Supplemental Information

Appendix 1: Appendix 1: Description of the SEAD Governor Approval Estimates (Singer 2023)

Appendix 2: Description of the State-Level Presidential Approval Estimates

Appendix 3: LASSO and Supplemental OLS Results

Appendix 4: Pre-Registered Forecast for 2022 Governor Elections

Appendix 1: Description of the SEAD Governor Approval Estimates (Singer 2023)

The paper uses data from the SEAD dataset to estimate governor approval. The methodology for this dataset is laid out in Singer (2023). We downloaded the dataset and codebook from the *State Politics and Policy* website[1] linked to Singer (2023). However, we explain the methodology briefly here for interested readers.

The SEAD dataset was developed in three phases.

(1) The starting point for the SEAD is the Job Approval Ratings (JAR) database by Beyle et al. (2002), which we cite in the paper. Beyle and colleagues collected marginals from state-level surveys on governor approval (and presidential approval and senatorial approval) from publicly available surveys. The JAR ultimately includes 5132 survey marginals collected from 456 different polling firms or survey centers between 1954 and 2009. All the questions are about general gubernatorial performance, but there are over 120 possible response options (e.g. favorable/unfavorable, approve/disapprove, strongly approve/somewhat approve/somewhat disapprove/strongly disapprove, etc.). Beyle et al. never cite them all directly, but the JAR's codebook lists all of the firms and notes how they found the data (press coverage, press releases, etc.).
(2) Singer (2023) updated the JAR from 2009 through 2020 to create the SEAD by collecting another 5564 survey marginals from state-specific samples from 331 polling firms. Some of those marginals date from 1990, but most are concentrated in the 2010-2020 period. Singer's SEAD codebook updates Beyle et al.'s codebook and lists all the firms. The publicly available version of the SEAD reports the sources of the survey marginals. For some data points, a web link is provided. For others, the SEAD includes a note regarding pollsters, academics, or polling firms that shared data directly.
(3) Finally, as described in the text, Singer (2023) follows the dyad ratios algorithm methodology for combining survey data from multiple sources to extract latent approval that was developed by Stimson (e.g. 1991) and then applied to leader approval at the national level by Carlin et al (2023).

[1] https://dataverse.unc.edu/dataset.xhtml?persistentId=doi:10.15139/S3/QHHQEF

Appendix 2: Description of the State-Level Presidential Approval Estimates

In the training models, we developed a new time-series dataset of presidential approval at the state level that combines marginals from state-level surveys that we have identified and collected. We followed the SEAD model described in appendix 1. Namely, we build on the 5364 marginals of presidential approval at the state level from surveys conducted between 1974 and 2009 by 205 pollsters housed in the Job Approval Ratings Database (Beyle et al. 2002) that was first published in 2002 and then updated by the authors until 2009.[2] We then updated the dataset to 2021, collecting an additional 8277 marginal estimates of presidential approval at the state level from state-specific surveys published by 337 pollsters. Data sources included academic polling units, commercial pollsters active in each state, newspapers, firms that release polls across states (e.g. Morning Consult), and polling aggregators like 538.com. The resulting dataset is comprised of 13,638 survey marginals on presidential approval from state-specific polls. To estimate approval on a quarterly basis, we extracted latent approval data from underlying the series using Stimson's dyads-ratio method. Because some states have few surveys available, we aggregate the estimates by quarter. The results are estimates of presidential approval based solely on state-specific sources.

Tables A1 and A2 describe the survey marginals available by year and by state. The dataset of raw survey estimates, sampling targets, question-wording, and data sources is available for download) along with a codebook and the quarterly estimates of latent presidential approval at https://doi.org/10.7910/DVN/I6VZ9Y.

Table A1: Presidential Approval Marginals by Year

Year	Freq.	Year	Freq.	Year	Freq.	Year	Freq.
1974	1	1987	20	1999	113	2011	281
1976	1	1988	20	2000	98	2012	672
1977	1	1989	18	2001	87	2013	253
1978	1	1990	29	2002	153	2014	428
1979	1	1991	54	2003	198	2015	163
1980	3	1992	31	2004	385	2016	265
1981	8	1993	120	2005	837	2017	803
1982	7	1994	161	2006	1,436	2018	993
1983	7	1995	144	2007	617	2019	839
1984	12	1996	198	2008	620	2020	1,241
1985	12	1997	63	2009	659	2021	737
1986	17	1998	137	2010	734		

Table A2: Presidential Approval Marginals by State

State	Freq.	State	Freq.
Alabama	222	Montana	163
Alaska	115	Nebraska	118
Arizona	277	Nevada	208
Arkansas	172	New Hampshire	523
California	476	New Jersey	687

[2] The JAR data can be downloaded from https://jmj313.web.lehigh.edu/node/6.

Colorado	234	New Mexico	207
Connecticut	294	New York	622
Delaware	117	North Carolina	538
Florida	517	North Dakota	125
Georgia	272	Ohio	475
Hawaii	105	Oklahoma	155
Idaho	106	Oregon	211
Illinois	197	Pennsylvania	711
Indiana	152	Rhode Island	163
Iowa	301	South Carolina	158
Kansas	209	South Dakota	125
Kentucky	280	Tennessee	167
Louisiana	154	Texas	346
Maine	172	Utah	160
Maryland	188	Vermont	113
Massachusetts	255	Virginia	563
Michigan	572	Washington	246
Minnesota	313	West Virginia	151
Mississippi	129	Wisconsin	532
Missouri	232	Wyoming	126

Appendix 3: LASSO and OLS Estimators for Incumbent Party Vote Share

We present OLS estimates in Table 1 based on our LASSO models. Table A3 below compares the two estimates.

Table A3: Lasso and OLS Estimates of Gov. Party Vote Share Pre-2020

	LASSO	OLS	
Gov. Approval 2Qtrs Prior	0.166	0.165	**
		0.063	
Elected Incumbent	-12.242	-12.257	**
		4.435	
Unelected Incumbent	-13.074	-13.853	
		9.962	
Gov. Approval 2Qtrs Prior × Elected Incumbent	0.380	0.379	**
		0.086	
Gov. Approval 2Qtrs Prior × Unelected Incumbent	0.380	0.390	*
		0.185	
Gov. Party: GOP	18.142	17.978	**
		4.481	
Dem. 2-Party Vote	0.197	0.196	**
		0.071	
Gov Party: GOP × Dem. 2-Party Vote	-0.361	-0.361	**
		0.090	
Pres. Approval 2Qtrs Prior	-0.243	-0.236	**
		0.085	
Pres. Co-partisan	-17.855	-18.191	**
		5.320	
State-Level Presidential Approval 2 Qtrs Prior × President Co-partisan	0.324	0.327	**
		0.117	
Constant	42.572	42.582	**
		7.226	
R2		0.457	
Adj. R2		0.439	
Number of Elections	345	345	

OLS estimates based on model selected by linear LASSO
Standard Errors in italics. **<.01, *<.05 (two-tailed)

Table A4: OLE Estimates of Gov. Party Vote Share Pre-2020, including Economic Variables

	Incumbent Party Vote Share				
Gov. Approval 2Qtrs Prior	0.172**	0.164***	0.170***	0.169***	0.174***
	0.066	*0.063*	*0.062*	*0.063*	*0.063*
Elected Incumbent	-14.351***	-12.310***	-12.409***	-12.944***	-12.620***
	4.682	*4.449*	*4.415*	*4.447*	*4.448*
Unelected Incumbent	-13.761	-13.875	-12.637	-13.306	-13.833
	10.052	*9.963*	*9.941*	*9.943*	*9.951*
Gov. Approval 2Qtrs Prior × Elected Incumbent	0.416***	0.379***	0.382***	0.389***	0.386***
	0.09	*0.086*	*0.085*	*0.086*	*0.086*
Gov. Approval 2Qtrs Prior × Unelected Incumbent	0.389**	0.390**	0.370**	0.380**	0.390**
	0.187	*0.185*	*0.185*	*0.185*	*0.185*
Gov. Party: GOP	17.502***	17.873***	18.813***	17.798***	17.990***
	4.632	*4.466*	*4.466*	*4.448*	*4.452*
Dem. 2-Party Vote	0.190**	0.194***	0.222***	0.199***	0.197***
	0.074	*0.071*	*0.072*	*0.07*	*0.07*
Gov Party: GOP × Dem. 2-Party Vote	-0.355***	-0.359***	-0.378***	-0.363***	-0.362***
	0.092	*0.089*	*0.089*	*0.089*	*0.089*
Pres. Approval 2Qtrs Prior	-0.214**	-0.237***	-0.233***	-0.245***	-0.244***
	0.089	*0.085*	*0.085*	*0.085*	*0.086*
Pres. Co-partisan	-18.094***	-18.253***	-18.323***	-18.642***	-18.316***
	5.508	*5.354*	*5.296*	*5.313*	*5.316*
State-Level Presidential Approval 2 Qtrs Prior × President Co-partisan	0.324***	0.329***	0.327***	0.338***	0.332***
	0.122	*0.118*	*0.117*	*0.117*	*0.117*
Coincidence Index 2Qtrs Prior	0.01				
	0.021				
GDP Growth 2Qtrs Prior		3.776			
		31.222			
Median Income Growth 2Qtrs Prior			-0.331*		
			0.188		
State Unemployment Rate 2Qtrs Prior				0.224	
				0.314	
National Unemployment Rate 2Qtrs Prior				-0.552	
				0.368	
State Relative Unemployment Rate 2Qtrs Prior					0.276
					0.312
Constant	40.640***	42.718***	42.287***	44.828***	42.438***
	7.736	*7.178*	*7.148*	*7.363*	*7.175*
R2	0.466	0.457	0.462	0.462	0.458
LOOV MAE	5.6	5.6	5.6	5.6	5.6

Number of Elections	333	346	346	346	346

Standard Errors in italics **<.01, *<.05

Appendix 4: Pre-Registered Forecast for 2022 Governor Elections

As discussed in the paper, as a validation for the method, we pre-registered predictions for the 2022 gubernatorial elections. The OSF registration includes an error in the predicting vote shares for each state (missing state-level presidential vote share in the predictions). Corrected predictions are below and are used in the analysis of the 2022 results. Win probabilities were calculated correctly and are reproduced below.

Table A5. 2022 Registered Pre-Election Forecast for Incumbent Party Gubernatorial Vote Share

			95% c.i.		
State	Incumbent Party	Vote Share	Lower	Upper	Share>50%
Alabama	GOP	65.61	62.89	68.32	Yes
Arizona	GOP	50.31	48.13	52.49	Yes
Arkansas	GOP	56.66	53.65	59.66	Yes
California	Dem.	58.35	55.75	60.95	Yes
Colorado	Dem.	60.07	57.4	62.75	Yes
Connecticut	Dem.	59.7	57.43	61.98	Yes
Florida	GOP	58.96	57.47	60.44	Yes
Georgia	GOP	58.35	56.8	59.89	Yes
Hawaii	Dem.	49	46.49	51.52	No
Idaho	GOP	65.4	62.12	68.68	Yes
Illinois	Dem.	55.6	53.72	57.48	Yes
Iowa	GOP	57.77	55.55	59.98	Yes
Kansas	Dem.	54.19	51.93	56.45	Yes
Maine	Dem.	53.19	51.28	55.09	Yes
Maryland	GOP	48.96	45.23	52.68	No
Massachusetts	GOP	49.45	45.44	53.46	No
Michigan	Dem.	53.2	51.6	54.8	Yes
Minnesota	Dem.	54.35	52.76	55.95	Yes
Nebraska	GOP	55.24	52.15	58.34	Yes
Nevada	Dem.	53.16	51.56	54.76	Yes
New Hampshire	GOP	62.09	60.22	63.96	Yes
New Mexico	Dem.	53.56	51.94	55.18	Yes
New York	Dem.	54.24	49.78	58.7	Yes
Ohio	GOP	62.94	60.95	64.94	Yes
Oklahoma	GOP	62.32	58.9	65.74	Yes
Oregon	Dem.	46.68	44.67	48.68	No
Pennsylvania	Dem.	45.79	44.22	47.36	No
Rhode Island	Dem.	47.48	40.88	54.07	No
South Carolina	GOP	61.08	59.11	63.04	Yes
South Dakota	GOP	66.53	63.87	69.18	Yes
Tennessee	GOP	65.37	62.54	68.21	Yes

Texas	GOP	58.93	56.94	60.93	Yes
Vermont	GOP	65.16	61.37	68.95	Yes
Wisconsin	Dem.	50.54	48.7	52.38	Yes
Wyoming	GOP	78.78	73.91	83.65	Yes

Table A6. 2022 Registered Pre-Election Forecast for Incumbent Party Win Probability

State	Incumbent Party	Prob. Win	95% c.i. Lower	95% c.i. Upper	Prediction
Alabama	GOP	0.99	0.99	0.99	Win
Arizona	GOP	0.8	0.65	0.95	Lose
Arkansas	GOP	0.97	0.92	1.01	Win
California	Dem.	0.95	0.91	0.99	Win
Colorado	Dem.	0.97	0.94	0.99	Win
Connecticut	Dem.	0.97	0.93	0.99	Win
Florida	GOP	0.96	0.93	0.99	Win
Georgia	GOP	0.96	0.93	0.99	Win
Hawaii	Dem.	0.64	0.44	0.84	Win
Idaho	GOP	0.99	0.99	0.99	Win
Illinois	Dem.	0.91	0.84	0.97	Win
Iowa	GOP	0.97	0.94	0.99	Win
Kansas	Dem.	0.85	0.74	0.97	Win
Maine	Dem.	0.8	0.68	0.92	Win
Maryland	GOP	0.59	0.29	0.89	Win
Massachusetts	GOP	0.62	0.31	0.93	Win
Michigan	Dem.	0.83	0.74	0.92	Win
Minnesota	Dem.	0.87	0.8	0.94	Win
Nebraska	GOP	0.97	0.92	1.02	Win
Nevada	Dem.	0.83	0.74	0.92	Win
New Hampshire	GOP	0.99	0.97	0.99	Win
New Mexico	Dem.	0.84	0.76	0.92	Win
New York	Dem.	0.92	0.79	1.05	Win
Ohio	GOP	0.99	0.98	0.99	Win
Oklahoma	GOP	0.99	0.99	0.99	Win
Oregon	Dem.	0.47	0.31	0.63	Lose
Pennsylvania	Dem.	0.41	0.28	0.53	Lose
Rhode Island	Dem.	0.84	0.5	1.17	Win
South Carolina	GOP	0.99	0.97	0.99	Win
South Dakota	GOP	0.99	0.99	0.99	Win

Tennessee	GOP	0.99	0.99	0.99	Win
Texas	GOP	0.98	0.95	0.99	Win
Vermont	GOP	0.99	0.97	1.01	Win
Wisconsin	Dem.	0.72	0.59	0.85	Win
Wyoming	GOP	0.99	0.99	0.99	Win