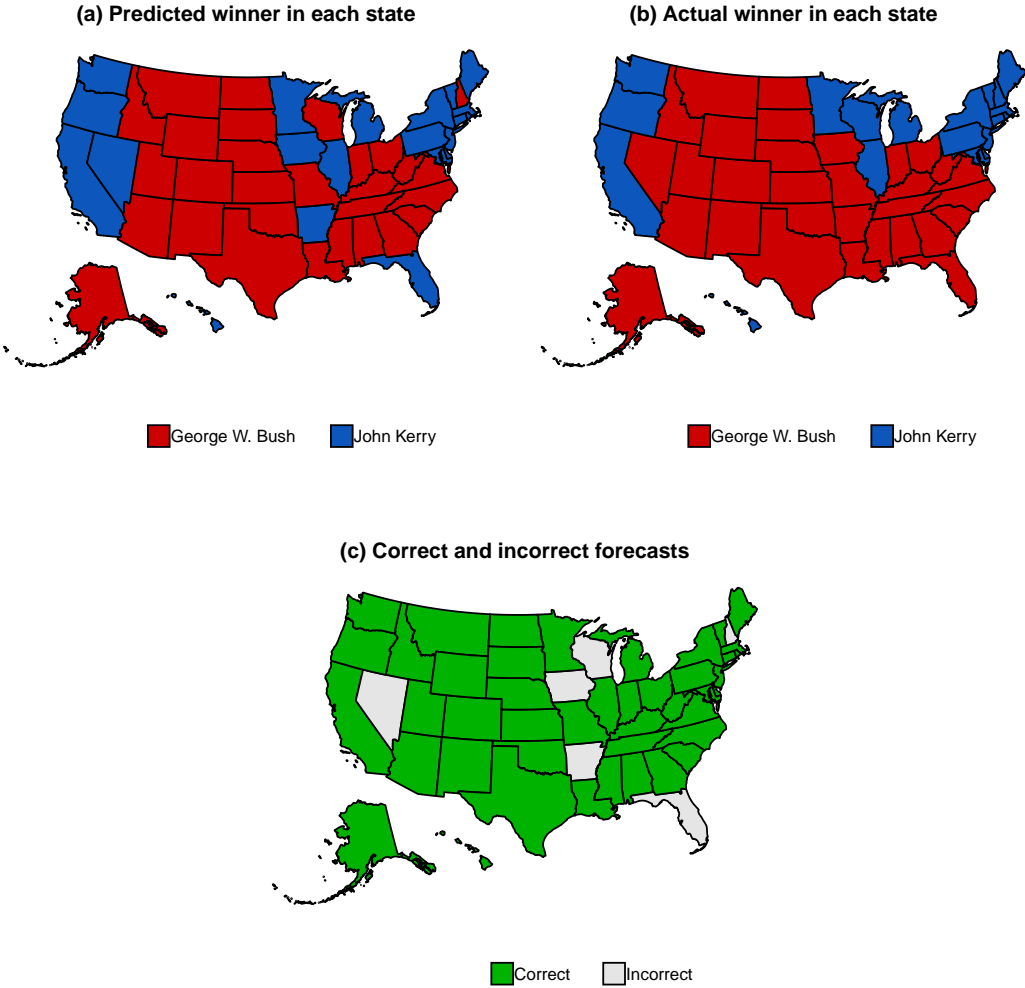


Figure G3. Predicted and actual outcomes, 2008 presidential election

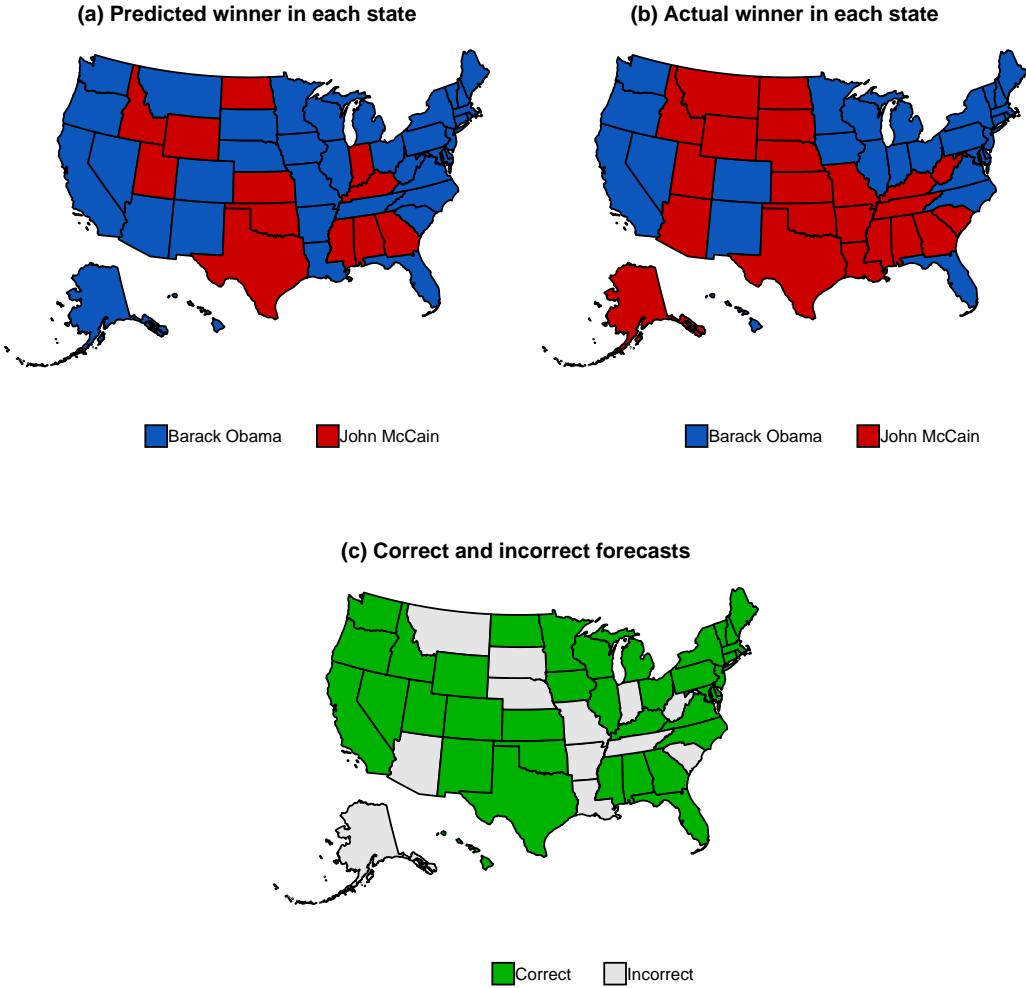


Figure G4. Predicted and actual outcomes, 2012 presidential election

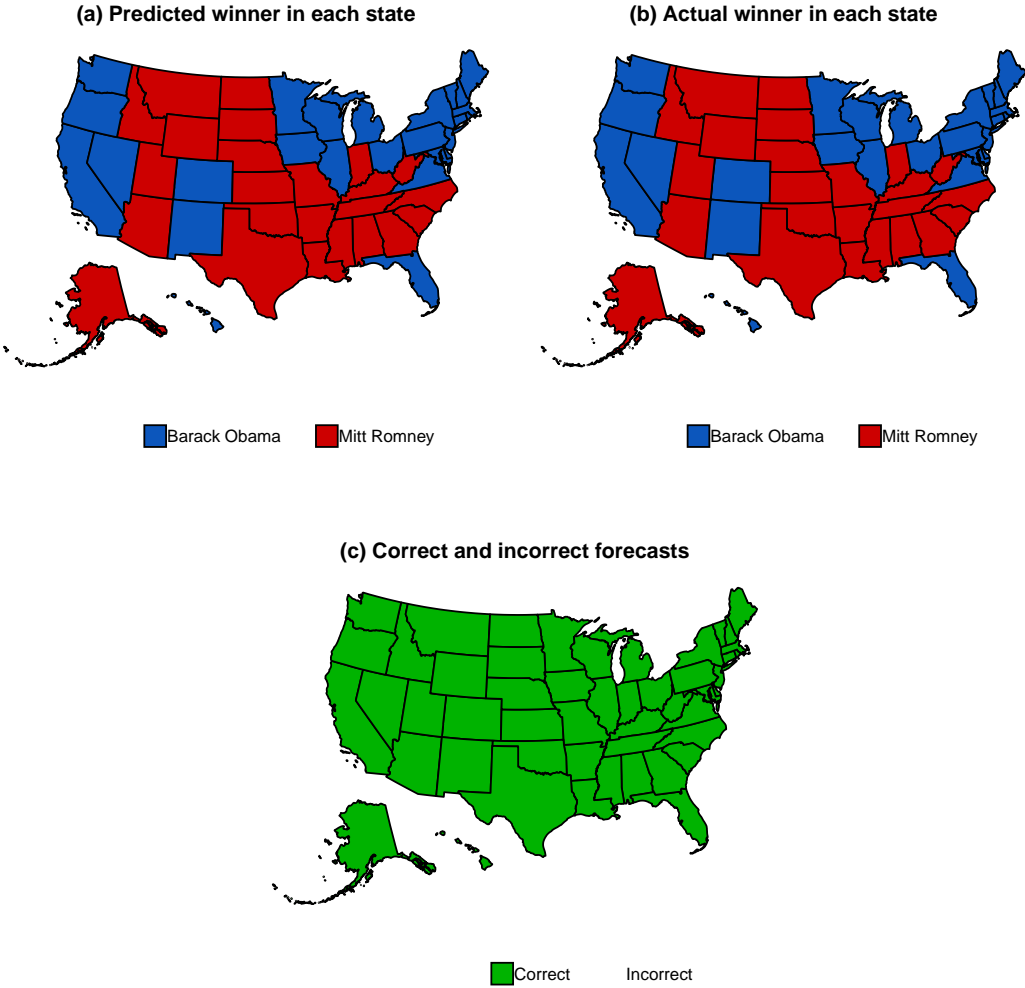


Figure G5. Predicted and actual outcomes, 2016 presidential election

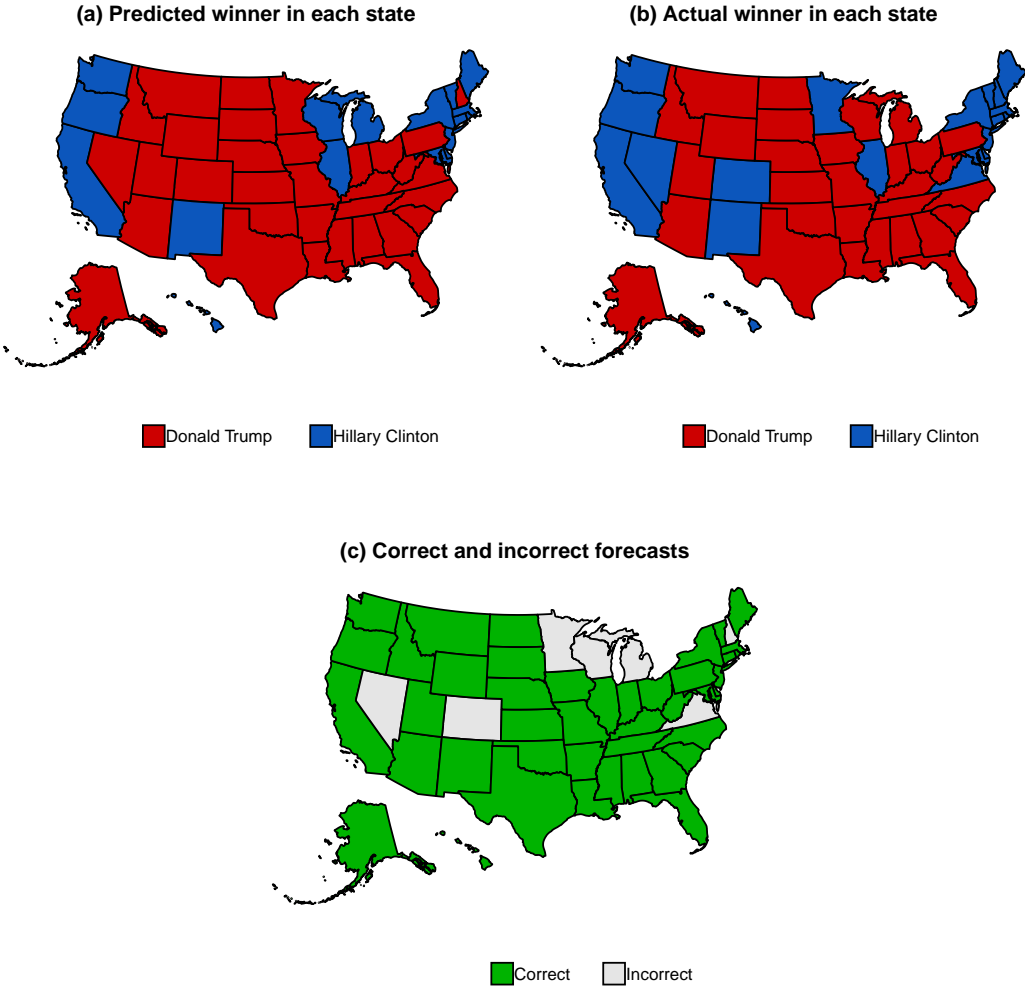
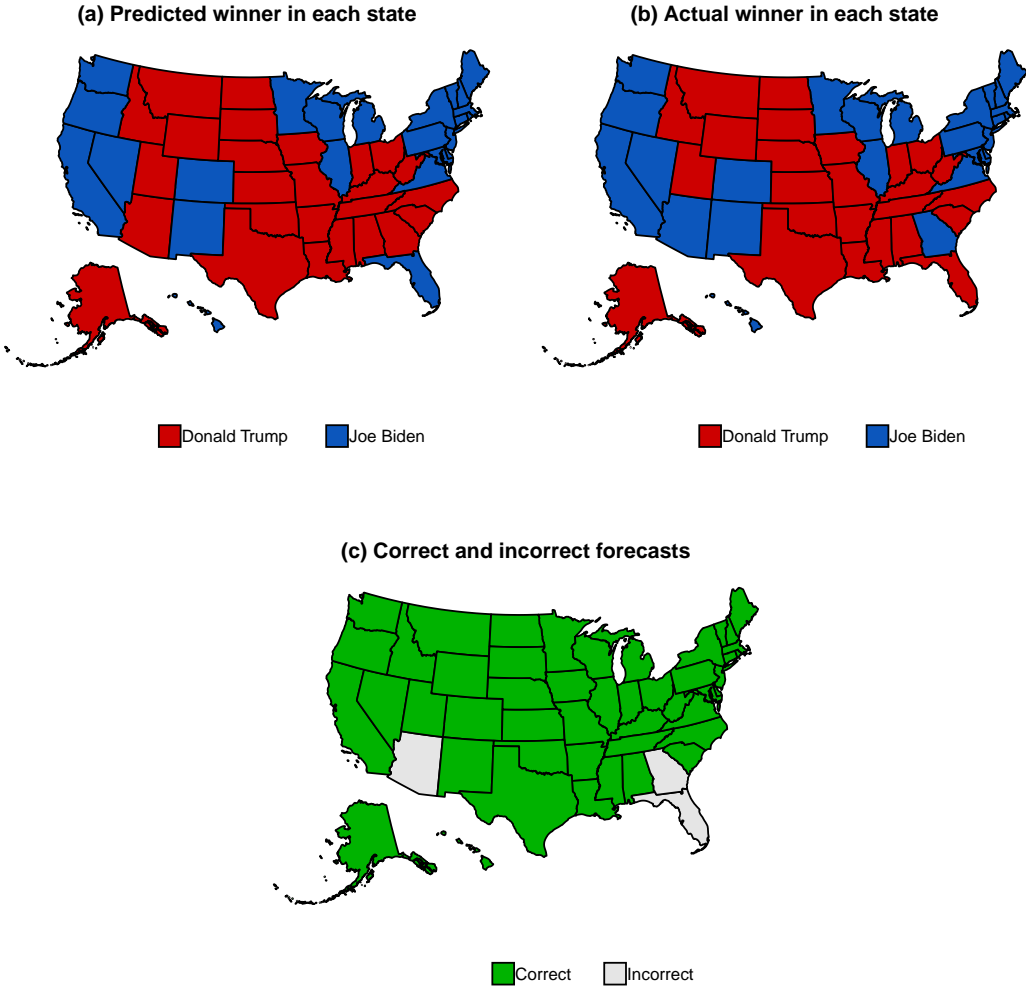


Figure G6. Predicted and actual outcomes, 2020 presidential election



H Additional analyses

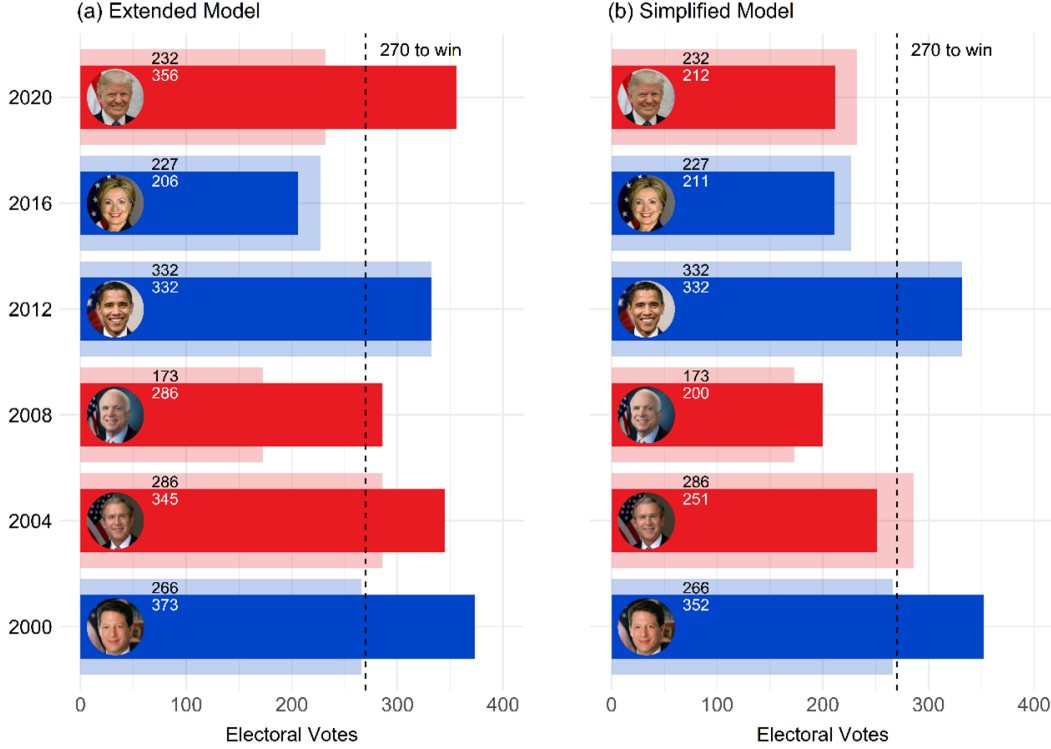
Since states are embedded within election years, a multilevel modeling strategy appears like a valuable alternative to fixed-effect models. This approach, which was followed by [Campbell, Ali and Jalalzai \(2006\)](#), allows using variables measured at the national level. Since state-level presidential approval ratings had to be imputed for some states and elections, we can circumvent potential issues related to missingness by using national-level presidential approval ratings. Additionally, inflation has become a major concern for many Americans over the past few years ([Dunne 2024](#); but see [Mutz and Mansfield 2024](#)). The multilevel approach also facilitates assessing the impact of this variable on incumbent performance as state-level inflation data going back multiple decades are more difficult to get by. The national approval rating for each election was measured in the second quarter of the election year (using data from the [American Presidency Project](#)). Change in the national inflation rate was measured as the difference between the average monthly inflation rate in the second quarter of the election year and the average monthly inflation rate in the election quarter (i.e., the fourth quarter) of the previous election year. Monthly inflation rates since 1976 were retrieved from the [CPI Inflation Calculator](#), which uses the data released by the Bureau of Labor Statistics. The multilevel models displayed in [H1](#) were however globally less accurate than the revised fixed-effect models as can be seen from [Figure H1](#).

Table H1. State-by-State Political Economy Multilevel Models, 50 States and D.C. (1980–2020)

Parameters	Extended Model		Simplified Model	
	B	SE	B	SE
Previous incumbent vote	0.74***	(0.03)	0.85***	(0.02)
Midterm election results	0.02	(0.02)		
Partisan composition of state legislatures	0.16	(0.41)		
State unemployment change	-0.12	(0.09)		
National inflation change	-0.55***	(0.15)	-0.14	(0.13)
President's national job approval rating	0.00	(0.03)	0.04	(0.06)
Incumbent president running	5.18	(6.36)	-17.62***	(4.86)
President's job approval × Incumbent running	0.52	(0.13)	0.44***	(0.10)
Partisan pattern indexes				
Partisan pattern index 1952-2020	2.91***	(0.39)	2.63***	(0.39)
Partisan pattern index 1980-2020	2.57***	(0.28)	2.13***	(0.28)
Challenger's vote in primaries	-0.01	(0.01)	-0.01	(0.01)
Third-party support				
John Anderson 1980	0.75	(1.45)		
Ross Perot 1992	-4.49**	(1.34)		
Ross Perot 1996	0.41*	(1.31)		
Highest scores				
Highest scores: Incumbent Democrat	2.81***	(0.76)		
Highest scores: Incumbent Republican	-0.55	(0.68)		
District of Columbia				
District of Columbia: Incumbent Democrat	9.86***	(1.63)		
District of Columbia: Incumbent Republican	-5.83***	(1.58)		
Constant	8.29***	(2.00)	1.78	(2.86)
Random-effects				
Intercept	0.21		1.23	
Observations				
States	561		561	
Elections	11		11	

Notes. Dependent variable: Incumbent party candidate's two-party vote share. Significance levels: + $p < 0.1$; * $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$; (two-tailed). Standard errors in parentheses.

Figure H1. Before-the-fact forecasts and results: Electoral College, 2000–2020



I Replication of results

The analyses were conducted using Stata. The data file (`data_2spe_model_1980_2024.dta`) and the do-files (`commands_2spe_model_1980_2024_extended.do` for the extended model and `commands_2spe_model_1980_2024_simplified.do` for the simplified model) to run the analyses can be found on *PS: Political Science & Politics* Dataverse. The figures, cartograms and choropleth maps presented in the article and the appendix were created using the R programming language. The R file with the code used to create these figures is available upon request.

The meaning of the variable names can be found below.²

- **abbr.** State abbreviation.
- **abserr_o.** Absolute jackknife out-of-sample errors, 1980–2020.
- **abserr_w.** Absolute within-sample errors, 1980–2020.
- **anderson.** John Anderson 1980. See section [A.2](#).
- **chae.** Actual challenger party candidate’s Electoral College vote, 1980–2020.
- **chance.** Likelihood of winning in each state (i.e., safe Democrat, likely Democrat, leans Democrat, tilt, leans Republican, likely Republican, safe Republican), 2024.
- **chance_ev.** Number of electoral votes according to likelihood of winning in each state, 2024.
- **chav.** Actual challenger party candidate’s vote share, 1980–2020.
- **chavp.** Challenger’s vote in the primaries. See section [A.2](#).
- **dcds.** District of Columbia: Incumbent Democrat. See section [A.2](#).
- **dcrs.** District of Columbia: Incumbent Republican. See section [A.2](#).
- **dhsc.** Highest scores: Incumbent Democrat. See section [A.2](#).
- **election.** Election year.
- **elecvote.** Number of Electoral College votes by state.
- **err_o.** Jackknife out-of-sample errors, 1980–2020 (i.e., `ftwoincv_o` – `twoincv`).
- **err_w.** Within-sample errors, 1980–2020 (i.e., `ftwoincv_w` – `twoincv`).
- **harris_e_2024.** Electoral College vote forecasts by state for Kamala Harris, 2024.
- **harris_v_2024.** Two-party vote share forecasts by state for Kamala Harris, 2024.
- **id.** Unique identification number.
- **ince.** Actual incumbent party candidate’s Electoral College vote, 1980–2020.
- **incumbent.** Incumbent party (DEM = Democratic, REP = Republican).
- **incv.** Actual incumbent party candidate’s vote share, 1980–2020.

²The opposition refers to any candidate campaigning against the incumbent party candidate. The challenger is the opposition candidate affiliated with one of the two major parties (Democratic or Republican depending on which party controls the White House).

- **indv.** Independent and third-party candidate vote share in each state (this variable was part of the original model and is not included in the revised models).
- **fchae_o.** Challenger party candidate’s Electoral College vote forecasts by state, 1980–2020 (obtained from jackknife out-of-sample vote share forecasts).
- **fchae_w.** Challenger party candidate’s Electoral College vote forecasts by state, 1980–2020 (obtained from within-sample vote share forecasts).
- **fince_o.** Incumbent party candidate’s Electoral College vote forecasts by state, 1980–2020 (obtained from jackknife out-of-sample vote share forecasts).
- **fince_w.** Incumbent party candidate’s Electoral College vote forecasts by state, 1980–2020 (obtained from within-sample vote share forecasts).
- **fips.** Federal Information Processing Standards (FIPS).
- **ftwochav_o.** Predicted challenger party candidate’s two-party vote share, 1980–2020 (jackknife out-of-sample forecasts).
- **ftwochav_w.** Predicted challenger party candidate’s two-party vote share, 1980–2020 (within-sample forecasts).
- **ftwoincv_o.** Predicted incumbent party candidate’s two-party vote share, 1980–2020 (jackknife out-of-sample forecasts).
- **ftwoincv_w.** Predicted incumbent party candidate’s two-party vote share, 1980–2020 (within-sample forecasts).
- **fstatewinner_2024.** Name of predicted winner in each state (Harris or Trump), 2024.
- **fstatewinner_o.** Name of predicted winner in each state (determined using out-of-sample vote share forecasts), 1980–2020.
- **fstatewinner_w.** Name of predicted winner in each state (determined using within-sample vote share forecasts), 1980–2020.
- **incpres.** Incumbent president running. See section [A.2](#).
- **jpa.** President’s job approval rating in each state. See section [A.2](#).
- **jpa0.** President’s job approval rating in each state when the incumbent president is not running for a second term (this variable was part of the original model and is not included in the revised models).
- **jpa2.** President’s job approval rating in each state when the incumbent president is running for a second term (this variable was part of the original model and is not included in the revised models).
- **legcont.** Partisan composition of state legislatures. See section [A.2](#).
- **legparty.** Party controlling the state legislature (DEM = both legislative chambers have Democratic majorities, REP = both legislative chambers have Republican majorities, SPLIT = neither party had majorities in both legislative chambers).
- **mabserr_o.** Mean absolute jackknife out-of-sample error, 1980–2020.
- **mabserr_state_o.** Mean absolute jackknife out-of-sample error by state, 1980–2020.

- **mabserr_state_w.** Mean absolute within-sample error by state, 1980–2020.
- **mabserr_year_o.** Mean absolute jackknife out-of-sample error by election year, 1980–2020.
- **mabserr_year_w.** Mean absolute within-sample error by election year, 1980–2020.
- **mabserr_w.** Mean absolute within-sample error, 1980–2020.
- **midterms2.** Midterm election results, 1978–2022. See section [A.2](#).
- **nationalcorrect_o.** Correct national forecast (determined from jackknife out-of-sample state forecasts) (yes or no), 1980–2020.
- **nationalcorrect_w.** Correct national forecast (determined from within-sample state forecasts) (yes or no), 1980–2020.
- **nationalwinner.** Name of the actual national winner, 1980–2020.
- **oppe.** Actual opposition’s Electoral College vote, 1980–2020.
- **oppv.** Actual opposition’s vote share, 1980–2020.
- **perot92.** Ross Perot 1992. See section [A.2](#).
- **perot96.** Ross Perot 1996. See section [A.2](#).
- **ppi5220.** Partisan pattern index 1952–2020. See section [A.2](#).
- **ppi8020.** Partisan pattern index 1980–2020. See section [A.2](#).
- **ptwoincv.** Actual incumbent party candidate’s two-party (Democratic–Republican) vote share in the previous presidential election, 1976–2020. See section [A.2](#).
- **rhsc.** Highest scores: Incumbent Republican. See section [A.2](#).
- **state.** State name.
- **statecorrect_o.** Correct state forecast (determined from jackknife out-of-sample forecasts) (yes or no), 1980–2020.
- **statecorrect_w.** Correct state forecast (determined from within-sample forecasts) (yes or no), 1980–2020.
- **statewinner.** Name of the actual winner in each state, 1980–2020.
- **sum_harris_e_2024.** Total predicted Electoral College votes for Kamala Harris, 2024.
- **sum_fchae_o.** Total predicted Electoral College votes for the challenger party candidate (obtained from jackknife out-of-sample forecasts), 1980–2020.
- **sum_fchae_w.** Total predicted Electoral College votes for the challenger party candidate (obtained from within-sample forecasts), 1980–2020.
- **sum_fince_o.** Total predicted Electoral College votes for the incumbent party candidate (obtained from jackknife out-of-sample forecasts), 1980–2020.
- **sum_fince_w.** Total predicted Electoral College votes for the incumbent party candidate (obtained from within-sample forecasts), 1980–2020.
- **sum_trump_e_2024.** Total predicted Electoral College votes for Donald Trump, 2024.

- **trump_e_2024**. Electoral College vote forecasts by state for Donald Trump, 2024.
- **trump_npv_2016**. National two-party vote share forecast for Donald Trump (obtained from weighted state-level forecasts), 2020.
- **trump_v_2024**. Two-party vote share forecasts by state for Donald Trump, 2024.
- **twohav**. Actual challenger party candidate’s two-party (Democratic–Republican) vote share, 1980–2020.
- **twoincv**. Actual incumbent party candidate’s two-party (Democratic–Republican) vote share, 1980–2020. See section [A.2](#).
- **unemp**. ΔU . See section [A.2](#).

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