**Following Doctors' Advice:
Explaining the Issuance of Stay-at-Home Orders Related to the
Coronavirus Disease 2019 (COVID-19) by U.S. Governors**

Draft: May 12, 2020

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ABSTRACT

Public health experts actively advocate for aggressive social distancing to slow the spread of serious infectious diseases. While government mandates to social distance protect public health, they can also impose substantial social and economic costs on those subject to them. As a result, government leaders may be reluctant to issue such mandates. The objective of this study is to identify political, social, economic, and scientific factors that influenced governors of U.S. states to issue stay-at-home orders (SAHOs) or not in response to coronavirus disease 2019 (COVID-19). It uses event history analysis to investigate the issuance of COVID-19-related gubernatorial SAHOs during a 41-day period that ultimately “locked down” more than 90 percent of the country’s residents. The results indicate that governors considered more than scientific factors. While public health factors related to the spread of the disease informed these decisions, political factors related to the partisanship of the governor and economic factors related to the health of the economy also informed them. The results also provide mixed support for scientific factors related to state healthcare capacity and external factors related to geographic diffusion.

KEYWORDS: coronavirus, covid-19, pandemic, executive order, stay-at-home, shelter-in-place, public health, policy diffusion.

NOTE: This manuscript has not been validated by formal peer review.

INTRODUCTION

Following urgent warnings from public health experts, governments around the world have taken dramatic steps to limit the spread of coronavirus disease 2019 (COVID-19). In an effort to force social distancing, a primary tool used to stop the spread of infectious diseases, government authorities have incrementally prohibited large gatherings of people, closed schools, and limited or closed businesses deemed non-essential. Few non-pharmaceutical interventions, though, are as dramatic and consequential as government-issued stay-at-home orders. Though the specific details vary from jurisdiction to jurisdiction, a stay-at-home order (SAHO), which is also referred to as a shelter-in-place order in some states (Delaware, Georgia, and Mississippi), mandates people stay in their homes except to shop for grocery and pharmacy items, seek medical care, or work in essential businesses.

While SAHOs protect public health, they impose substantial social and economic costs on society (Gostin and Wiley, 2020). For instance, in the United States, basic constitutional rights such as freedom of assembly and free exercise of religion have been curtailed. The provision of required education has been dramatically disrupted, as millions of children in grades kindergarten through 12 have been directed to complete their school year from home, and historic levels of unemployment have been breached (U.S. Bureau of Labor Statistics, 2020).

The federal government in the U.S. holds some health-related powers in terms of interstate and foreign commerce. But U.S. states are primarily responsible for public health based on authority derived from police powers granted to states by the 10th Amendment to the U.S. Constitution (NCSL, 2014). State public health powers are primarily exercised by governors, and governors visibly use their unilateral executive powers to pursue public health objectives. These objectives often include addressing health emergencies, establishing new public health programs, directing and reorganizing health agencies, and increasing the profile of public health issues, particularly when legislation, regulation, or litigation is insufficient or unavailable in a timely fashion (Gakh, Vernick, and Rutkow, 2013). Given the large number of governors who issued coronavirus-related SAHOs (42 out of 50 or 84.0 percent) in a short period of time (19 days; Mervosh, Lu, and Swales, 2020), it is likely that governors primarily focused on the health emergency aspects of the situation. Governors have issued gubernatorial executive orders, which in many cases are equivalent to enacted legislation (e.g., Sellers, 2017), to permit out-of-state emergency medical technicians to respond to disasters (e.g., Louisiana Executive Order No. BJ

2010-9), create state health insurance exchanges in response to healthcare reform (NCSL, 2020), and establish prescription drug monitoring programs (e.g., Missouri Executive Order 17-18).

As of April 10, 2020, the endpoint of this study, most U.S. governors had issued general, as opposed to targeted (e.g., age-restricted), stay-at-home orders in an effort to limit the spread of COVID-19. The first SAHO was issued on March 19 for California and the last on April 7 for South Carolina. Given the strong cue sent by the federal government at the end of January with the declaration of a national public health emergency, it is unclear why some governors moved faster than others to issue a coronavirus-related SAHO. Observers, both expert and novice, have offered a wide range of explanations.

Public health scholars have identified several broad factors that influence public health policy formulation: political, social, economic, and scientific factors (Brownson, Chriqui, and Stamtakis, 2009). Some argue that political actors – public office holders, civil servants, and interest groups – are “the most important players” in public health policy (Spasoff, 1999, p. 6). For instance, Karol and Thurston (2020) argue that starting in the mid-1980s, political partisanship began driving California state legislators’ vote on abortion policy. Interestingly, they further conclude that prior to that, social factors in the form of legislators’ religious values drove California state legislators’ votes on abortion policy. Protecting the public’s health is an expensive endeavor, so economic considerations also play an important role in the formulation of public health policy. Teutsch, Glied, and Roy (2016) note that the U.S. Congressional Budget Office and the Office of Management and Budget use cost estimates to score proposed policies and evaluate their costs and benefits across a number of dimensions including economic burden. Finally, scientific evidence has informed public health policy to great effect in domains such as preventing the spread of infectious diseases with vaccinations, slowing addiction with tobacco control, and controlling pollution with clean air and water regulations (Brownson et al., 2018, xiii).

The objective here is to identify factors that influenced governors’ decisions to issue a coronavirus-related stay-at-home order or not in their states. This information is important because it gives individuals, communities, and organizations tools to predict and plan for government responses to healthcare crises in the future. In particular, this study proposes then evaluates potential political, social, economic, and scientific factors. The next section provides background on the issue by identifying the steps leading up to the SAHOs, defining what “stay at

home” means in the context of such an order, and detailing some of the consequences. The third section presents pertinent literature regarding potential explanations and the resulting expectations in the form of eight hypotheses. The following section describes the event history analysis method used and then the data collected. The results section suggests that governors’ decisions regarding SAHOs are influenced by political, economic, and scientific concerns but not identified social concerns. The final section summarizes then connects the findings and puts them in a broader context about what goes into governors’ decisions during public health crises.

BACKGROUND

Governors took a number of incremental, non-pharmaceutical steps to address the coronavirus outbreak before taking the dramatic step of ordering people to stay at home (for details see Kaiser Family Foundation, 2020a). In most cases, governors first declared states of emergency as the virus began to spread and coronavirus-related deaths increased. Emergency declarations free up resources and waive legal constraints, both state and national, on state actions but place few restrictions on social or economic activities. The governor of Washington State led by declaring a state-wide state of emergency on February 29, the day of the first confirmed death due to COVID-19 on U.S. soil in Kirkland, Washington. All the other governors quickly followed suit with the governor of West Virginia, the last state, declaring a state of emergency on March 16.

The next increment of orders related to slowing the spread of the virus in order to not exceed state healthcare capacity to treat infected patients, the so-called “flatten-the-curve” declarations. To comply with CDC (Center for Disease Control and Prevention) recommendations to start “social distancing,” or staying physically separated from other people, government agencies at the state and local levels began restricting social gatherings. The first state-level “gathering” restriction, for indoor groups of 100 or people, was put in place on March 10 by the governor of Ohio. This was followed the next day by similar restrictions in California, Kentucky, Rhode Island, and Washington. By March 26, all 50 states had issued gathering restrictions.

Governors followed next with more disruptive orders that closed schools on a statewide basis starting on March 16 in Maryland, Michigan, Ohio, and Oregon. Eventually, all 130,000 of the nation’s schools were closed. Restrictions for the country’s one million restaurants began in

some states on March 15, followed on March 17 by closures of other non-essential businesses in many states. This incremental process of restrictions then closures was generally followed by the issuance of state-wide stay-at-home orders, the first of which was issued by California on March 19. By April 7, 42 of the 50 governors had issued SAHOs, with the states of Arkansas, Iowa, Nebraska, North Dakota, Oklahoma, South Dakota, Utah, and Wyoming remaining without a state-wide SAHO.

Though the specifics vary from state to state, stay-at-home orders mandate people stay in their homes except to shop for grocery and pharmacy items, seek medical care, or work in essential businesses. Many of the SAHOs indicate that compliance will be enforced through civil or criminal penalties such as fines of up to several thousand dollars, orders to suspend business operations, and arrest or imprisonment. News reports indicate individuals in Illinois, Maryland, and New Jersey have been cited, charged, or arrested for violating coronavirus-related SAHOs (Norwood, 2020).

The end result is over 55 million children home from school, more than 20 million people filing initial jobless claims over a recent four-week period (J.P. Morgan, 2020), and almost 300 million Americans, about 90 percent of the country, required to stay home for several weeks (Norwood, 2020).

THEORY AND HYPOTHESES DEVELOPMENT

In most states, the authority to issue a public health-related SAHO rests with the executive branch, the governors, and there is significant variance in the timing of governors' issuance of such orders. Public policy researchers have identified two high-level categories of factors that affect the adoption of governmental policies by U.S. states: internal state determinants and external diffusion effects (e.g., Berry and Berry, 2018; Mooney and Lee, 1995). Internal determinants broadly consist of the characteristics of a state that make a policy more or less appealing to its policymakers. More narrowly, these categories break down further into political, social, and economic factors, and, with regard to public health policy in particular, scientific factors (Brownson, Chiqui, and Stamatakis, 2009). External effects refer to the influence on a state's policymakers by the policy choices of other states such as geographically proximate neighbors (e.g., Berry and Berry, 2018).

Starting with internal factors, Spasoff (1999) asserts that political actors play the principal role in public health decisions. Political ideology captures people's perspective on the political world, in particular regarding the appropriate social and economic role of government in society. Political liberals tend to support greater government intervention in society to address society's challenges, while political conservatives tend to favor larger roles for individuals, private institutions, and markets. Although the correspondence between ideology and partisanship is not perfect, Democrats typically embrace a liberal political belief system and Republicans a conservative one (Lewis-Beck, Jacoby, Norpoth, and Weisberg, 2008). As such, Democratic governors may be more likely to intervene in a public health crisis than Republican governors. Further, evidence suggests that party interests are playing a larger role in gubernatorial behavior (Ferraiolo, 2017; Jensen, 2017), so partisan cues from the president may affect a governor's decision to issue a SAHO, whether the governor is Democratic or Republican. In the case of coronavirus in the U.S. in 2020, the Republican president who sees the disease as less threatening may have influenced Republican governors to delay or decline to issue a SAHO, while Democratic governors may be reacting to the inactivity of a Republican president and act more quickly (e.g., McCann, Clouser, Shipan, and Volden, 2015). Together these suggest:

Hypothesis 1: The probability a governor will issue a stay-at-home order is higher when the governor is a Democrat than a Republican.

Another political factor may also contribute to governors' decisions. People's vote choices are heavily influenced by their partisanship: Democrats favor Democratic candidates and Republicans favor Republican candidates (Lewis-Beck, Jacoby, Norpoth, and Weisberg, 2008). Although a pandemic disease creating a public health emergency seems like a non-partisan issue, research indicates the H1N1 virus (swine flu) crisis in 2009 polarized public attitudes in the U.S. along party lines such that Democrats were more responsive to pro-vaccination messages than Republicans (Baum, 2011). In the case of the 2019 coronavirus, early public opinion polling showed a similar partisan divide on how to address the pandemic, with Democrats being more supportive of prioritizing slowing the spread of the disease (94%) than Republicans (68%; Kaiser Family Foundation, 2020). Evidence also indicates voters hold governors accountable for policy outcomes (e.g., Niemi, Stanley, and Vogel, 1995). This suggests that candidates for office in states with more Democratic voters would fare better at the polls when they favor more

government action in response to a public health crisis than when they favor less government action. The key connection to governors' behavior is that holders of elected office are strongly, if not primarily, motivated to win re-election (e.g., Mayhew, 1974). This suggests:

Hypothesis 2: The probability a governor will issue a stay-at-home order will increase as the Democratic vote share in a state increases.

Social factors also matter in policy making. The World Health Organization recommends people social distance to protect against COVID-19 (2020). Social distancing includes people keeping physical space between themselves and others when outside their homes by staying about six feet away from others, not gathering in groups, staying out of crowded places, and avoiding mass gatherings (CDC, 2020). This means that social distancing requires significant social and financial sacrifices by individuals on behalf of their communities to slow the spread of a disease or “flatten the curve” through measures such as closing schools, businesses, and places of worship. The primary purpose of SAHOs is to mandate social distancing through government order. Scholars have long studied the consequences of individualistic versus collectivistic attitudes, which affect individuals' attitudes regarding sacrificing for the public good. Elazar (1966) contends that the civil society of states can be categorized in terms of how they prioritize individual versus community interests. He argues, for instance, that “individualistic” and “moralistic” states in particular seek to promote private interests relative to community interests. Others have focused specifically on an individualism-collectivism dimension. Generally speaking, individualism focuses on promoting individual autonomy and independence, while collectivism focuses on group membership and interdependence (e.g., Vandelo and Cohen, 1999). This implies that the voters in states with a more collectivistic civil society may be more tolerant of SAHOs, in which they are called on to make costly sacrifices for others, than voters in states with more individualistic civil societies. This suggests:

Hypothesis 3: The probability a governor will issue a stay-at-home order will increase as a state's collectivistic tendencies increase.

Economic factors play a role in policy making as well. Evidence suggests that voters hold governors responsible for the perceived economic conditions in their state (e.g., Niemi, Stanley, and Vogel, 1995). When a state's economy is good, voters tend to reward the incumbent governor at the polls; when it is bad, they tend to punish the incumbent. It is commonsensical to predict that a SAHO, which by definition limits or closes large segments of the economy, will

substantially and negatively affect a state's economy (Correia, Luck, and Verner, 2020).

Therefore, a governor who issues a SAHO is likely to understand that the order will negatively, and probably substantially, impact the economy, which may negatively impact her or his vote share in the next election. Governors in states with stronger economies may calculate that they can afford electorally to hamper their state's economy, while governors in states with weaker economies may estimate that they have less latitude in regard to harming the economy.

Consequently:

Hypothesis 4: The probability a governor will issue a stay-at-home order will increase as the strength of the state's economy increases.

The previous discussion develops hypotheses regarding political, social, and economic factors affecting governors' decisions to issue SAHOs. Scholars suggest that scientific factors also influence public health policy (e.g., Brownson, Chiqui, and Stamatakis, 2009). This study categorizes the scientific factors in terms of population vulnerability, healthcare system capacity, and spread of the disease. The populations of some states may be more vulnerable to the coronavirus than other states. For instance, urban populations can be particularly vulnerable to pandemics (Kawashima, Matsumoto, and Akashi, 2016), as the virus is more likely to spread when people are in close physical proximity and there are more potentially infected people to spread it. Evidence suggests older people are much more vulnerable to serious illness and even death, while more unhealthy populations in general are more vulnerable to disease (Bialek et al., 2020). Consequently, governors with more vulnerable populations may be more inclined to take steps to protect them. This suggests:

Hypothesis 5: The probability a governor will issue a stay-at-home order will increase when a state's residents are more vulnerable to the disease.

Another scientific factor is when a disease spreads too quickly, and the state projects it does not have enough medical staff, medical equipment, or hospital beds to care for patients, in worst cases forcing emergency rooms to turn away patients untreated. In epidemiology, taking steps to slow the spread of a disease to prevent the healthcare system from becoming overwhelmed with patients is known as "flattening the curve." SAHOs are powerful tool governors have to enforce social distancing and, therefore, to flatten the curve. Governors in states with less medical capacity may be more concerned about their state's healthcare system

becoming overwhelmed and therefore be more aggressive in trying to flatten their state's curve. This suggests:

Hypothesis 6: The probability a governor will issue a stay-at-home order will increase as the state's healthcare capacity decreases.

Further, wider spread of a disease may signal greater future threat to the capacity of the healthcare system. As such, the healthcare systems in states with more evidence of a disease, such as, related deaths or cases, may be more likely to be overwhelmed with patients. So, governors in states with more traces of a disease may be more aggressive in trying to flatten the curve in their states. This suggests:

Hypothesis 7: The probability a governor will issue a stay-at-home order will increase as evidence of the spread of coronavirus increases.

The previous discussion reviews potential internal factors that may affect a governor's decision to issue as SAHO. State policy may also be affected by factors external to the state via the influence or diffusion of the policy choices of other states (Berry and Berry, 2018). A number of studies show that states are influenced by states with shared borders, also referred to as geographic diffusion (e.g., Chamberlain and Haider-Markel, 2005). Research has shown that policies can spread from next-door-neighbor states through learning, imitation, cooperation, and competition. In particular, being informed by the experiences of neighboring states, with their similarities in media, populations, and common values (Mooney, 2001), assists states in reducing the risks inherent in making policy. A governor may learn from neighboring governors about new or more effective policy approaches, which particularly may include the rare case of public health crises on a major scale. A governor may imitate another governor whose approach may be deemed "an appropriate response to a given problem" (Maggetti and Gilardi, 2015) or who may "give cover" in the case of consequential measures such as SAHOs. Finally, a governor may want to gain a competitive advantage for her or his state (Berry and Berry, 1992) such as keeping the state's economy open to attract business from states in which the economy has been closed down. Further, and from another perspective, due to concerns about the physical spread of the virus across state boundaries due to the interactions of geographically proximate populations (e.g., Macinko and Silver, 2015), a governor may see a SAHO in a neighboring state as a signal of the severity of the threat in that state and feel the need to also issue a SAHO to protect the state's residents. This leads to the final expectation:

Hypothesis 8: The probability a governor will issue a stay-at-home order will increase as the proportion of governors in geographically proximate states issuing a stay-at-home order increases.

METHOD AND DATA

Event History Analysis

This research uses event history analysis to estimate the effects of political, social, economic, scientific, and external factors on the probability a governor will issue a COVID-19-related SAHO. Event history analysis is a time-series technique used to estimate relationships with rare events and is commonly used in policy adoption research (Berry and Berry, 1992; Hageman and Robb, 2011; Hayes and Dennis, 2014). It uses panel data consisting of non-repeatable events to identify the association between, in this case, the gubernatorial issuance of a stay-at-home order and internal state factors in policy adoption and external factors of policy diffusion. By comparing states, this research design accounts for shared national-level factors and analyzes state-level factors that are associated with differences in the issuance of SAHO by a governor. The unit of analysis is U.S. state-days (e.g., California-March 19 or Indiana-March 24). The timeframe assessed includes the 41 days from March 1 to April 10, 2020. March 1 is the day after the governor of Washington declared the first coronavirus-related state of emergency and the first U.S. coronavirus-related death was reported, which also occurred in the state of Washington. These unambiguous events indicate a reasonable date for what is frequently identified as the first stage in the policy process, problem identification, and, therefore, suggest a date from which to collect and analyze data. April 10 is shortly after the last SAHO was issued in South Carolina on April 7.

Dependent Variable

The dependent variable is the gubernatorial issuance of a SAHO or not. These data were collected from official sources (e.g., statements from governors' offices or tweets from governors) following news reports from the *New York Times* (Mervosh, Lu, and Swales, 2020). Governors in 42 states issued SAHOs during the period under review. Following the event history analysis method, a state is coded 0 for each day a SAHO is not in effect, then coded 1 for the day on which a SAHO goes into effect. After a SAHO goes into effect in a state (i.e., its code

is 1), the state is dropped from the data set and, therefore, from further analyses. For example, the New York SAHO went into effect on March 22. It was coded 0 from March 1 to March 21, then 1 on March 22, the day on which the state's SAHO went into effect, then is omitted from March 23 to April 10. As a result of this coding, California, the first state in which a SAHO went into effect (March 19), contributes 19 observations to the dataset and South Carolina, the last state in which a SAHO went into effect, contributes 38 (April 7). The eight states without a SAHO contribute 41 observations each. This results in 1483 state-day observations. See Appendix 1 for the effective date of each state's SAHO.

Independent and Control Variables

This section identifies the independent variables used in the theoretically strongest model. Alternative measures will be evaluated and reported following the presentation of the results of this model. Factors internal and external to states influence policy adoption. Beginning with internal factors, two measures are used to capture political factors, the political party of the governor and the partisan composition of the state's electorate. The political party of the governor, *demGOV*, was collected from the National Conference of State Legislatures (2019) and coded 1 when the governor is a Democrat (24 or 48 percent) and 0 when a Republican. State partisan composition, *demVOTE*, was collected from the U.S. Federal Election Commission (2016). It is the percentage of the two-party vote in the 2016 presidential election cast for Democratic candidate Hillary Clinton in her race against Republican Donald Trump. The 50-state minimum is 24.3 percent and the maximum is 67.4 percent with a mean of 47.0 (sd = 11.0). Following Hypotheses 1 and 2, the expectation is that Democratic governors are more likely to issue a SAHO as are governors with more Democratic electorates.

The effects of social factors are captured by estimates of states' level of collectivism as indicated by Vandello and Cohen's (1999) index that scores states on their individualist versus collectivist tendencies, *socINDCOL*. The scores are based on eight items, the first three of which are related to state residents' family structure and living arrangements and the remaining items are related to residents' social, economic, religious, and political practices. The scores range from a low of 31 in Montana to a high of 91 in Hawaii, and they were linearly transformed by the creators to have a mean of 50 and standard deviation of 20 with higher scores indicating

greater collectivism. Following Hypothesis 3, the expectation is that governors in more collectivist states will be more likely to issue a SAHO.

Moving to economic factors, the rate of unemployment is a fundamental indicator of the condition of a state's economy. It indicates whether the economy is running above or below capacity, and if it is running efficiently. High unemployment imposes increased costs on individuals and society including reduced psychological well-being and limited availability of needed resources. Higher unemployment is associated with a weaker economy. Unemployment, *econUNEMP*, is measured as the number of eligible workers in each state in 2019 who are unemployed as a percent of the labor force as reported by the U.S. Department of Labor's Bureau of Labor Statistics (2019). The 50-state minimum is 2.4 percent and the maximum is 6.1 percent with a mean of 3.6 percent ($sd = 0.7$). Per Hypothesis 4, the expectation is that the probability a governor will issue a SAHO increases as the state of the economy improves as indicated by lower unemployment.

The model also accounts for three scientific factors that may affect a governor's decision regarding a SAHO. The first reflects population vulnerability in the form of the percentage of a state's population that lives in urbanized areas or urban clusters, *vulURBAN*, as reported by the U.S. Census Bureau. Per Hypothesis 5, the expectation is the probability a governor will issue a SAHO increases as the state's population is more vulnerable as represented by increased urban population. The next two scientific factors specifically relate to "flattening the curve" in terms of capacity and spread of the disease. One indicates states' healthcare capacity to treat infected patients in the form of the number of medical doctors per 100,000 population, *capDOCTOR*. These data are collected from State Health Facts (2019), a product of the Kaiser Family Foundation and American Hospital Association. This measure ranges across the 50 states from a minimum of 161.9 to a maximum of 435.9 doctors per 100,000 residents with a mean of 247.4 ($sd = 56.0$). Per Hypothesis 6, the expectation is that the probability a governor will issue a SAHO increases as a state's healthcare capacity decreases as represented by the number of medical doctors. The other is cumulative deaths in increments of 10, *cumDEATH*, which ranges from 0 (no deaths) to 16.4 (164 deaths) with a mean of 0.4 ($sd = 1.3$). To ensure consistency in counts, daily cumulative deaths were collected from the *Washington Post* as reported by the World Health Organization, U.S. Centers for Disease Control and Prevention, and Johns Hopkins University (Fox, Mayes, Schaul, and Shapiro, 2020). The count starts on February 29, and the

observations are lagged one day such that cumulative deaths from a state-day are used to predict the probability of a SAHO on the following state-day. Per Hypothesis 7, the expectation is that the probability a governor will issue a SAHO increases as evidence of the spread of the disease increases in the form of increased reported deaths.

The previous descriptions detail states' internal factors that may help explain the gubernatorial issuance of a SAHO. But external factors also have an effect. Geographic diffusion, *diffGEO*, is the proportion of contiguous states that have previously issued a stay-at-home order. As an example, when the governor of Connecticut issued a SAHO on March 23, one neighboring state (New York) of Connecticut's three neighboring states (New York plus Massachusetts and Rhode Island) had already issued a SAHO, so Connecticut was assigned a value of 33 percent on that date. The denominator ranges from 0 (Alaska and Hawaii) to 8 (Missouri and Tennessee). Per Hypothesis 8, the expectation is that the probability a governor will issue a SAHO increases as the proportion of neighboring states with SAHOs increases.

Lastly, it is important to account for the effects of two control variables. First, media coverage can play a role in stimulating public interest in an issue that pressures political leaders to address the issue. But the media are more likely to report on issues that already have policymakers' attention (Kingdon, 1995) creating, therefore, a simultaneity bias. This study does not hypothesize about the directional effect of media, but, following other event history analyses, the model includes a measure, *ctlNEWS*, to control for saliency of the issue in the form of cumulative state newspaper story counts. The count starts on February 29, and the observations are lagged one day such that cumulative stories from a state-day are used to predict the probability of a SAHO on the following state-day. Story counts were collected from a search of the ProQuest U.S. Newsstream database where the entry has the document type indicated as "news" and includes the terms "COVID-19," "coronavirus," or "pandemic." According to ProQuest promotional information, its U.S. Newsstream archives U.S. news content including full-text news from major newspapers as well as regional newspaper collections. The data included at least one newspaper from each state except for Idaho, Nebraska, Rhode Island, and West Virginia, which were added with independent online searches for appropriate stories.

Second, event history analyses typically assume a constant hazard rate (adoptions/risk set) (Hageman and Robb, 2011). The analyses reported in Appendix 2 indicate these data do not have a constant hazard rate. As a result, following common practice (Mooney and Lee, 1995;

Murray, 2018; Sylvester and Haider-Markel, 2015), the model includes a nonlinear trend variable, *ctlTREND*, which is constructed by taking the square root of the number of days between a given day and the day with the highest hazard rate, in this study April 3.

Model

The relationships are estimated using probit regression, because the dependent variable, *STATUS*, is dichotomous. The following probit model is used to test the relationships between the proposed explanatory variables and *STATUS*:

$$\begin{aligned} STATUS_{it} = & \alpha + \beta_1 demGOV_{it} + \beta_2 demVOTE_{it} + \beta_3 socINDCOL_{it} + \beta_4 econUNEMP_{it} \\ & + \beta_5 vulURBAN_{it} + \beta_6 capDOCTOR_{it} + \beta_7 cumDEATH_{it-1} \\ & + \beta_8 diffGEO_{it-1} + \beta_9 ctlNEWS_{it-1} + \beta_{10} ctlTREND_{it} + \varepsilon_{it} \end{aligned} \quad (1)$$

where *STATUS* is the dependent variable, representing the existence of a stay-at-home order (coded 1 in day *t* that a state governor *i* issued the order and coded 0 otherwise); the measures representing political factors are *demGOV* and *demVOTE*; the measure representing social factors as collectivist versus individualist tendencies is *socINDCOL*; the measure representing the economic factor is *econUNEMP*; the measures representing scientific factors are population vulnerability, *vulURBAN*, healthcare capacity, *capDOCTOR*, and evidence of disease, *cumDEATH*; the measure representing external diffusion is *diffGEO*; and the control measures are media attention, *ctlNEWS*, and trend, *ctlTREND*. This model, Model 1, is offered as the theoretically strongest model, and the section following the presentation of Model 1 results details alternative model specifications to assess its robustness.

RESULTS

Descriptive Statistics and Bivariate Correlations

The model includes 1483 state-day observations. Table 1 reports the descriptive statistics for all variables in Model 1. Table 2 presents the related correlation matrix.

Table 1. Descriptive statistics for Model 1 variables.

<i>Variable</i>	<i>Mean (Proportion[†])</i>	<i>Std. Dev.</i>	<i>Min.</i>	<i>Max.</i>
<i>Status (DV)</i>	0.03 [†]	0.17	0	1
<i>demGOV</i>	0.42 [†]	0.49	0	1
<i>demVOTE</i>	45.59	10.70	24.3	67.4
<i>socINDCOL</i>	49.76	11.20	31	91
<i>econUNEMP</i>	3.53	0.77	2.4	6.1
<i>vulURBAN</i>	0.73	0.14	0.4	1.0
<i>capDOCTOR</i>	241.23	54.13	162	436
<i>cumDEATH</i>	0.42	1.33	0	16.4
<i>diffGEO</i>	0.09	0.21	0	1
<i>ct/NEWS</i>	87.54	150.52	0	1058
<i>ct/TREND</i>	4.08	1.26	0	5.7

N = 1483.

Where *Status* = gubernatorial issuance of a stay-at-home order (coded 1) or not (coded 0) in a given state in a given day; *demGOV* = political party of the governor is Democratic (coded 1) or not (coded 0); *demVOTE* = percentage of the two-party vote in the 2016 presidential election received by the Democratic candidate; *socINDCOL* = measure of collectivist versus individualistic tendencies; *econUNEMP* = number of eligible workers who are unemployed as a percent of the labor force 2019; *vulURBAN* = the percentage of population living in urbanized areas; *capDOCTOR* = the number of medical doctors per 100,000 population; *cumDEATH* = the cumulative deaths in increments of ten; *diffGEO* = proportion of contiguous states that have previously issued a stay-at-home order; *ct/NEWS* = cumulative related state newspaper story counts; *ct/TREND* = square root of the number of days between a given state-day and the day with the highest order rate or hazard rate, in this case April 3.

[†]Proportions are presented for indicator variables.

Table 2. Correlation coefficients for variables in Model 1 (n=1483).

Variable	1	2	3	4	5	6	7	8	9	10	11
1. <i>Status (DV)</i>	1										
2. <i>demGOV</i>	[0.05]*	1									
3. <i>demVOTE</i>	[0.06]*	[0.55]*	1								
4. <i>socINDCOL</i>	0.03	0.05	0.30*	1							
5. <i>econUNEMP</i>	0.03	0.19*	0.02	0.13*	1						
6. <i>vulURBAN</i>	0.03	0.29*	0.51*	0.28*	0.04	1					
7. <i>capDOCTOR</i>	0.05	0.30*	0.75*	0.10*	-0.06*	0.29*	1				
8. <i>cumDEATH</i>	0.25*	-0.07*	0.03	0.05*	0.00	0.09*	-0.07*	1			
9. <i>diffGEO</i>	0.24*	-0.13*	-0.15*	-0.05	-0.10*	-0.06*	-0.14*	0.35*	1		
10. <i>ctlNEWS</i>	0.13*	0.11*	0.21*	0.03	0.03	0.18*	0.17*	0.35*	0.24*	1	
11. <i>ctlTREND</i>	-0.23*	0.22*	0.22*	0.04	0.12*	0.12*	0.19*	-0.45*	-0.69*	-0.32*	1

All variables defined in Table 1.

† Correlation coefficients are [Spearman] with dichotomous variables, Pearson otherwise.

* Indicates significance at the 5-percent level.

Regression Results

Diagnostic tests present evidence of heteroskedasticity, so Model 1 is estimated using robust standard errors. The continuous measures *demVOTE*, *socINDCOL*, *econUNEMP*, and *vulURBAN* are centered on their 50-state means (i.e., $N = 50$) to make the values of models' constants meaningful. All p -values are based on two-tailed tests. All predicted probabilities are estimated with the centered variables at 0 and *demGOV*, *capDOCTOR*, *cumDEATH*, *diffGEO*, *ctlNEWS*, and *ctlTREND* at 0, which is meaningful for those six variables. The overall model fit is statistically significant (Log pseudolikelihood = -128.733, LR[10] = 124.721, $p < 0.001$) with a McFadden's pseudo R^2 of 0.326, AIC of 0.188, and BIC of -10490.816. The model correctly classifies 97.4 percent of the cases with a proportional reduction in error of 9.5 percent.

Figure 1 presents the marginal effects of each variable in Model 1, while Table 3 presents the probit coefficients of Model 1. These indicate that a number of factors significantly affect the probability that a governor will issue a SAHO. Starting with the internal factors, political factors in the form of partisanship play a role. Democratic governors are more likely to issue SAHOs than Republican governors (coeff = 0.711, se = 0.259, $p = 0.006$). In substantive terms, on any day during the period under consideration, Democratic governors are 3.2 percentage points ($dy/dx = 0.032$, se = 0.012, $p = 0.005$) more likely to issue a SAHO than their Republican

counterparts. The probability a Republican governor will issue a SAHO on any given day is 0.017 (se = 0.004, $p < 0.001$) and the probability a Democratic governor is three times greater at 0.051 (se = 0.011, $p < 0.001$). On the other hand, the partisan nature of state electorates does not exert a statistically detectable effect (coeff = 0.017, se = 0.018, $p = 0.333$). These results support Hypothesis 1 but not 2. They suggest the partisanship of the governor affects her or his decision to issue a SAHO, but the partisanship of states' voters does not.

Figure 1. Marginal Effects of Variables in Model 1

Note: variables are defined in Table 1.

Table 3. Determinants and alternative specifications of determinants of gubernatorial stay-at-home orders.

		Model 1	Model 2	Model 2A	Model 3	Model 4	Model 5	Model 5A	Model 6	Model 7	Model 8	Model 9
		Coefficient (Robust SE)										
H1	<i>demGOV</i>	0.71* (0.26)	-	0.66* (0.25)	0.69* (0.26)	0.64* (0.27)	0.69* (0.27)	0.71* (0.26)	0.56* (0.25)	0.70* (0.26)	0.75* (0.22)	0.55* (0.24)
H2	<i>govVOTE</i>											
	<i>dem/DEM</i>	-	1.06* (0.34)	-	-	-	-	-	-	-	-	-
	<i>dem/REP</i>	-	0.97* (0.36)	-	-	-	-	-	-	-	-	-
	<i>rep/DEM</i>	-	0.82 (0.50)	-	-	-	-	-	-	-	-	-
	<i>rep/REP</i>	-	-	-	-	-	-	-	-	-	-	-
H2	<i>demVOTE</i>	0.02 (0.02)		0.02 (0.02)	0.02 (0.02)	0.02 (0.02)	0.02 (0.02)	0.01 (0.02)	0.03+ (0.02)	0.02 (0.02)	0.02 (0.02)	0.02 (0.02)
H2	<i>gvtDIV</i>	-	-	0.24 (0.22)	-	-	-	-	-	-	-	-
H3	<i>socINDCOL</i>	-0.00 (0.01)	0.00 (0.01)	-0.00 (0.01)	-	0.00 (0.01)	-0.00 (0.01)	0.00 (0.01)	-0.00 (.01)	-0.00 (0.01)	-0.00 (0.01)	0.00 (0.01)
H3	<i>socCIVMIND</i>	-	-	-	0.10 (0.16)							
H4	<i>econUNEMP</i>	0.35* (0.13)	0.37* (0.13)	0.35* (0.13)	0.38* (0.12)	-	0.37* (.13)	0.37* (.13)	0.32* (0.11)	0.36* (0.13)	0.33* (0.13)	0.28* (0.13)
H4	<i>econRATING</i>	-	-	-	-	-0.11* (0.06)	-	-	-	-	-	-
H5	<i>vulURBAN</i>	-0.00 (0.01)	0.00 (0.01)	0.00 (0.01)	-0.00 (0.01)	-0.00 (0.01)	-	-	-0.01 (0.01)	-0.00 (0.01)	-0.00 (0.01)	-0.00 (0.01)
H5	<i>vul65</i>	-	-	-	-	-	0.03 (0.05)	-	-	-	-	-
H5	<i>vulHEALTH</i>	-	-	-	-	-	-	0.07 (0.29)	-	-	-	-
H6	<i>capDOCTOR</i>	0.01* (0.00)	0.00+ (0.00)	0.00+ (0.00)	0.01+ (0.00)	0.00+ (0.00)	0.01* (0.00)	0.01* (0.00)	-	0.01* (0.00)	0.01* (0.00)	0.00+ (0.00)
H6	<i>capBED</i>	-	-	-	-	-	-	-	-0.19 (0.21)	-	-	-

(continued on next page)

Table 3. (continued)

		Model 1	Model 2	Model 2A	Model 3	Model 4	Model 5	Model 5A	Model 6	Model 7	Model 8	Model 9
		Coefficient (Robust SE)										
H7	<i>cumDEATH</i>	0.10* (0.04)	0.11* (0.04)	0.10* (0.04)	0.10* 0.04	0.11* (0.04)	0.10* (0.04)	0.10* (0.04)	0.07+ (0.04)	-	0.09* (0.04)	0.08* (0.03)
H7	<i>cumCASES</i>	-	-	-	-	-	-	-	-	0.00* (0.00)	-	-
H8	<i>diffGEO</i>	0.66+ (0.35)	0.60+ (0.35)	0.66+ (0.35)	0.65+ (0.35)	0.52 (0.34)	0.65+ (0.34)	0.66+ (0.35)	0.63+ (0.34)	0.72* (0.35)	-	0.88* (0.38)
H8	<i>diffBEA</i>	-	-	-	-	-	-	-	-	-	0.39 (0.38)	-
Ctrl	<i>ctINews</i>	-0.00+ (0.00)	-0.00 (0.00)	-0.00+ (0.00)	-0.00+ (0.00)	-0.00 (0.00)	-0.00+ (0.00)	-0.00+ (0.00)	-0.00 (0.00)	-0.00* (0.00)	-0.00+ (0.00)	-
Ctrl	<i>ctISEARCH</i>	-	-	-	-	-	-	-	-	-	-	0.02* (0.01)
Ctrl	<i>ctTREND</i>	-0.59* (0.12)	-0.60* (0.12)	-0.60* (0.12)	-0.60* (0.12)	-0.58* (0.12)	-0.59* (0.12)	-0.59* (0.12)	-0.57* (0.11)	-0.57* (0.12)	-0.63* (0.12)	-0.57* (0.13)
	Intercept	-0.51 (0.38)	-0.73* (0.37)	-0.52 (0.38)	-0.48 (0.39)	0.12 (0.58)	-0.93 (0.97)	-0.51 (0.38)	-0.04 (0.68)	-0.57 (0.38)	-0.34 (0.39)	-2.08* (0.70)
<i>Model Statistics</i>		(N=1483 state years)										
	Likelihood Ratio	-128.73	-128.01	-128.14	-128.55	-130.94	-128.61	-128.72	-130.69	-126.72	-129.91	-126.42
	Wald χ^2 (df)	115.10* (10)	117.45* (11)	115.59* (11)	117.79* (10)	108.49* (10)	114.37* (10)	113.98* (10)	122.86* (10)	117.31* (10)	104.97* (10)	86.98* (10)
	Pseudo R ²	0.33	0.33	0.33	0.33	0.31	0.33	0.33	0.32	0.34	0.32	0.34

Alternative models testing alternative variables (original variables defined in Table 1); Model 2 replaces *demGOV* and *demVOTE* with indicator variables for the four combinations of the interaction of governor and voter partisanship, *govVOTE*; Model 2A adds an indicator variable for the existence of a divided government; Model 3 replaces *socINDCOL* with the measurement for civic-mindedness *socCIVMIND*; Model 4 replaces *econUNEMP* with the S&P rating, *econRATING*; Model 5 replaces *vulURBAN* with the percent of the population ages 65 and older, *vul65*; Model 5A replaces *vulURBAN* with the Health Score, *vulHEALTH*; Model 6 replaces *capDOCTOR* with hospital beds per 1000 population, *capBED*; Model 7 replaces *cumDEATH* with tens of cumulative confirmed cases, lagged one day, *cumCASES*; Model 8 replaces *diffGEO* with the proportion of governors in the same BEA region that have issued a SAHO the day before, *diffBEA*; Model 9 replaces *ctINews* with the 7-day moving average of Google Trends scores, *ctISEARCH*.

* and + indicate statistical significance at the 5-percent and 10-percent levels, respectively, using two-tailed tests.

Model 1 results do not support Hypothesis 3 either. Social factors in the form of states' collectivist versus individualist tendencies do not statistically affect governors' decisions to issue SAHOs (coeff = -0.000, se = 0.008, $p = 0.983$). This suggests that governors do not take into account their states' civil society regarding sacrifice for others in these decisions. This finding is consistent with the finding for Hypothesis 2 that the electorates' partisan preferences are inconsequential, and together these results may suggest that governors' decisions are not widely influenced by the broader views of the citizens in their states in urgent health circumstances.

On the other hand, the strength of the economy does exert an influence, but the effect is unexpected. Counter to Hypothesis 4, as a state's unemployment rate increases – i.e., the economy is weaker -- the probability that the governor issues a SAHO also increases (coeff = 0.352, se = 0.125, $p = 0.005$). Each 1-percentage-point increase in unemployment increases the probability of a SAHO by 1.6 percentage points on any given day ($dy/dx = 0.016$, se = 0.006, $p = 0.005$). The predicted probability of a SAHO ranges from 0.014 (se = 0.004, $p = 0.001$) when unemployment is at its minimum of 2.4 percent to 0.102 (se = 0.039, $p = 0.008$) when it is at its maximum value of 6.1 percent. One interpretation of the unexpected direction of the effect is that instead of governors with strong economies feeling they have more latitude in terms of the economy, it may be that they fear derailing their economy and hampering their re-election efforts. Overall, this result identifies a significant role for the state of the economy in a governor's decision, though the effect is contrary to expectations.

Turning now to the scientific factors, the results do not support Hypothesis 5. Population vulnerability in the form of the percentage of urban residents does not exert a statistically detectable effect (coeff = -0.118, se = 0.630, $p = 0.852$). On the other hand, both measures related to “flattening the curve,” healthcare capacity and evidence of spread of the disease, do have an effect. The probability of a SAHO increases as the number of medical doctors per 100,000 residents increases (coeff = 0.005, se = 0.002, $p = 0.028$), but this effect is counter to Hypothesis 6. Each additional doctor increases the probability of a SAHO by a trivial but statistically significant amount ($dy/dx = 0.0002$, se = 0.0001, $p = 0.026$). The predicted probability of a SAHO ranges from 0.014 (se = 0.005, $p = 0.003$) when the number of doctors is at its minimum to 0.117 (se = 0.063, $p = 0.063$) when it is at its maximum. One interpretation is that the presence of more doctors in a state does not make a governor more comfortable that her or his state's healthcare system has the capacity to adequately assist patients in the absence of a

SAHO, but that more doctors indicates the state is more concerned with ensuring good public health and, therefore, is willing to take significant steps to protect it. Regardless of the explanation, this result identifies a significant role for healthcare capacity in a governor's decision, but not the expected one.

The results are as expected regarding spread of the disease. Consistent with Hypothesis 7, as the cumulative number of coronavirus-related deaths increases so does the probability a governor will issue a SAHO (coeff = 0.095, se = 0.037, $p = 0.010$). Every 10 additional deaths increase the probability a governor will issue a SAHO by four-tenths of one percentage point ($dy/dx = 0.004$, se = 0.002, $p = 0.008$). The predicted probability of a SAHO ranges from 0.022 (se = 0.004, $p < 0.001$) when the number of deaths is 0 to 0.200 (se = 0.118, $p = 0.090$) when it is at its maximum value of 16.4 (i.e., 164 deaths). This result supports Hypothesis 7. It suggests that effects related to flattening the curve in terms of increasing deaths affects governors' decision to issue a SAHO.

Hypothesis 8 proposes effects from external factors, in this case geographic diffusion. The results offer marginal statistical support for this factor (coeff = 0.655, se = 0.345, $p = 0.057$) and limited support for Hypothesis 8.

Finally, the results are mixed for the control variables. Although media coverage may play a marginal role (coeff = -0.001, se = 0.000, $p = 0.091$), adjustments for trend play a clear role (coeff = -0.590, se = 0.122, $p < 0.001$).

Overall, these analyses present clear statistical evidence that the partisanship of the governor, health of the economy, and factors related to flattening the curve influence governors' decisions to issue a SAHO. They also provide marginal statistical evidence that the decisions of governors in neighboring states influence a governor in her or his decision. On the other hand, there is no statistically detectable effect for political factors related to partisan composition of the electorate, social factors related to broader attitudes related to civil society and social collectivism, or scientific factors related to population vulnerability in the form of percent urban population. While the statistical findings do not align with all the hypotheses – i.e., the effects are opposite for Hypothesis 3 regarding economic factors in the form of unemployment and Hypothesis 6 regarding healthcare capacity in the form of number of medical doctors – this research is designed to identify factors affecting governors' decisions to issue SAHOs as well as to explain them.

Additional Analyses and Robustness Checks

The findings from Model 1 suggest there are several important factors in governors' decisions to issue a SAHO. The next analyses are designed to assess the robustness of those findings. Table 3 also presents the multivariate results for these analyses in terms of probit coefficients. All the models are statistically significant. Starting, again, with political factors, in a democracy the policy preferences of voters should matter to re-election seeking politicians. The results from Model 1 suggest the partisanship of the governor affects her or his decision to issue a SAHO (Hypothesis 1) but not the partisanship of states' voters (Hypothesis 2). Democratic governors may feel additional pressure to issue a SAHO when they have a Democratic-leaning electorate, while Republican governors may feel additional pressure not to issue a SAHO when they have a Republican-leaning electorate. To test this interactive effect, a new variable was created and scored 1 in states with a Republican governor and Republican-leaning electorate (i.e., 2016 Democratic vote share less than 50%; $N = 759$), 2 in states with a Republican governor and Democratic-leaning electorate (i.e., 2016 Democratic vote share greater than or equal to 50%; $N = 106$), 3 in states with a Democratic governor and Republican-leaning electorate ($N = 218$), and 4 in states with a Democratic governor and Democratic-leaning electorate ($N = 400$). This variable was transformed into a series of three indicator variables and entered in the model such that the comparison group was states with a Republican governor and Republican-leaning electorate. The expectation is that Democratic governors in states with Democratic-leaning electorates will be more likely to issue a SAHO than Democratic governors in states with Republican-leaning electorates, and, conversely, Republican governors in states with Republican-leaning electorates will be less likely to issue a SAHO than Republican governors in states with Democratic-leaning electorates.

The results of Model 2, which appear in Table 3, suggest that partisan composition of the electorate relative to the governor likely does not matter, contrary to Hypothesis 2. Democratic governors, regardless of electorate partisan composition, are more likely to issue SAHOs than Republican governors with Republican-leaning electorates. But additional analyses indicate, contrary to Hypothesis 1, they are not statistically more likely than Republican governors with Democratic-leaning electorates ($\text{chisq}(1) = 0.10, p = 0.753$; and $\text{chisq}(1) = 0.40, p = 0.526$). Further analyses indicate Democratic governors with Democratic-leaning electorates are not more likely to issue a SAHO than Democratic governors with Republican-leaning electorates

($\text{chisq}(1) = 0.11, p = 0.735$), and Republican governors with Republican-leaning electorates are not less likely to issue a SAHO than Republican governors with Democratic-leaning electorates ($\text{coeff} = 0.822, \text{se} = 0.504, p = 0.103$). In all, the partisan composition of the electorate is not meaningfully influencing the individual effect of the partisanship of the governor. That said, the difference between the estimates for Republican governors is very close statistically ($p = 0.103$). Further, the statistical tests reported above indicate there are no detectable differences between the Democratic governors and Republican governors with Democratic-leaning electorates. Moreover, the predicted probabilities for each governor-electorate partisan configuration depicted in Figure 2 suggest that Republican governors with Democratic-leaning electorates look more like Democratic governors than their fellow Republican governors with Republican-leaning electorates, so there is some suggestion that there may be an interactive effect at least for Republican governors.

Figure 2. Predicted Probabilities of Stay-at-Home Order by Governor-Electorate Partisan Configuration (95% Confidence Intervals)

Note: Rg-Re = Rep Gov/Rep Electorate; Rg-De = Rep Gov/Dem Electorate; Dg-Re = Dem Gov/Rep Electorate; Dg-De = Dem Gov/Dem Electorate

The results from Models 1 and 2 suggest the partisan composition of the electorate does not affect governors' decisions to issue a SAHO (Hypothesis 2), but research suggests the partisan composition of the legislature may. Although executive orders are unilateral actions that do not require action by the legislative branch, there is evidence that the partisan alignment of the legislative branch with the executive branch (i.e., unified or divided government) affects policy adoption, including the issuance of executive orders (e.g., Fine and Warber, 2012). For example, presidents are more likely for strategic reasons to issue executive orders when they face obstacles to achieving their policy preferences from a divided government, in which their party does not fully control the legislature or an opposing party fully controls the legislature (e.g., Mayer and Price, 2002). Following this literature, the expectation is that a governor will be more likely to issue a SAHO when confronted with a divided government.

To test this effect, a new variable was created and coded 1 in states where the governor's party does not fully control the legislature (i.e., a divided government) and 0 when the governor's party does. The measure is weakly positively correlated with both the measure indicating governor partisanship (Spearman = 0.318, $p < 0.001$) and the measure indicating Democratic vote share (Spearman = 0.180, $p < 0.001$). The results of Model 2A suggest that divided government has no statistically discernible effect on the probability a governor will issue a SAHO (coeff = 0.236, se = 0.216, $p = 0.276$). Further, the relationships of the other variables are not consequentially changed by adding this measure to the model. One explanation for this lack of effect is that concerns with addressing a widespread public health crisis may take precedence over governors' strategic partisan interests. This may speak to Hypothesis 1 regarding partisan differences between governors. Democratic governors may not be acting out of party competition when they issue a SAHO, it may be that they are motivated by their political ideology to conclude that the best way to address COVID-19 is as a public health issue and not a partisan issue.

The results from Model 1 suggest social factors related to collectivist tendencies in civil society are not related to governors' decisions to issue a SAHO (Hypothesis 3). Rice and Sumberg's (1997) measure of civic mindedness offers an alternative indicator of social factors. This measure is designed to capture levels of cooperation; civic engagement; political equality; and solidarity, trust, and tolerance. This continuous measure is coded -1.5 to 1.5 with higher scores indicating greater civic mindedness. In particular, voters in states with higher levels of

equality, solidarity, and cooperation may be more accepting of SAHOs so, therefore, governors in such states may be more likely to issue a SAHO. The measure is moderately negatively correlated with the measure of *socINDCOL* ($r = -0.653, p < 0.001$). The results from Model 3 suggest, again, that social factors do not meaningfully contribute to a governor's decision to issue a SAHO (coeff = 0.098, se = 0.155, $p = 0.525$). Further, the relationships of the other variables are not consequentially changed by replacing the individualism-collectivism measure with this measure. Overall, the results from Models 1 and 3 fail to support Hypothesis 3 and suggest that the social factors assessed here do not play a role in governors' decisions to issue SAHOs.

The results from Model 1 indicate economic factors related to unemployment affect governors' decisions to issue a SAHO (Hypothesis 4). In particular, the results unexpectedly suggest that the probability a governor will issue a SAHO increases as a state's unemployment rate increases (i.e., economic health decreases). Because this effect is opposite of what was expected, it is particularly important to confirm. Model 4 replaces the unemployment rate with the Standard & Poor's Rating for each state (S&P Global Market Intelligence, 2020). This rating is an estimate of the ability of a state to repay its debt obligations or avoid default based on the opinions of Standard & Poor's credit analysts. It looks beyond unemployment to incorporate other factors such as budget stabilization, reserve funds, and diversification of the economy. The range for ratings is AAA (high confidence of repayment) to BBB- (adequate confidence of repayment). Because these ratings are ranked based on letter grades and not numerically coded, for ease of estimation it is transformed into a continuous scale ranging from 0 to 7, with BBB-, the lowest state rating, coded 0 and AAA, the highest state rating, coded 7. With this coding, this measure is weakly negatively correlated with *econUNEMP* ($r = -0.338, p < 0.001$). The results in Model 4 confirm the previous results: as states' economies strengthen, their governors are less likely to issue a SAHO (coeff = -0.113, se = 0.055, $p = 0.039$). In terms of substantive effect, on any given day the probability of a SAHO decreases by half a percentage point ($dy/dx = -0.005$, se = 0.003, $p = 0.042$) for every one-level increase in rating. The predicted probability of a SAHO ranges from 0.071 (se = 0.029, $p = 0.014$) at the minimum rating down to 0.021 (se = 0.004, $p < 0.001$) at its maximum rating. Further, the relationships of the other variables are not consequentially changed by replacing the unemployment measure with this measure, and the results do not meaningfully change when the ratings are specified as a series of indicator

variables. These results confirm the findings in Model 1: governors in states with stronger economies are less likely to issue a SAHO.

The results from Model 1 suggest scientific factors related to population vulnerability in terms of a state's level of urbanization are not related to governors' decisions to issue a SAHO (Hypothesis 5). Population density per square mile as reported by the U.S. Census Bureau provides a more broad-based measure of close physical proximity of individuals to each other in a state. It and percent urban population are moderately positively correlated ($r = 0.506$, $p < 0.001$), which suggests they are somewhat different measures. Despite the difference, in an additional analysis not detailed here, population density is not statistically significant in the model when replacing urban population (coeff = -0.000, se = 0.001, $p = 0.582$). Overall, physical closeness does not appear to influence the issuance of a SAHO.

There are other reasonable measures of population vulnerability, though. Early epidemiological evidence suggested that the coronavirus was particularly dangerous to older individuals (e.g., Bialek et al., 2020). As such, governors may be more likely to issue a SAHO when they have a larger senior population. The percentage of the state's population 65 years old and older offers another indicator of population vulnerability. This measure, which is reported by the U.S. Census Bureau, ranges from a low of 11.1 percent in Utah to a high of 20.6 percent in Maine with a mean of 16.5 percent (sd = 1.9). This measure and percent urban population are weakly negatively correlated ($r = -0.323$, $p < 0.001$), which suggests they measure different dimensions of population vulnerability. The results from Model 5 suggest, again, that population vulnerability does not meaningfully contribute to a governor's decision to issue a SAHO (coeff = 0.027, se = 0.053, $p = 0.614$). Further, the relationships of the other variables are not consequentially changed by replacing the urbanization measure with this measure. Overall, the results from Models 1 and 5 fail to support Hypothesis 5 and suggest that population vulnerability does not play a role in governors' decisions to issue SAHOs.

The specifications of Models 1 and 5 test whether governors may be sensitive to vulnerability of very specific populations: urban dwellers and seniors. It may be instead that governors are sensitive when their states' residents in general are more vulnerable to disease. Model 5A replaces the measures of specific populations with a broad-based measure of each state's health, *vulHealth*. This measure is part of the 2019 American Health Rankings, an annual state-by-state index of 35 metrics of health determinants such as smoking rates and infant

mortality and is used by state public health departments (Erwin et al., 2011). This is a continuous measure ranging from a low (unhealthy) score of -1.005 for Mississippi to a high (healthy) score of 0.850 for Vermont. It is weakly positively correlated with percent urban population ($r = 0.313$, $p < 0.001$) and trivially negatively correlated with percent population over age 64 ($r = -0.059$, $p = 0.024$), both of which suggest these are measuring different dimensions of population vulnerability. Per Hypothesis 5, the expectation is that the probability a governor will issue a SAHO increases as *vulHealth* decreases. The results from Model 5A suggest, again, that population vulnerability does not meaningfully contribute to a governor's decision to issue a SAHO (coeff = 0.073, se = 0.285, $p = 0.798$). Further, the relationships of the other variables are not consequentially changed by replacing the other measures of population vulnerability with this one. Overall, the results from Models 1, 5, 5A, and another alternative model fail to support Hypothesis 5 and suggest that population vulnerability does not play a role in governors' decisions to issue SAHOs.

The results from Model 1 suggest considerations related to flattening the curve and healthcare capacity in terms of the number of medical doctors in a state affects governors' decisions to issue a SAHO (Hypothesis 6). In particular, the results unexpectedly suggest that the probability a governor will issue a SAHO increases as the number of medical doctors increases. Because this effect is opposite of what was expected, it is important to confirm. Model 6 replaces the number of doctors per 100,000 residents with the number of hospital beds per 1000 residents. These data, which range from 1.6 to 4.8 beds per thousand residents, are provided by State Health Facts. This measure is weakly negatively correlated with the measure of number of medical doctors ($r = -0.351$, $p < 0.001$). The results from Model 6 do not confirm the results in Model 1. The number of available hospital beds does not meaningfully contribute to a governor's decision to issue a SAHO (coeff = -0.185, se = 0.205, $p = 0.366$). In this case the relationships of the other variables are marginally changed by replacing the doctors measure with this measure (e.g., cumulative deaths and percent Democratic vote become marginally statistically significant), but overall the changes are not substantively consequential. In an additional analysis not detailed here, the number of intensive care unit beds per 10,000 population as reported by State Health Facts does not affect it either (coeff = 0.036, se = 0.196, $p = 0.853$). This measure is weakly positively correlated with the measure of number of hospital beds as just reported ($r = 0.328$, $p < 0.001$). Together, the results from Models 1, 6, and another alternative model provide

mixed evidence that flattening the curve and healthcare capacity play a role in governors' decisions to issue SAHOs.

The results from Model 1 suggest scientific factors related to spread of the disease in the form of confirmed deaths affect governors' decisions to issue a SAHO (Hypothesis 7). Along with the number of coronavirus deaths, the number of confirmed coronavirus cases in each state has been widely reported by the media. Considerations of mortality are particularly salient to humans (e.g., Soloman, Greenberg, and Pyszczynski, 1991), so it may be considerations of deaths and not simply evidence of the spread of the disease that affects governors' decisions regarding a SAHO. In Model 7, a measure of cumulative confirmed cases replaces cumulative confirmed deaths as a predictor of the issuance of a gubernatorial SAHO. This variable, *cumCASES*, is recoded into groups of 10, ranging from 0 (no cases) to 1035.6 (10,356 cases). The count starts on February 29, and the observations are lagged one day such that cumulative cases from a state-day are used to predict the probability of a SAHO on the following state-day. To ensure consistency in counts, daily cumulative cases were collected from the *Washington Post* as reported by the World Health Organization, U.S. Centers for Disease Control and Prevention, and Johns Hopkins University (Fox, Mayes, Schaul, and Shapiro, 2020). This measure is strongly positively correlated with the measure of cumulative deaths ($r = 0.774, p < 0.001$).

The results in Model 7 support Hypothesis 7 and confirm the previous results: as evidence increases that the disease is spreading as indicated by cumulative cases governors are more likely to issue a SAHO (coeff = 0.002, se = 0.001, $p = 0.001$). While the results from Model 1 indicate that every 10 deaths increase the probability a governor will issue a SAHO by three-tenths of one percentage point on any given day, these results suggest that every 10 cases increase the probability of a SAHO by one one-hundredth of one percentage point ($dy/dx = 0.0001$, se = 0.0000, $p = 0.001$) on any given day. Further, the relationships of the other variables are not consequentially changed by replacing the death measure with this measure. While these results indicate that cumulative cases play a much smaller role than cumulative deaths, which is not surprising considering the suggested undercounting of cases due to lack of testing (Weinberger et al., 2020) and salience of death in human considerations (Solomon, Greenberg, and Pyszczynski, 1991), they confirm the results of Model 1 that the widespread presence of the disease increases the probability that a governor will issue a SAHO.

Finally, Hypothesis 8 suggests and the results in Model 1 marginally support the assertion that coronavirus-related SAHOs are influenced by geographic diffusion. That is, the probability that a SAHO will be issued increases when governors in geographically proximate states have already issued a SAHO. To confirm this finding, Model 8 replaces the proportion of a state's next-door neighbors that have a SAHO with the proportion of states in the same region of the U.S. Department of Commerce's Bureau of Economic Analysis (BEA) with a SAHO, *diffBEA*. The BEA groups states into eight regions based on their social and economic homogeneity. The results do not confirm the results in Model 1. While SAHOs may diffuse among states with shared borders, they do not diffuse through BEA regions (coeff = 0.392, se = 0.379, $p = 0.300$). It may be that the close intermingling of the populations of states with shared borders increases governors' concerns more than simply a number of shared characteristics in a geographic region. Further, the relationships of the other variables are not consequentially changed by replacing the immediate geographic proximity measure with this measure. Together, the results from Models 1 and 8 provide mixed evidence that geographic diffusion plays a role in governors' decisions to issue SAHOs.

At least one other model of external diffusion makes sense in this context. Ideological diffusion suggests policymakers imitate policymakers of the same ideological persuasion in other states (Grossback, Nicholson-Crotty, and Peterson, 2004). There is evidence that the role of ideological diffusion has been growing over time, while the role of geographic diffusion has been declining (Mallinson, 2020). Although ideology and partisanship are not the same (Lewis-Beck, Jacoby, Norpoth, and Weisberg, 2008), this suggests that Democratic governors will imitate other Democratic governors, and Republican governors will imitate other Republican governors. To test this, in another model not detailed here, a measure of partisan diffusion replaces the measure of geographic diffusion. Partisan diffusion is the proportion of co-partisan governors who have previously issued a stay-at-home order. As an example, when the Democratic governor of Connecticut issued a SAHO on March 23, 17 percent of Democratic governors had previously issued a SAHO, so Connecticut was assigned a value of 0.17 on that date. The denominator ranges from 0, when no governors had issued a SAHO, to 1, when all the Democratic governors had issued a SAHO, and to 0.69 for the remaining Republican governors who had not issued one. The results do not support this expectation (coeff = 0.720, se = 0.495, $p = 0.146$). Further, the relationships of the other variables are not consequentially changed by

replacing the immediate geographic proximity measure with this measure. This suggests that while there is evidence from Hypothesis 1 that gubernatorial partisanship plays a role, this result confirms the evidence from Hypothesis 2 that there are limits to the effect of this political factor.

It is worth mentioning the control variable for news coverage. In Model 1 and all the alternative models its coefficient is negatively signed and often approaches at least marginal levels of statistical significance. This suggests that public attention to the pandemic may be associated with a governor's decision to issue a coronavirus-related SAHO. To investigate this potential effect, Model 9 replaces the cumulative media stories measure with a more direct measure of public interest in coronavirus in the form of internet searches. The Google Trends tool can report the results of Google searches for specific terms during a specific timeframe in specific geographic locations. This tool was used to determine relative public interest in each state regarding the coronavirus public health crisis. A query was conducted for each state for Google searches between January 1 and April 10, 2020, on: coronavirus OR covid-19 OR covid19 OR pandemic. The January 1 start date was used to ensure that each state had a 0 baseline before the virus gained widespread public attention. The scores reported range from 0, when the relative number of specified searches was at its minimum for a state during the time period, to 100, when the relative number of specified searches reached its maximum during the time period. In other words, a score of 100 for a day indicates peak interest in terms of Google searches in the topic in that state between January 1 and April 10. It is important to remember this is a relative ranking within each state and not a count of searches. For instance, a score of 100 for a date in one state may result from many fewer actual searches than a score of 50 in another state. For this analysis, a 7-day moving average of scores was calculated for each state-day and then lagged one day for inclusion in the model.

The results indicate that as relative public interest in a state increases so does the probability that a governor will issue a SAHO (coeff = 0.021, se = 0.007, $p = 0.002$). In substantive terms, each 1-point increase in relative interest increases the probability that a governor will issue a SAHO by one-tenth of one percentage point (coeff = 0.001, se = 0.000, $p = 0.004$) on any given day. The predicted probability of a SAHO on any given day is 0.003 (se = 0.002, $p = 0.200$) at the measure's minimum level of relative interest and 0.060 (se = 0.015, $p < 0.001$) at its maximum value. While the results of Hypothesis 2 regarding the partisanship of the electorate and Hypothesis 3 regarding state attitudes related to civil society and collectivism do

not play a consequential role in governors' decisions to issue a SAHO, this result suggests that governors are responsive to residents' interest in this important issue, as one would hope in a democracy.

CONCLUSION

Public health experts widely advocate for aggressive social distancing efforts, like government-issued stay-at-home orders, to slow the spread of COVID-19. The vast majority of U.S. governors issued such orders, but they did it at different times, and eight of the 50 did not issue one at all (Mervosh, Lu, and Swales, 2020). This study is intended to identify political, social, economic, and scientific factors that influence governors of U.S. states to issue stay-at-home orders to slow the spread of COVID-19. While these orders protect public health, they also impose substantial social (e.g., Pew Research Center, 2020) and economic (e.g., Leonhardt, 2020) costs on their states' residents. The findings indicate that scientific factors alone did not inform governors' decisions. The results unambiguously indicate that political factors related to the partisanship of the governor (Democratic governors were more likely to issue a SAHO), economic factors related to the health of the economy (governors of states with stronger economies were less likely to issue a SAHO), and scientific factors related to evidence of the spread of the disease (governors of states with more COVID-19 deaths and cases were more likely to issue a SAHO) contributed to the issuance of stay-at-home orders. The results also provide mixed support for scientific factors related to state healthcare capacity and external factors related to geographic diffusion.

Table 4 presents a summary of the findings. Of the eight expected effects identified in the literature and specified in the hypotheses (Column A), four of the relationships are statistically significant at conventional levels and one at marginal levels (Column B). In two cases, though, the effects were in the opposite direction expected. The results uniformly support only two of the hypothesized relationships (Hypotheses 1 and 7; Column G). Overall, it is reasonable to conclude that the analyses identify a number of important factors that influence governors' decisions to issue SAHOs during a time of public health crisis.

Table 4. Summary of predictors of gubernatorial stay-at-home orders.

Hypo-thesis	Factor	Variable	(A) Exp. sign	(B) Model 1 <i>p</i> -value	(C) Hypotheses supported (Model 1)	(D) Alt. models	(E) Alt. models <i>p</i> -value	(F) Hypotheses supported (alt models)	(G) Both models support hypothesis
H1	Political	<i>demGOV</i>	+	0.006	Yes	2	‡	Yes‡	✓
H2	Political	<i>demVOTE</i>	+	NS	No	2	‡	No‡	
H3	Social	<i>socINDCOL</i>	+	NS	No	3	NS	No	
H4	Economic	<i>econUNEMP</i>	-	0.005 [†]	No	4	0.039	No	
H5	Scientific	<i>vulURBAN</i>	+	NS	No	5/5A	NS/NS	No	
H6	Scientific	<i>CapDOCTOR</i>	-	0.028 [†]	No	6	NS	No	
H7	Scientific	<i>cumDEATH</i>	+	0.010	Yes	7	0.049	Yes	✓
H8	Proximity	<i>diffGEO</i>	+	0.057	Yes	8	NS	No	
-	Control	<i>ct/NEWS</i>	±	0.091		9	0.002		
-	Control	<i>ct/TREND</i>		0.000					

All variables defined in Table 1.

[†] Statistically significant but the opposite sign from what was hypothesized.

[‡] See text for detailed explanations.

NS = not significant, Exp. Sign = Expected Sign, and Alt. = Alternative.

It is worth noting several limitations of this study. This is one examination of one rare but urgent event that happened over a very short period of time. One should generalize with great caution, if at all. These results reflect the analysis of publicly available quantitative data; they do not and cannot indicate the effects of non-public data to which governors have access or governors' private motivations or fears. These details most likely will be uncovered as the coronavirus threat plays out over time and qualitative research is undertaken. There is no guarantee of governors' intentions to enforce their SAHOs (e.g., Norwood, 2020). Given the sensitivities of curtailing people's liberties in the U.S., it is not certain that governors could comfortably forecast how their residents would react to these mandates. Finally, the study does not consider the effects of local policies, which may serve as an impetus to state action (Quinton, 2017). This leaves open an important question about what local policies may compel versus retard state action.

Research like this is important. In the case of coronavirus disease 2019, more than 90 percent of the country was affected by SAHOs (Norwood, 2020). This study offers to individuals, communities, organizations, and policymakers information pertinent to forecasting far-reaching government responses to large-scale healthcare crises in the future. For instance, the

Director of the U.S. National Institute of Allergy and Infectious Diseases has warned that a second wave of COVID-19 is inevitable (Moreno, 2020). If this prediction is correct, then results from this study indicate that individuals, businesses, and organizations should be prepared to be “locked down” again, particularly when they live and operate in a state with a Democratic governor, weak economy, or widespread deaths and cases related to coronavirus.

Policy makers and researchers are still very early in their investigation of the effects of coronavirus and government interventions. Understanding will take time, but the severity of the crisis demands urgent action. Science is incremental but progress requires a beginning. This study has hopefully contributed in some way to the beginning. More importantly, it gives a sense of how political leaders balance public health against other considerations.

Appendix 1. Stay-at-home orders by state.

Date	Count	States
19-Mar	1	California
21-Mar	2	Illinois, New Jersey
22-Mar	1	New York
23-Mar	5	Connecticut, Louisiana, Ohio, Oregon, Washington
24-Mar	6	Delaware, Indiana, Massachusetts, Michigan, New Mexico, West Virginia
25-Mar	4	Hawaii, Idaho, Vermont, Wisconsin
26-Mar	2	Colorado, Kentucky
27-Mar	2	Minnesota, New Hampshire
28-Mar	3	Alaska, Montana, Rhode Island
30-Mar	4	Kansas, Maryland, North Carolina, Virginia
31-Mar	2	Arizona, Tennessee
1-Apr	2	Nevada, Pennsylvania
2-Apr	2	Maine, Texas
3-Apr	3	Florida, Georgia, Mississippi
4-Apr	1	Alabama
6-Apr	1	Missouri
7-Apr	1	South Carolina
No order*	8	Arkansas, Iowa, Nebraska, North Dakota, Oklahoma, South Dakota, Utah, Wyoming

*As of April 10, 2020.

Appendix 2. Daily hazard rates for states declaring a stay-at-home order.

Date	Declarations ^a	Risk set ^b	Hazard rate ^c
03/18/20	0	50	0%
03/19/20	1	50	2%
03/20/20	0	49	0%
03/21/20	2	49	4%
03/22/20	1	47	2%
03/23/20	5	46	11%
03/24/20	6	41	15%
03/25/20	4	35	11%
03/26/20	2	31	6%
03/27/20	2	29	7%
03/28/20	3	27	11%
03/29/20	0	24	0%
03/30/20	4	24	17%
03/31/20	2	20	10%
04/01/20	2	18	11%
04/02/20	2	16	13%
04/03/20	3	14	21%
04/04/20	1	11	9%
04/05/20	0	10	0%
04/06/20	1	10	10%
04/07/20	1	9	11%

^a Declarations = number of state declarations of a stay-at-home order (SAHO).

^b Risk Set = total number of states not previously having passed a SAHO.

^c Hazard Rate = Declarations/Risk Set (Mooney and Lee, 1995).

ACKNOWLEDGMENTS

The authors thank colleagues Andrew Balas, Olivia Carr, Mike Dugan, Cathy Slade, Patrick Stewart, and Ray Tatalovich for their generous efforts and helpful suggestions to improve this manuscript.

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