Online Appendices

State Capacity and Covid-19 Responses: Comparing the U.S. states

Contents

1 Additional Main Results

Appendix Figures 1 through 3 display the distribution of the three dependent variables by state. Figure 1 shows mean excess deaths. Figures 2 and 3 map vaccination rates across U.S. states. Lighter colors indicate more positive outcomes (fewer excess deaths and greater vaccination uptake), whereas darker colors are associated with higher death rates and lower vaccination rates.

Figure 1: Mean Excess Deaths in 2020

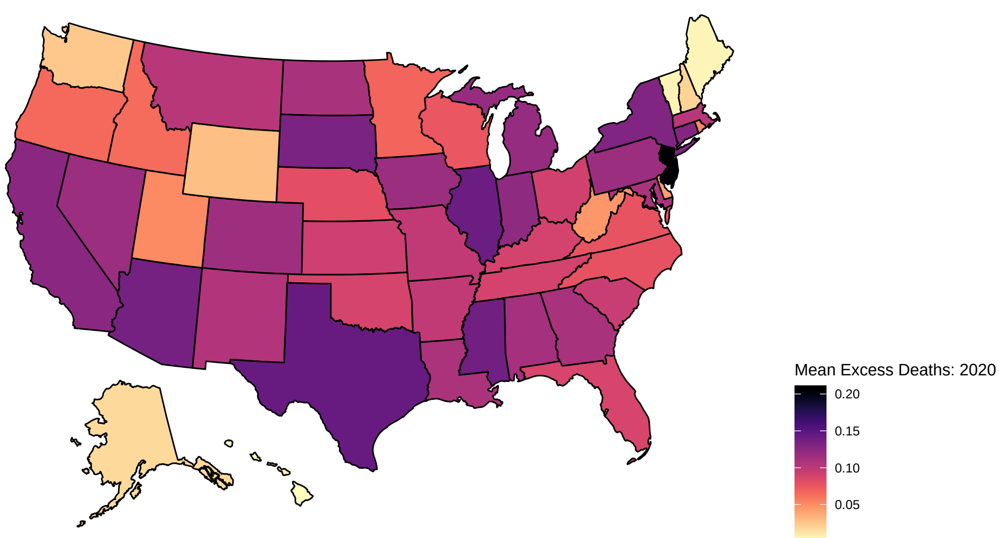


Figure 2: Vaccine Administration per 100k as of April 1st

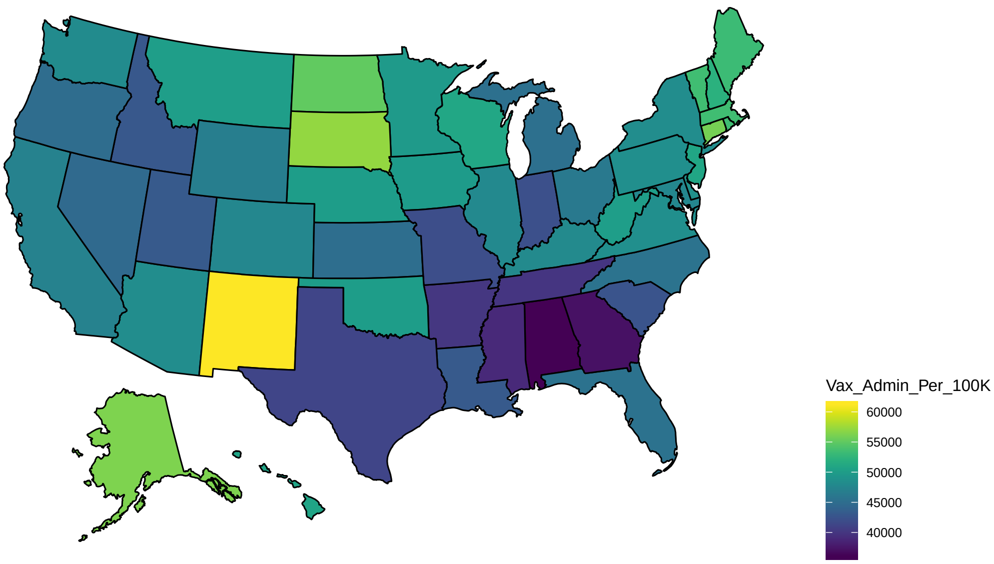
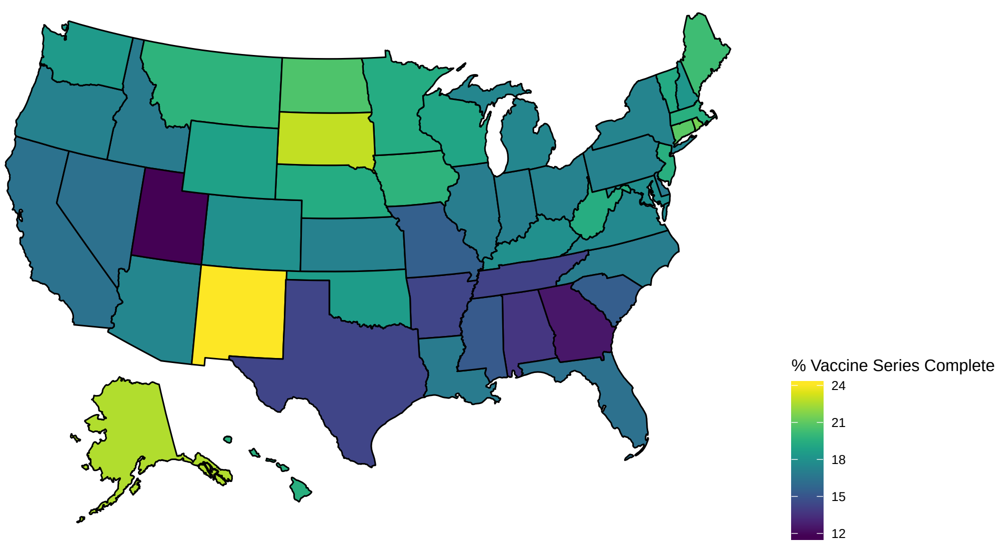


Figure 3: Percent of Population Vaccine Series Complete as of April 1st



2 Additional Theoretical Considerations

2.1 Why we use a Reflective Measure of State Capacity

The other method of measurement would be a composite measurement. This means a measurement that identifies all the components of a construct and incorporates them in the score. For instance, socio-economic status is composed of income, education, and occupational prestige. A measurement of SES must therefore include all the parts to be accurate. State capacity has an unknown (and possibly unknowable) number of constitutive factors. Generating an accurate composite measure of it is thus impossible. We think that our measure of state capacity as a reflective measure is unique. However, the underlying logic of Hanson and Sigman (2020) is similar. They profess to use a composite measure of state capacity – listing all of the different components of state capacity that are important – however, they rely on a latent trait model not dissimilar to ours. They use expert judgements on state capacity as their indicators; we use the outcomes themselves. We believe that the expert judgements are likely partially or entirely influenced by the same types of outcomes that we use as our indicators of state capacity. Thus, we think our approach is essentially the same as theirs, but with one less layer of abstraction.

Because we are measuring a latent factor, the specific items included should be outcomes that reflect the state's capacity. At the same time, no item is itself central to the metric. As such, the latent measurement is not substantially changed by the inclusion or exclusion of any particular indicator. Table 4 shows that the latent factor used in the analysis is almost perfectly correlated with the factor produced under the exclusion of any particular individual item. This suggests that our assertion that our latent measure is a reflective in nature is meritorious.

Table 1: Robustness of Latent Factor Measurement

Variable Dropped	Correlation with the Modeled Latent Factor
Infant Mortality (Per 1000 live births)	0.987
Student:Teacher Ratio	0.996
Federal Corruption Convictions (2010-2019) Rate per 100 people (2017 population)	0.997
Illiteracy	0.960
Innumeracy	0.954
Graduation Rate	0.999
Operating Ratio	0.996
Poverty Rate	0.993
Population Share College Educated	0.991
Patents Awarded per 1,000 Individuals in Science and Engineering Occupation	0.996
Car Theft Rate	0.982
Murder Rate	0.993
Property Crime Rate	0.992
Robbery Rate	0.989

2.2 Do All States Actually Want to Prevent Death?

It is our belief that no state government is actively seeking the death of its citizens. Individual actors or groups have different opinions about the most effective or appropriate measures to stem death and destruction resulting from the Covid-19 pandemic. State governments faced tradeoffs between protecting the public health of its citizens and economic well-being. Different state leaders held different value judgments about these tradeoffs and did not pursue identical strategies. However, the underlying premise — that no state was pro-death — is a policy interest that all states shared.

As a counterfactual, we can consider the alternative. If Republican politicians were favoring death from Covid, then the Republican-run states with higher capacity would achieve that goal with greater efficacy. There would be a significant negative relationship between state capacity and Republican governorship. Instead, the relationship is not significant with respect to excess deaths and it is positive with respect to the vaccination programs. Capacity influenced vaccination capacity *more* in Republican-led state. This pattern would be more consistent with the state using its authority to push for vaccinations in the face of a population that might be more vaccine resistant.

Some legislators may also hold unscientific views on how to treat disease. For instance, some individuals proposed intentionally pursuing infection to build herd immunity faster or questioned the use of the new vaccines. No state, though, banned the vaccines or held events *targeted at* increasing infection rates. In fact, as is noted in our discussion of state Covid-19 mitigation policies, every state adopted at least some social distancing measures to combat the pandemic. They were not, however, as we discuss here, equally effective at implementing those policies.

2.3 Federalism and Individual Actors in State Politics

It is not our argument that the federal government played no role in Covid-19 mitigation. However, we would posit that federal action is a uniform feature of the country. As a constant, it cannot explain the subnational variation in Covid-19 outcomes. Furthermore, as part of our focus on state-level capacity, state policy, and state outcomes, we construct our outcome metrics so that the federal policy is not being measured. This is particularly pertinent for our assessment of vaccination; the federal government used its supercessionary powers to order states to revise their vaccination programs and policies partway through April 2021. As such, in order to assess a state-crafted policy profile, we terminate our data collection prior to that point. Thus, while several scholars, cited in the manuscript, have addressed issues of federalism in a comparative context, it is not part of our American states narrative. The states, we argue, have enough discretion in the American system that they were able to enact different policies (to varying degrees of efficacy) and to mobilize resources for vaccination and harm mitigation. For instance, early in the pandemic, states governments ordered protective equipment and ventilators, regulated schools and businesses, and coordinated protocols with bordering states.

For the purposes of our analyses, states are treated as unitary actors. Although individuals in government – from governors to legislators to bureaucrats – may hold a variety of ideological preferences, with respect to a plague, we posit that the actors interests are aligned. They want their constituents not to die. Secondarily to that, of course, they would seek re-election That may influence the avenues they favor in pursuing the primary goal. However, they could be joint in that goal.

3 Details of State Capacity Factor

The state capacity components are shown in the manuscript (Article Table 1). These factors form a cohesive scale (Cronbach's alpha: 0.82). Table 2 provides a summary table that provides details scores for each state and the dependent variables we explored in the paper. As the score is a latent factor, the unit measure is not specifically interpretatble. Positive scores indicate greater capacity.

Figure 4: State Capacity Density Plot

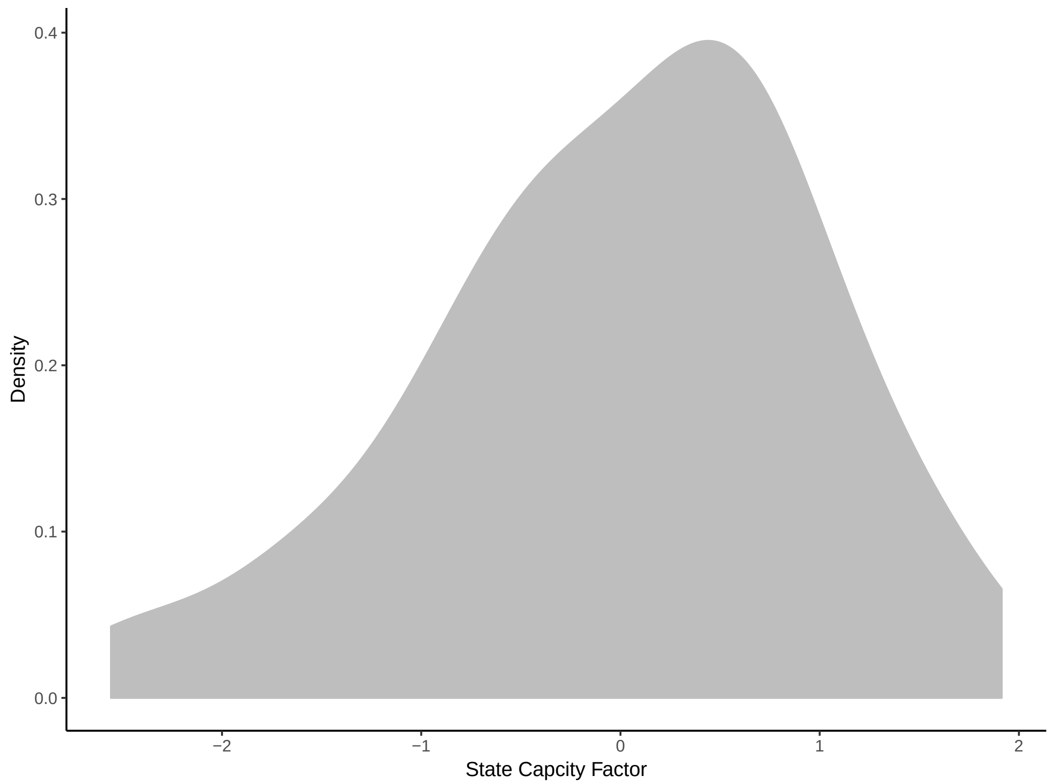


Figure 4 displays the density plot of our state capacity factor across the 50 U.S. states. The scores for this latent variable have been centered at zero so that negative values indicate weak capacity and positive scores indicate high capacity. The density plot shows that the distribution of the state capacity factor approximates a normal distribution with mean at zero and standard deviation of 1.

Table 3 details the indicators that comprise the state capacity factor. The first column describes the variable and the corresponding year, the second column lists the source of the variable, and the third column describes the range of the data. Several variables were compiled from Grossmann et al. (2021), including the student-teacher ratio, poverty rate, robbery rate, car theft rate, murder rate, property crime rate, and operating ratio.

Figure 5: Trump Vote Share vs. State Capacity Factor

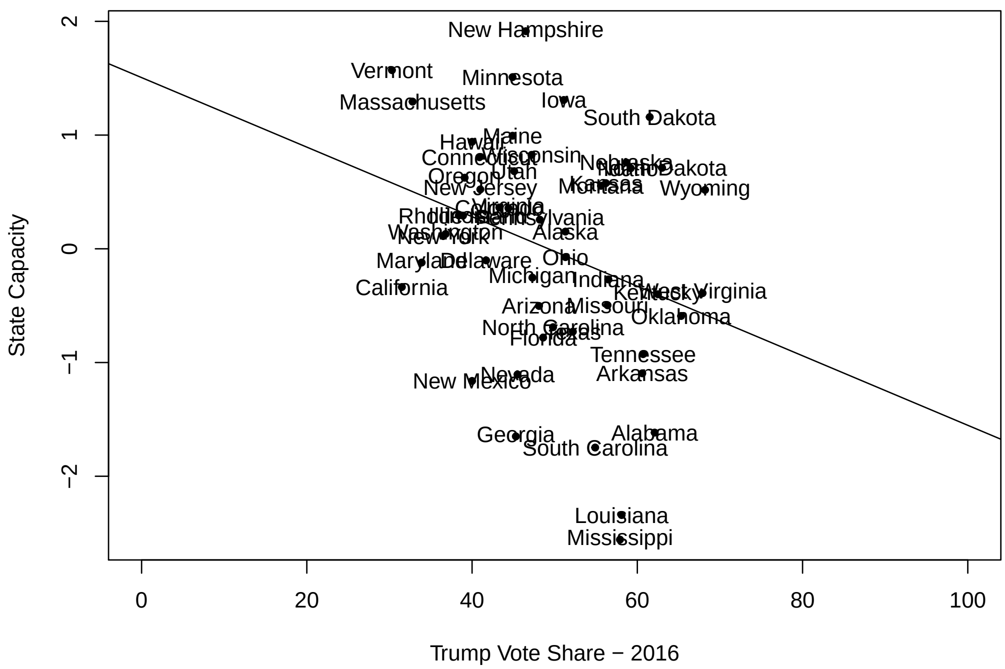
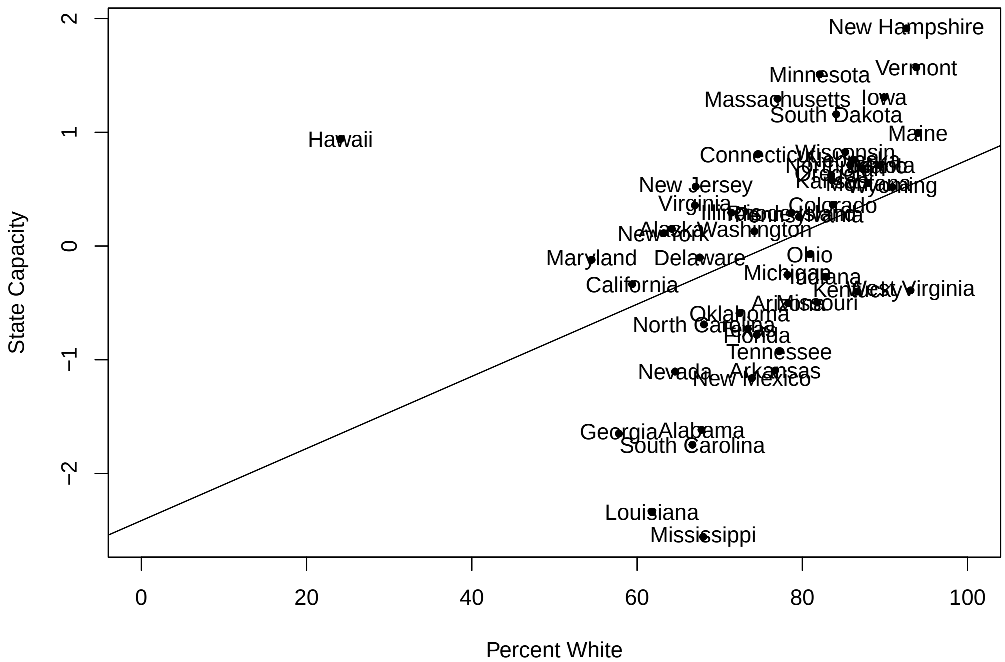


Figure 5 plots state capacity scores by the state's Trump vote share in the 2016 presidential election. The x-axis shows that there is not a large variation in Trump's vote share, which ranges from 30% to 68%. The regression line indicates an overall negative relationship between state capacity and Trump vote share. However, this does not tell the whole story as South Carolina at Iowa have a similar proportion of Trump votes (51% and 54% respectively), but very different levels of state capacity.

Figure 6 plots state capacity by the percentage of white residents in the state's population. The plot shows that state capacity is not simply a function of racial composition. For example, Maryland has the second highest minority population (54% white) and has average

Figure 6: Percent State Population White vs. State Capacity Factor



level capacity. Georgia is similarly racially diverse (58% white) but below-average capacity. Hawaii is an outlier as the percentage of white residents is only 24%. Excluding Hawaii, the range of this variable is 54.5% to 94%.

Figure 7 plots state capacity by the overall average age of the state's population, which we would expect to have a strong confounding relationship with COVID-19 outcomes, given the well known relationship between individual age and serious illness, hospitalization, and death from COVID (see `https://www.cdc.gov/coronavirus/2019-ncov/covid-data/investigations-discovery/hospitalization-death-by-age.html` for details of this relationship). Also, since vaccine distribution used age as a criteria for eligibility, we needed to account for that directly as well. We do not see much of a relationship between population age and state capacity.

Figure 7: Median Population Age vs. State Capacity Factor

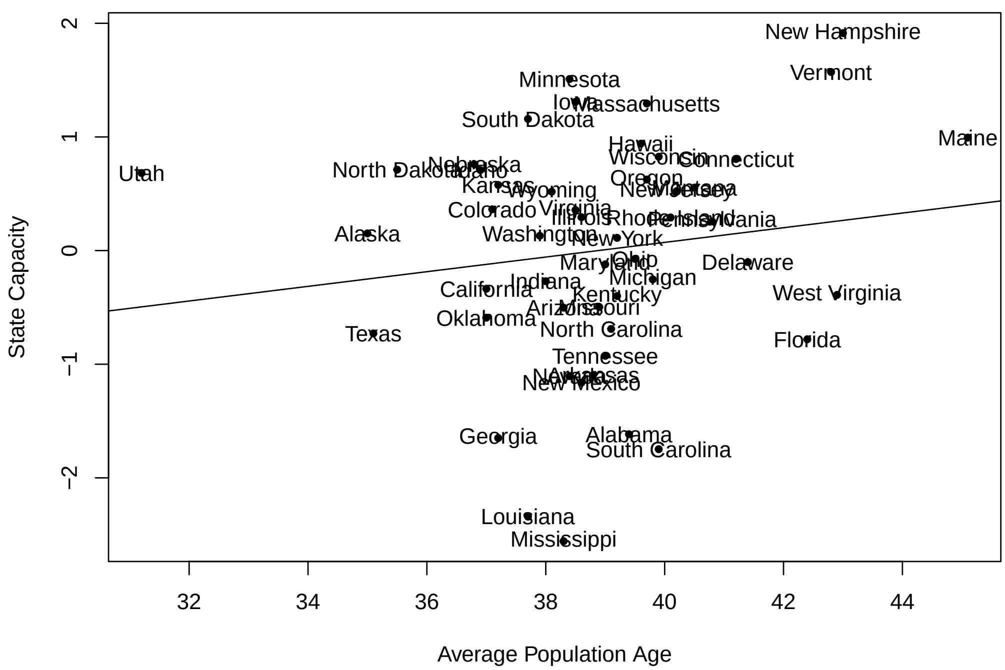


Figure 8: GSP per Capita vs. State Capacity Factor

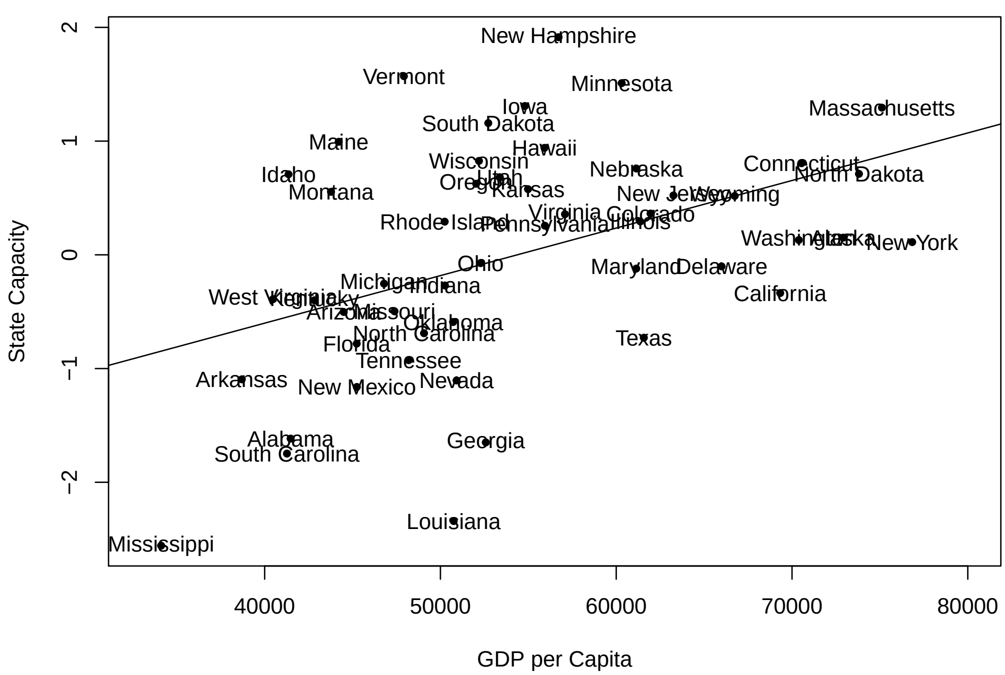


Table 2: State Capacity and Outcomes by State

	State	State Capacity Factor	Mean Excess Deaths	Vaccines per 100K People	Percent Fully Vaccinated
1	AL	-1.62	0.11	36139	13.70
2	AK	0.15	0.02	56255	22.60
3	AZ	-0.50	0.14	48258	17.40
4	AR	-1.09	0.10	40094	14.30
5	CA	-0.34	0.13	47085	16.40
6	CO	0.36	0.12	47685	17.90
7	CT	0.81	0.13	55897	20.90
8	DE	-0.10	0.04	48668	16.80
9	FL	-0.78	0.09	45544	16.30
10	GA	-1.65	0.11	37209	12.50
11	HI	0.94	0.00	50696	19.50
12	ID	0.71	0.06	42903	16.80
13	IL	0.29	0.14	47929	16.90
14	IN	-0.27	0.12	42193	17.00
15	IA	1.31	0.12	49695	19.70
16	KS	0.58	0.09	45012	17.10
17	KY	-0.40	0.09	47966	17.90
18	LA	-2.34	0.11	43091	16.80
19	ME	0.99	0.01	53194	20.20
20	MD	-0.12	0.11	47673	17.80
21	MA	1.29	0.10	53467	19.50
22	MI	-0.25	0.12	45200	17.40
23	MN	1.51	0.07	49660	19.30
24	MS	-2.56	0.14	38982	15.20
25	MO	-0.50	0.10	41988	15.50
26	MT	0.55	0.10	49989	19.70
27	NE	0.76	0.08	49965	19.30
28	NV	-1.10	0.12	44615	16.30
29	NH	1.91	0.02	52045	18.20
30	NJ	0.52	0.21	50933	19.50
31	NM	-1.16	0.11	61094	24.00
32	NY	0.11	0.13	48287	17.30
33	NC	-0.69	0.08	45589	16.90
34	ND	0.71	0.11	55046	20.60
35	OH	-0.07	0.09	46203	17.20
36	OK	-0.59	0.09	49913	18.50
37	OR	0.63	0.07	44898	17.10
38	PA	0.26	0.12	48444	17.20
39	RI	0.29	0.05	53477	21.50
40	SC	-1.75	0.09	42564	15.40
41	SD	1.16	0.13	57093	22.90
42	TN	-0.93	0.09	39908	14.20
43	TX	-0.73	0.14	41216	14.30
44	UT	0.68	0.05	43074	11.80
45	VT	1.57	0.01	53475	19.20
46	VA	0.36	0.08	48513	17.50
47	WA	0.13	0.02	48062	18.40
48	WV	-0.39	0.05	50018	19.40
49	WI	0.83	0.08	50997	19.00
50	WY	0.52	0.03	46691	18.80

Table 3: Variables in State Capacity Factor

Variable	**Source**	**Range**
Infant Mortality per 1000 live births (2018)	Centers for Disease Control	3.5-8.41
Illiteracy (2017)	National Center for Education Statistics (Population share at or below Level 1 Literacy)	0.115-0.291
Innumeracy (2017)	National Center for Education Statistics (Population share at or below Level 1 Numeracy)	0.191-0.434
Student to Teacher Ratio (2010)	National Center for Education Statistics	10.47-22.31
Federal Corruption Convictions (2010-2019) Rate per 100 people (2017 population)	Department of Justice	0.003-0.324
High School Graduation Rate (2019)	US News and World Report	75-94
Poverty Rate (2017)	Froberg (2019)	6.6-21.4
College educated labor force (2019)	National Science Board	22.36-64.95
Patents Awarded per 1,000 Individuals in Science and Engineering Occupations (2019)	National Science Board	3.44-45.08
Robbery rate per 100,000 people (2014)	FBI Uniform Crime Reports	9.1-530
Car Theft Rate (2014)	Dept. of Justice, Uniform Crime Reporting Statistics	38.9-574.1
Murder Rate (2014)	Dept. of Justice, Uniform Crime Reporting Statistics	0.-15.9
Property Crime Rate (2014)	Dept. of Justice, Uniform Crime Reporting Statistics	1524.4-5182.5
Operating Ratio (2014)	Norcross (2018)	0.939-1.552

Variables compiled from The Correlates of State Policy Project V2.2, except: infant mortality, share of college. educated, and patents awarded. Full references provided in reference list at the end of the appendix.

Table 4: Outcome Variables and Covariates, including Robustness checks

Variable	**Source**
Excess Deaths	CDC National Center for Health Statistics
Vaccinations	CDC COVID-19 Vaccinations in the United States
Social Distancing Policies	Fullman et al. (2020)
Republican Governor	New York Times election results
Trump Vote Share	New York Times election results
Party Control of State Legislature	National Conference of State Legislatures (2020)
Republican Control of State Gov.	National Conference of State Legislatures (2020)
Population Age	U.S. Census, American Community Survey (2019)
Population Density	U.S. Census, American Community Survey (2020)
Percent White	U.S. Census, American Community Survey (2019)
GSP per Capita	Bureau of Economic Analysis and
	U.S. Census State Population Total (2019)
Recreational Income	Bureau of Economic Analysis (2019)
Service Income	Bureau of Economic Analysis (2019)
Flu Vaccine	CDC Flu Vaccine Coverage, United States 2019-2020 Influenza Season
Social Capital (2009 values)	Hawes et al. (2013)
Policy Liberalism (2019 values)	Caughey and Warshaw (2015)
Latitude	Rogerson (2015)
Longitude	Rogerson (2015)
Individualism	World Values Survey (2015)
Census Region	U.S. Census Bureau (2020)
Days until first Covid case	USA Facts, COVID-19 cases and deaths by state (2020)
Social Vulnerability Index	CDC (2020)
Legislative Professionalism	Bowen (2014), Squire (2007)
State Employees (2016 values)	Sorens et al. (2008)

Note: Full references provided in reference list at the end of the appendix.

4 Robustness Checks

Table 5: Summary of Robustness Checks

Robustness Check	Table	Excess Deaths	Vaccines per 100K	Percent Vaccinated
OLS	6	*	*	*
Trump Vote	7	*	*	*
GOP State Legislature	8	*	*	*
GOP Unified Control	9	*	*	*
GOP Gov. and Leg.	10	*	*	*
Alt. Death and Vaccine specification	11	*	*	*
Population Density	12	*	*	*
Gross State Product	13	*	*	*
Recreational Income	14	*	*	*
Services Income	15	*	*	*
Social Capital	16	*	*	*
Policy Liberalism	17	*	*	+
Latitude	18	*	*	*
Longitude	19	*	*	*
Latitude and Longitude	20	*	*	*
Individualism	21	*	*	*
Census Region	22	*	*	+
Days until first Covid case	23	*	*	*
Social Vulnerability Index	24	*	*	*
Legislative Professionalism	25	(State capacity not included)		
State Employees	26	(State capacity not included)		

* indicates that the result remains significant at $p<0.05$.
+ indicates that the result remains significant at $p<0.10$.

4.1 Modeling Robustness

In this section, we tested the robustness of our main findings by allowing for a variety of different specifications in our regressions.

Table 6 presents the same regressions from our main paper but using OLS instead of a beta regression. The coefficient estimates for state capacity remain significant for all variables, though the specific effects did change from the Beta regression model. Given that our DVs are all proportions of some sort, we would expect a Beta regression to be a more

Table 6: State Capacity Factor and COVID Outcomes (OLS)

	Dependent variable:		
	Mean Excess Death	Percent Fully Vaccinated	Vaccines per 100K People
	(1)	(2)	(3)
State Capacity	−0.015**	1.172***	3,124.632***
	(0.006)	(0.350)	(678.729)
Republican Governor	−0.009	−0.637	−1,487.376
	(0.012)	(0.670)	(1,298.452)
Population Age	−0.004	0.171	274.071
	(0.003)	(0.141)	(273.558)
Percent White	0.0002	−0.004	−23.148
	(0.001)	(0.029)	(55.581)
Constant	0.223**	11.747**	39,601.270***
	(0.104)	(5.630)	(10,914.900)
Observations	50	50	50
R^2	0.164	0.296	0.407
Adjusted R^2	0.090	0.233	0.354
Residual Std. Error (df = 45)	0.040	2.177	4,221.131
F Statistic (df = 4; 45)	2.213*	4.728***	7.716***
Note:			*p<0.1; **p<0.05; ***p<0.01

precise representation of the data generating process, but it is important that our results are not solely contingent on model specifications. Overall, there are minimal differences in the substance of our results between these models and the ones presented in the main paper.

Table 7: State Capacity Factor and COVID Outcomes with Trump 2016 Vote

	Dependent variable:		
	Mean Excess Deaths	Vaccines per 100k People	Percent Fully Vaccinated
State Capacity	-0.336^{***}	0.124^{***}	0.100^{***}
	(0.105)	(0.030)	(0.025)
Trump Vote (2016)	-0.006	-0.002	0.003
	(0.010)	(0.003)	(0.003)
Population Age	-0.064^{*}	0.012	0.017^{*}
	(0.035)	(0.011)	(0.009)
Percent White	0.012	-0.001	-0.002
	(0.010)	(0.002)	(0.002)
Constant	-0.548	-0.405	-2.180^{***}
	(1.481)	(0.440)	(0.379)
Observations	50	50	50
R^2	0.303	0.393	0.316
Note:			*p<0.1; **p<0.05; ***p<0.01

Table 7 includes an alternative variable to measure partisanship, namely Trump vote share in the 2016 presidential elections instead of Republican governors. This shows the effect of the partisanship in the public, which would potentially guide behavior distinctly from partisanship in the administration, though a conservative public would likely elect conservative leaders. We considered using Trump's vote share in the 2020 election, but were worried about endogeneity problems from Covid outcomes influencing vote choice. In practice, the state level Trump vote share has a correlation of 0.975 between 2016 and 2020, so this difference would not materially impact our results. The coefficient estimates for state capacity are similar to the original results and remain robust to this alternative specification. Trump vote share is not significantly associated with the outcomes, which replicates our original findings when we used Republican governor to measure partisanship.

Thus, while conservatives may behave differently sometimes, once taking state capacity into account, we do not find differential death or vaccination rates.

Table 8: State Capacity Factor and COVID with GOP State Legislature

	Dependent variable:		
	Mean Excess Deaths	Vaccines per 100k People	Percent Fully Vaccinated
	(1)	(2)	(3)
State Capacity	-0.323^{***}	0.108^{***}	0.079^{***}
	(0.106)	(0.030)	(0.027)
Republican St. Leg.	−0.080	−0.088	−0.024
	(0.214)	(0.062)	(0.054)
Population Age	-0.067^{*}	0.008	0.015
	(0.038)	(0.011)	(0.010)
Percent White	0.011	−0.0001	−0.001
	(0.009)	(0.002)	(0.002)
Constant	−0.574	−0.354	-2.049^{***}
	(1.482)	(0.430)	(0.377)
Observations	49	49	49
R^2	0.281	0.412	0.307
Note:			*p<0.1; **p<0.05; ***p<0.01

Table 8 includes an alternative variable to measure partisanship, whether the state legislature is controlled by Republicans. The results for state capacity are similar and robust to this alternative specification. The partisanship variable remains not significant.

Table 9 includes unified Republican control of the state government as an alternative specification for partisan influence. This would identify whether the Republican effect was occurring when the legislature and the executive were united Republican forces and could push the agenda at its fullest. The results for state capacity are robust to this alternative specification, and the coefficient sizes are similar. The partisanship variable remains not significant.

Table 10 includes the binary indicators for a Republican governor and a Republican-controlled legislature and an interaction between them to assess the impact of partisanship.

Table 9: State Capacity Factor and COVID Outcomes with GOP Unified Control

	Dependent variable:		
	Mean Excess Deaths	Vaccines per 100k People	Percent Fully Vaccinated
	(1)	(2)	(3)
State Capacity	-0.330^{***}	0.117^{***}	0.079^{***}
	(0.097)	(0.028)	(0.025)
Republican Unified Gov.	-0.150	-0.069	-0.027
	(0.187)	(0.056)	(0.050)
Population Age	-0.072^{*}	0.009	0.014
	(0.038)	(0.011)	(0.010)
Percent White	0.012	-0.001	-0.001
	(0.009)	(0.002)	(0.002)
Constant	-0.401	-0.361	-2.036^{***}
	(1.494)	(0.435)	(0.379)
Observations	49	49	49
R^2	0.292	0.406	0.310
Log Likelihood	86.670	87.704	120.472
Note:			*p<0.1; **p<0.05; ***p<0.01

Table 10: State Capacity Factor and COVID Outcomes with GOP Gov and Leg

	Dependent variable:		
	Mean Excess Deaths	Vaccines per 100k People	Percent Fully Vaccinated
	(1)	(2)	(3)
State Capacity	-0.314^{***}	0.110^{***}	0.085^{***}
	(0.108)	(0.031)	(0.027)
Republican St. Leg.	0.032	−0.073	−0.024
	(0.264)	(0.079)	(0.068)
Republican Governor	−0.154	−0.049	−0.100
	(0.378)	(0.095)	(0.081)
Population Age	-0.068^{*}	0.009	0.017^{*}
	(0.039)	(0.011)	(0.010)
Percent White	0.012	−0.00002	−0.0004
	(0.009)	(0.002)	(0.002)
RepLeg*RepGov	−0.019	0.019	0.081
	(0.449)	(0.121)	(0.104)
Constant	−0.554	−0.362	-2.112^{***}
	(1.507)	(0.438)	(0.380)
Observations	49	49	49
R^2	0.293	0.418	0.329
Note:			$^{*}p<0.1$; $^{**}p<0.05$; $^{***}p<0.01$

This would indicate whether the parties were amplifying or constraining each other. There is no indication of even a conditional partisan effect. Furthermore, the state capacity results are robust to this alternative specification.

Table 11: State Capacity Factor and COVID Outcomes Misc. Robustness Checks

	Dependent variable:	
	Mean Excess Deaths (upper bound)	Vaccines per 100k People (as percent)
	(1)	(2)
State Capacity	-0.181^{***}	0.103^{***}
	(0.051)	(0.029)
Republican Governor	-0.026	-0.043
	(0.098)	(0.049)
Population Age	-0.047^{**}	0.008
	(0.020)	(0.010)
Percent White	0.006	-0.001
	(0.005)	(0.002)
Flu Vaccination		0.011^{*}
		(0.006)
Constant	-0.350	-0.795^{*}
	(0.820)	(0.461)
Observations	50	50
R^2	0.320	0.440
Note:	*p<0.1; **p<0.05; ***p<0.01	

Additionally, We can account for general vaccine skepticism or resistance in the population. To measure this, we look at the rate of flu vaccination in the previous flu season. Table 11 controls for flu vaccination rates from the 2019/2020 flu season. We find a small effect of antecedent vaccination propensity on the number of vaccines given, but it is only significant at the 0.10 level. It does not detract from the significance of state capacity. We also use a more conservative estimate of excess deaths in this table. Specifically, we use the CDC's upper bound of the 95% prediction interval of the expected number of deaths, whereas the main paper uses the average expected number of deaths to calculate excess deaths (details are available on the CDC's website: https://www.cdc.gov/nchs/nvss/vsrr/covid19/excess_deaths.htm. The effect of state capacity on these outcomes remains robust to the inclusion of flu vaccination rates and the alternative measure of excess deaths.

Table 12: State Capacity Factor and COVID Outcomes + Population Density as Covariate

	Dependent variable:		
	Mean Excess Deaths	Vaccines per 100k People	Percent Fully Vaccinated
	(1)	(2)	(3)
State Capacity	−0.360***	0.122***	0.080***
	(0.090)	(0.027)	(0.023)
Republican Governor	−0.081	−0.058	−0.044
	(0.156)	(0.050)	(0.043)
Population Age	−0.092***	0.009	0.013
	(0.036)	(0.011)	(0.009)
Percent White	0.016*	−0.0005	−0.0001
	(0.008)	(0.002)	(0.002)
Population Density	0.001***	0.0001	0.00003
	(0.0003)	(0.0001)	(0.0001)
Constant	−0.183	−0.386	−2.004***
	(1.377)	(0.418)	(0.362)
Observations	50	50	50
R^2	0.458	0.411	0.321
Log Likelihood	93.831	90.115	123.641
Note:			*p<0.1; **p<0.05; ***p<0.01

Table 12 introduces a population density covariate, as denser areas might have a greater threat from a communicable disease and then feel a greater need for defense. Denser areas may also have an advantage for generating state capacity. The direction and significance of the state capacity variables are robust to the inclusion of this variable. If anything, including density makes the effect size of state capacity on excess death rates greater. Density is significantly, though slightly, related to death rate; it is not significantly related to vaccine uptake.

Another concern is that this is a function of states' economic circumstances. There are a few ways this could manifest. The first is mere development or wealth effects; richer states could just have better outcomes. We might also consider that poorer states would show greater deaths because their leaders' would be less willing to sacrifice the economy for

Table 13: State Capacity Factor and COVID Outcomes + GSP per Capita as Covariate

	Dependent variable:		
	Mean Excess Deaths	Vaccines per 100k People	Percent Fully Vaccinated
	(1)	(2)	(3)
State Capacity	−0.378***	0.097***	0.066**
	(0.120)	(0.032)	(0.028)
Republican Governor	−0.125	−0.048	−0.038
	(0.169)	(0.049)	(0.043)
Population Age	−0.053	0.017	0.017*
	(0.039)	(0.011)	(0.010)
Percent White	0.015	0.0004	0.0004
	(0.009)	(0.002)	(0.002)
GSP per Capita	0.00001	0.00000	0.00000
	(0.00001)	(0.00000)	(0.00000)
Constant	−1.909	−1.003*	−2.327***
	(2.089)	(0.566)	(0.495)
Observations	50	50	50
R^2	0.333	0.433	0.334
Note:			*p<0.1; **p<0.05; ***p<0.01

safety. We address these points in Table 13 by introducing a state-level GDP per capita covariate, GSP. The direction and significance of the state capacity variables are robust to the inclusion of this variable. GSP per capita is not itself significantly related to the Covid outcomes. Additionally, to address concerns that poorer states were strategically not using their capacity, we checked for an interaction between capacity and GSP per capita; the results (not included) were not significant.

We also consider whether economic dependence on industries that would be hampered by Covid restrictions was the factor, rather than wealth itself. Table 14 shows that the effect of state capacity is robust to controlling for the share of GSP from the arts, entertainment, and recreation in 2019Q3. There is no significant direct effect of recreation income on morbidity or mortality. We also find that the impact of state capacity on vaccination, by one metric, declines as the recreation GDP rate increases. In states with low shares of GDP from recreation, higher capacity leads to more vaccination; at higher shares, the outcomes are not significantly different.

Table 15 shows that the effect of state capacity is robust to controlling for the share of GSP from accommodations and services in 2019Q3. Moreover, states that garnered their wealth from service and accommodations had lower rates of excess deaths. Possibly the Covid safety protocols targeting those fields meant that overall exposures were reduced.

We can also see an interactive relationship with respect to mortality. Where the state garners no money from services and accommodations, the result is not as separable by state capacity; where states earn more of their money from these industries, higher state capacity states had significantly fewer excess deaths. Thus, state capacity is offsetting the effect of dependence on these affected sectors on excess deaths. Overall, the state capacity effect is robust to these economic concerns. Furthermore, there is no evidence that states based on these industries were more lax in fighting Covid as a result; they may have been more assiduous because of that economic neeed.

Table 16 introduces a state-level social capital covariate to address concerns that we are

Table 14: State Capacity Factor and COVID Outcomes + Recreation Income

	Dependent variable:					
	Mean Excess Deaths	Vaccines per 100k	Percent Fully Vaccinated	Mean Excess Deaths	Vaccines per 100k	Percent Fully Vaccinated
	(1)	(2)	(3)	(4)	(5)	(6)
SC	−0.321***	0.126***	0.083***	−0.344*	0.199***	0.175***
	(0.090)	(0.026)	(0.022)	(0.205)	(0.060)	(0.051)
recrate	2.997	−1.056	−1.333	3.469	−2.252*	−2.741**
	(3.066)	(1.017)	(0.905)	(4.764)	(1.334)	(1.125)
repgov	−0.129	−0.066	−0.051	−0.132	−0.057	−0.037
	(0.169)	(0.049)	(0.042)	(0.170)	(0.049)	(0.041)
popage	−0.073**	0.013	0.016*	−0.075**	0.019*	0.023**
	(0.036)	(0.010)	(0.009)	(0.038)	(0.011)	(0.009)
percentwhite	0.013	−0.001	−0.001	0.013	−0.002	−0.001
	(0.008)	(0.002)	(0.002)	(0.008)	(0.002)	(0.002)
SC:recrate				0.549	−1.707	−2.121**
				(4.419)	(1.265)	(1.073)
Constant	−0.552	−0.417	−2.015***	−0.522	−0.551	−2.175***
	(1.439)	(0.412)	(0.353)	(1.459)	(0.417)	(0.352)
Observations	50	50	50	50	50	50
R^2	0.303	0.420	0.349	0.302	0.440	0.396
Log Likelihood	89.385	90.470	124.661	89.392	91.364	126.529
Note:						*p<0.1; **p<0.05; ***p<0.01

Table 15: State Capacity Factor and COVID Outcomes + Services Income

	Dependent variable:					
	Mean Excess Deaths	Vaccines per 100k	Percent Fully Vaccinated	Mean Excess Deaths	Vaccines per 100k	Percen Vacci
	(1)	(2)	(3)	(4)	(5)	(6
SC	−0.265***	0.126***	0.082***	0.613***	0.163**	0.1
	(0.088)	(0.026)	(0.023)	(0.204)	(0.067)	(0.0
servrate	−3.708***	−0.110	−0.062	−5.294***	−0.221	−0.
	(1.325)	(0.295)	(0.259)	(1.268)	(0.346)	(0.2
repgov	−0.112	−0.060	−0.045	−0.012	−0.052	−0.
	(0.162)	(0.050)	(0.043)	(0.142)	(0.051)	(0.0
popage	−0.032	0.012	0.014	0.011	0.014	0.0
	(0.036)	(0.011)	(0.009)	(0.033)	(0.011)	(0.0
percentwhite	0.002	−0.001	−0.0005	−0.008	−0.002	−0.
	(0.008)	(0.002)	(0.002)	(0.008)	(0.003)	(0.0
SC:servrate				−5.082***	−0.197	−0.
				(1.176)	(0.326)	(0.2
Constant	−0.642	−0.412	−2.012***	−1.410	−0.440	−2.0
	(1.415)	(0.416)	(0.360)	(1.275)	(0.417)	(0.3
Observations	50	50	50	50	50	5
R^2	0.345	0.409	0.322	0.661	0.413	0.3
Log Likelihood	91.277	90.005	123.619	99.830	90.188	123.

Note: *p<0.1; **p<0.05; ***p actually measuring state-populace interpersonal trust or interpersonal connectedness. The direction and significance of the state capacity variables are robust to the inclusion of this variable. State capacity decreases in effect size when we account for social capital, but it is still significant. Social capital is only related significantly to death rate, such that greater social capital is associated with having fewer deaths, but it is not significantly linked to vaccine uptake. Because states can (and for Covid did) use these networks to distribute aid and mobilize response, it is not surprising that state capacity and social capital are linked.

Table 16: State Capacity Factor and COVID Outcomes + Social Capital as Covariate

	Dependent variable:		
	Mean Excess Deaths	Vaccines per 100k People	Percent Fully Vaccinated
	(1)	(2)	(3)
State Capacity	0.238**	0.107***	0.069**
	(0.094)	(0.038)	(0.032)
Republican Governor	−0.064	−0.072	−0.069
	(0.122)	(0.049)	(0.042)
Population Age	−0.033	0.015	0.018**
	(0.029)	(0.011)	(0.009)
Percent White	−0.023***	−0.001	0.002
	(0.007)	(0.003)	(0.003)
Social Capital	−0.413***	0.022	−0.005
	(0.096)	(0.036)	(0.031)
Constant	0.875	−0.591	−2.350***
	(1.191)	(0.448)	(0.385)
Observations	48	48	48
R^2	0.593	0.455	0.383
Note:			*p<0.1; **p<0.05; ***p<0.01

Table 17 introduces a state-level policy liberalism covariate to address concerns that we are actually measuring policy liberalism, despite our efforts to separate policy liberalism from our measure of state capacity. Recall, we argue that capacity is the ability of the state to act whereas policy liberalism or conservatism relates to the direction in which the state will desire to act. Our latent measure relies on outcomes we believe all parties would favor,

Table 17: State Capacity Factor and COVID Outcomes + Policy Liberalism as Covariate

	Dependent variable:		
	Mean Excess Deaths	Vaccines per 100k People	Percent Fully Vaccinated
	(1)	(2)	(3)
State Capacity	-0.371^{***}	0.085^{***}	0.061^{**}
	(0.120)	(0.032)	(0.029)
Population Age	-0.075^{**}	0.004	0.011
	(0.038)	(0.011)	(0.010)
Percent White	0.013	0.001	0.0004
	(0.009)	(0.002)	(0.002)
Policy Liberalism	0.060	0.041^{**}	0.021
	(0.065)	(0.018)	(0.016)
Constant	−0.472	−0.324	-1.983^{***}
	(1.438)	(0.406)	(0.360)
Observations	50	50	50
R^2	0.297	0.445	0.329
Log Likelihood	88.910	91.585	123.887
Note:			*p<0.1; **p<0.05; ***p<0.01

such as low crime, to avoid extracting the liberalism-conservatism dimension. Table 17 shows that the direction and significance of the state capacity variables are robust to the inclusion of this policy liberalism variable. Policy liberalism is not significantly related to the Covid death toll, but states with greater policy liberalism did show slightly greater vaccine uptake.

Table 18: State Capacity Factor and COVID Outcomes + Latitude

	Dependent variable:		
	Mean Excess Deaths	Vaccines per 100k People	Percent Fully Vaccinated
	(1)	(2)	(3)
State Capacity	−0.295***	0.102***	0.056**
	(0.101)	(0.027)	(0.023)
Republican Governor	−0.158	−0.051	−0.032
	(0.168)	(0.048)	(0.040)
Population Age	−0.075**	0.016	0.018**
	(0.036)	(0.010)	(0.009)
Percent White	0.014*	−0.003	−0.002
	(0.008)	(0.002)	(0.002)
Latitude	−0.010	0.010**	0.011***
	(0.017)	(0.004)	(0.004)
Constant	−0.071	−0.842*	−2.461***
	(1.594)	(0.445)	(0.377)
Observations	50	50	50
R^2	0.289	0.458	0.414
Log Likelihood	89.198	92.188	127.315
Note:			*p<0.1; **p<0.05; ***p<0.01

To address concerns that geographic patterns are driving the effect, models have been tested controlling for geographic factors. This addresses whether being southern is driving the effect, since the map in Figure 1 in the article does reveal that several southern states have low state capacity. It also addresses the concern that a "frontier" mindset of rugged individualism would lead some states to favor treating avoiding Covid-19 deaths as an individual responsibility, rather than viewing it as a state responsibility. Table 18 includes a variable for the latitude of the center of the state (Rogerson 2015). Table 19 includes the

Table 19: State Capacity Factor and COVID Outcomes + Longitude

	Dependent variable:		
	Mean Excess Deaths	Vaccines per 100k People	Percent Fully Vaccinated
	(1)	(2)	(3)
State Capacity	-0.210^{**}	0.120^{***}	0.070^{***}
	(0.084)	(0.027)	(0.023)
Republican Governor	-0.143	-0.061	-0.046
	(0.154)	(0.049)	(0.042)
Population Age	-0.139^{***}	0.017	0.024^{**}
	(0.040)	(0.012)	(0.010)
Percent White	0.001	-0.0003	0.001
	(0.008)	(0.002)	(0.002)
Longitude	-0.017^{***}	0.001	0.002^{*}
	(0.005)	(0.002)	(0.001)
Constant	4.611^{**}	-0.809	-2.726^{***}
	(1.966)	(0.614)	(0.519)
Observations	50	50	50
R^2	0.452	0.416	0.371
Log Likelihood	94.208	90.311	125.304
Note:			*p<0.1; **p<0.05; ***p<0.01

Table 20: State Capacity Factor and COVID Outcomes + Longitude + Latitude

	Dependent variable:		
	Mean Excess Deaths	Vaccines per 100k People	Percent Fully Vaccinated
	(1)	(2)	(3)
State Capacity	−0.213**	0.099***	0.050**
	(0.097)	(0.028)	(0.023)
Republican Governor	−0.143	−0.052	−0.034
	(0.155)	(0.047)	(0.039)
Population Age	−0.139***	0.019	0.026***
	(0.040)	(0.012)	(0.010)
Percent White	0.001	−0.002	−0.001
	(0.008)	(0.002)	(0.002)
Latitude	0.001	0.009**	0.010***
	(0.017)	(0.004)	(0.004)
Longitude	−0.017***	0.001	0.002
	(0.005)	(0.001)	(0.001)
Constant	4.594**	−1.087*	−3.005***
	(2.004)	(0.606)	(0.499)
Observations	50	50	50
R^2	0.453	0.462	0.447
Log Likelihood	94.211	92.365	128.611
Note:			*p<0.1; **p<0.05; ***p<0.01

Table 21: State Capacity Factor and COVID Outcomes + Individualism

	Dependent variable:		
	Mean Excess Deaths	Vaccines per 100k People	Percent Fully Vaccinated
	(1)	(2)	(3)
State Capacity	−0.285***	0.102***	0.074***
	(0.097)	(0.027)	(0.024)
Republican Governor	−0.088	−0.086*	−0.063
	(0.165)	(0.047)	(0.041)
Population Age	−0.083**	0.017*	0.018**
	(0.035)	(0.010)	(0.009)
Percent White	0.009	0.002	0.001
	(0.009)	(0.002)	(0.002)
Individualism	0.013	−0.038	0.001
	(0.108)	(0.031)	(0.027)
Constant	0.177	−0.657	−2.272***
	(1.450)	(0.404)	(0.349)
Observations	49	49	49
R^2	0.315	0.470	0.387
Log Likelihood	88.265	91.754	124.924
Note:			*p<0.1; **p<0.05; ***p<0.01

longitude of the center of the state (Rogerson 2015). Table 20 includes both variables.

The results show that the effect of state capacity is robust to these geographic considerations. A higher latitude (i.e., being farther north) is associated with greater vaccine uptake, but not fewer excess deaths. Westward states have lower rates of excess deaths, but not necessarily different vaccine uptake. Nonetheless, state capacity remains a strong and significant predictor of these outcomes.

The idea of rugged individualism could also be evaluated using state-level survey data. In 2017, the World Values Survey in the United States asked Americans to place themselves on a 10-point scale from "The government should take more responsibility to ensure that everyone is provided for" to "People should take more responsibility to provide for themselves." This encapsulates the individualist-collectivist ideology. State-level individualist culture is measured as the mean-value in the state on this government-individual scale. The state capacity metric for each state remains significant, despite accounting for individualism. The state-level individualism score is not significant in any of the models. Between this result and the longitude results, a cowboy culture does not seem to be determinative of Covid-19 outcomes.

An additional means to address concerns that geographic patterns are driving the effect, models have been tested controlling for the census region in which the state are located (Table 22). This addresses whether being region is driving the effect, since the map in Figure 1 in the article indicates regional patterns. The results show that the effect of state capacity is robust to these geographic considerations. Southern and Western states had worse performance than the Midwest, particularly for mortality. However, state capacity remains a strong and significant predictor of these outcomes.

To address concerns that states hit earlier in the pandemic had less warning and less guidance, we introduce a covariate for the number of days since the first state's case before a Covid-19 case was identified in that state. We count from January 21st, 2020, Washington state (Table 23). The results indicate no significant relationship earliness/lateness of arrival

Table 22: State Capacity Factor and COVID Outcomes + Census Region

	Dependent variable:		
	Mean Excess Deaths	Vaccines per 100k People	Percent Fully Vaccinated
	(1)	(2)	(3)
State Capacity	-0.377^{***}	0.098^{***}	0.053^{*}
	(0.106)	(0.034)	(0.029)
Population Age	-0.096^{**}	0.013	0.022^{**}
	(0.039)	(0.012)	(0.010)
Percent White	0.004	−0.002	−0.001
	(0.008)	(0.002)	(0.002)
Northeast	−0.056	0.069	−0.040
	(0.258)	(0.081)	(0.068)
South	-0.551^{**}	−0.067	-0.123^{*}
	(0.242)	(0.079)	(0.068)
West	-0.744^{***}	0.038	−0.001
	(0.215)	(0.066)	(0.056)
Constant	1.397	−0.479	-2.267^{***}
	(1.556)	(0.476)	(0.409)
Observations	50	50	50
R^2	0.390	0.425	0.363
Log Likelihood	94.065	90.718	125.134
Note: Reference region - Midwest		*p<0.1; **p<0.05; ***p<0.01	

Table 23: State Capacity Factor and COVID Outcomes + Days until First COVID case

	Dependent variable:		
	Mean Excess Deaths	Vaccines per 100k People	Percent Fully Vaccinated
	(1)	(2)	(3)
State Capacity	-0.317^{***}	0.132^{***}	0.089^{***}
	(0.089)	(0.026)	(0.023)
Population Age	-0.060^{*}	0.013	0.015^{*}
	(0.035)	(0.010)	(0.009)
Percent White	0.011	−0.002	−0.001
	(0.008)	(0.002)	(0.002)
Days	−0.006	0.0003	0.001
	(0.006)	(0.002)	(0.002)
Constant	−0.646	−0.488	-2.070^{***}
	(1.435)	(0.419)	(0.358)
Observations	50	50	50
R^2	0.294	0.389	0.311
Log Likelihood	89.046	89.222	123.317
Note:		*p<0.1; **p<0.05; ***p<0.01	

and medical outcomes. Furthermore, state capacity remains a strong predictor.

Table 24: Social Vulnerability Index, State Capacity, and COVID Outcomes

	Dependent variable:		
	Mean Excess Deaths	Vaccines per 100k People	Percent Fully Vaccinated
	(1)	(2)	(3)
State Capacity	-0.382^{***}	0.166^{***}	0.093^{**}
	(0.145)	(0.041)	(0.037)
SVI	-0.680	0.272	0.053
	(0.789)	(0.218)	(0.195)
Rep. Gov.	-0.002	-0.068	-0.057
	(0.166)	(0.046)	(0.041)
Constant	-2.033^{***}	-0.187^{*}	-1.528^{***}
	(0.406)	(0.113)	(0.101)
Observations	50	50	50
R^2	0.163	0.412	0.289
Log Likelihood	85.751	90.127	122.457
Note:			*p<0.1; **p<0.05; ***p<0.01

To address concerns that our measure is also capturing the social determinants of health, which could be responsible for explaining variations in mortality and case rates, we include the CDC's social vulnerability index (SVI). SVI includes indicators of socio-economic status, household demographics, racial and ethnic minority status, and housing type and transportation. Since the measure is calculated at the county level, we aggregate the scores up to the state level.

We include SVI in the regression model, omitting percent white and population age, as these variables are part of the SVI construct. Table 24, shows that state capacity remains robust to the inclusion of this variable. SVI is not significantly related to any of the dependent variables.

As final robustness checks, we replace state capacity with legislative professionalism and the number of state employees, shown in Table 25. For legislative professionalism, we find the Squire index to perform in the opposite direction than expected. The Bowen index

Table 25: Legislative Professionalism and COVID Outcomes

	Dependent variable:					
	Mean Excess Deaths	Vaccines per 100k People	Percent Fully Vaccinated	Mean Excess Deaths	Vaccines per 100k People	Percent Fully Vaccinated
	(1)	(2)	(3)	(4)	(5)	(6)
Squire	1.563**	−0.466**	−0.447***			
	(0.671)	(0.217)	(0.172)			
Bowen				0.136**	−0.001	−0.006
				(0.061)	(0.022)	(0.018)
Rep. gov.	0.036	−0.138**	−0.105**	0.059	−0.101	−0.080
	(0.184)	(0.058)	(0.045)	(0.195)	(0.064)	(0.052)
Pop.age	−0.060	0.012	0.013	−0.074**	0.013	0.015
	(0.037)	(0.012)	(0.010)	(0.037)	(0.013)	(0.011)
Perc. white	0.011	0.001	0.0004	0.011	0.003	0.002
	(0.008)	(0.002)	(0.002)	(0.008)	(0.003)	(0.002)
Constant	−1.863	−0.259	−1.734***	−0.399	−0.734	−2.237***
	(1.699)	(0.542)	(0.427)	(1.518)	(0.512)	(0.419)
Observations	50	50	50	46	46	46
R^2	0.167	0.202	0.248	0.192	0.108	0.130
Note:						*p<0.1; **p<0.05; ***p<0.01

Table 26: Number of State Employees and COVID Outcomes

	Dependent variable:					
	Mean Excess Deaths	Vaccines per 100k People	Percent Fully Vaccinated	Mean Excess Deaths	Vaccines per 100k People	Percent Fully Vaccinated
	(1)	(2)	(3)	(4)	(5)	(6)
log(Employees)	0.381***	−0.092***	−0.085***			
	(0.080)	(0.027)	(0.021)			
Employees %				−38.371**	18.408***	12.879***
				(16.981)	(4.872)	(4.054)
Rep. gov	0.108	−0.142***	−0.109***	−0.079	−0.096*	−0.069
	(0.153)	(0.054)	(0.042)	(0.177)	(0.052)	(0.043)
pop. age	−0.049	0.009	0.010	−0.084**	0.022*	0.021**
	(0.033)	(0.011)	(0.009)	(0.038)	(0.011)	(0.009)
% white	0.008	0.002	0.001	0.007	0.001	0.001
	(0.007)	(0.002)	(0.002)	(0.008)	(0.002)	(0.002)
Constant	−4.061**	0.223	−1.293***	2.770	−2.103***	−3.160***
	(1.621)	(0.539)	(0.419)	(1.911)	(0.551)	(0.457)
Observations	50	50	50	50	50	50
R^2	0.383	0.295	0.350	0.189	0.322	0.282
Note:						*p<0.1; **p<0.05; ***p<0.0

also performs in the opposite direction for excess deaths, and is not significantly associated with vaccination rates. Regarding state employees (Table 26), we find the raw number of employees (logged) to be associated with worse health outcomes. When we measure state employees as a percentage of the workforce employed by the state, we find it to perform in the expected directions, meaning better health outcomes.

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