Studia z Polityki Publicznej
ISSN: 2391-6389
ISSN: 2719-7131
aklimcz@sgh.waw.pl
Szkoła Główna Handlowa w Warszawie
Polonia

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Studia z Polityki Publicznej, vol. 9, núm. 1, 2022
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Disponible en: https://www.redalyc.org/articulo.oa?id=663772601007

Policy diffusion in federal systems during a state of emergency: diffusion of COVID- 19 statewide lockdown policies across the United States

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Redalyc: https://www.redalyc.org/articulo.oa?id=663772601007

Financiamiento
Fuente: The authors would like to thank the Center for Fighting Pandemics and the Center for the Study of the United States in Partnership with the Fulbright Program at Tel Aviv University for the support during the work on this article. Beneficiario: Sharon Elhadad, Udi Sommer

Abstract: This paper develops a unified model of policy diffusion to analyze the speed of adoption of statewide lockdown policies within a federal system during the COVID-19 pandemic. The modified unified model was built to improve our understanding of policy diffusion in contexts where existing models fall short. The authors highlight three main policy diffusion channels: regional, vertical, and internal. The paper shows the empirical test of the model across US states and finds that vertical effects, such as higher approval ratings for President Donald Trump, as well as a comparatively high proportion of COVID-19 federal funding support, bear a strong positive association with the speed of statewide lockdown adoption policies. In addition, certain internal effects are also important – higher governor approval ratings are positively associated with the speed of statewide lockdown adoption policies, as are state and local spending, democratic state governments, and population awareness of the virus. However, other internal factors, such as the stringency of statewide lockdown policies and the relative proportion of COVID-19 deaths in a state, were minimally associated with the speed of lockdown policy adoption. Surprisingly, unlike past studies, horizontal regional effects did not play a significant role in the presented analysis – the speed of adoption of lockdown policies by neighboring states bears no association with the speed of policy adoption of statewide lockdowns. Overall, the results suggest a strong influence of political factors on the speed of statewide lockdown adoption policies in the US.

Keywords: COVID-19, policy diffusion, policy styles, crisis management, United States.

Streszczenie: Niniejszy artykuł przedstawia ujednolicony model dyfuzji polityki publicznej w celu analizy szybkości przyjmowania stanowych polityk lockdownu w systemie federalnym podczas pandemii COVID-19. Został tu zbudowany zmodyfikowany ujednolicony model w celu lepszego zrozumienia dyfuzji polityki publicznej w kontekstach, w których istniejące modele nie spełniają oczekiwań. Wyróżniono trzy główne kanały dyfuzji polityki publicznej: regionalny, wertykalny i wewnętrzny. Artykuł zawiera empiryczny test modelu na przykładzie Stanów Zjednoczonych i stwierdza, że efekty wertykalne, takie jak wyższe oceny poparcia dla prezydenta Donalda Trumpa, a także stosunkowo wysoki udział federalnego wsparcia finansowego na walkę z COVID-19, mają silny pozytywny związek z szybkością przyjmowania lockdownu. Ponadto ważne są również pewne efekty wewnętrzne – wyższe oceny akceptacji gubernatorów są pozytywnie powiązane z szybkością polityki przyjmowania lockdownu w całym stanie, podobnie jak wydatki stanowe i lokalne, demokratyczne rządy i świadomość ludności na temat wirusa. Jednak inne czynniki wewnętrzne, takie jak rygorystyczne stanowe polityki lockdownu i względny odsetek zgonów z powodu COVID-19 na poziomie stanowym, były minimalnie związane z szybkością przyjmowania polityki lockdownów. Co zaskakujące, w przeciwieństwie do wcześniejszych badań, horyzontalne efekty regionalne nie odegrały znaczącej roli w analizie – szybkość przyjmowania polityki lockdownu przez sąsiednie państwa nie ma

związku z tempem przyjmowania lockdownu w całym kraju. Ogólnie rzecz biorąc, wyniki sugerują silny wpływ czynników politycznych na szybkość wdrażania polityki lockdownu w Stanach Zjednoczonych na poziomie stanowym.

Słowa kluczowe: COVID-19, dyfuzja polityki publicznej, style polityki publicznej, zarządzanie kryzysowe, Stany Zjednoczone.

After first emerging in December 2019, the COVID-19 pandemic ravaged the world in 2020 and 2021, to the dismay of governments and people around the world. The problems the world faced were compounded by a subpar understanding of potential solutions to the risk the virus posed (Capano et al., 2020; Barak et al., 2021). As the novel coronavirus raged across borders, national and state governments acted based on limited knowledge and imposed lockdowns and other emergency measures to curb the spread. Billions of people around the world were forced to stay home and tens of millions were left without jobs, as healthcare systems worldwide were stretched thin. The pandemic unfolded quickly, leading to a range of complex social outcomes. Accordingly, there are multiple policy areas of COVID-19 that call for further analyses, including, for instance, the effect of partisanship on policies, societal compliance with pandemic restrictions, and how public leaders reacted to the pandemic (Weible et al., 2020).

In the United States, the spread of COVID-19 faced officials across the states with policy decisions they had had little to no experience as they fought against the most significant pandemic in memory. Soon after the virus started spreading worldwide, the US became an epicenter for the pandemic (Sommer and Rappel-Kroyzer, 2021a, 2021b). Ultimately, up to 42 US states adopted some form of statewide lockdown, requiring people to stay at home due to the general perceived risk of the virus and the fear of hospital systems being overrun. The first state to adopt a statewide lockdown was California on March 19, 2020, followed by Illinois and New York shortly thereafter. Of the states that adopted statewide lockdown policies, the last to do so were Missouri and South Carolina (on April 6, 2020). In total, five states (Arkansas, Iowa, Nebraska, North Dakota, and South Dakota) did not impose statewide lockdown orders in response to the first wave of the virus. In Oklahoma, Utah, and Wyoming no statewide lockdown orders were implemented but some form of lockdown mandates were imposed by different municipal jurisdictions within these states (Mervosh, Swales, 2020).

From a policy perspective, a key concern relates to the varying responses of national and state-level governments in combating the effects of the pandemic. Some US states did not adopt lockdown policies but did proclaim a state of emergency. Delving into the reasons behind the variance in policy adoption and the extent to which pandemic responses can help inform governments' reactions to future challenges is an issue of considerable importance in the realm of policy studies (Hart et al., 2001).

Importantly, pandemics of novel diseases are different from other crises, like natural disasters or the spread of better-known diseases, where the causes, challenges, and appropriate policy solutions are more easily discernible. Determining the appropriate course of action is especially difficult in global pandemics (Capano et al., 2020).

Of note, swift policy reaction may be critical to the success of a country's efforts in minimizing the burden on its healthcare system. Such a line of thinking motivated many of the world's most stringent lockdowns including with more recent variants such as Omicron. By helping uncover some of the factors that affect the speed of adoption of policies enacted under a state of emergency (SOE), such as statewide lockdowns (one of the toughest policies possible), we can shed light on key scholarly debates surrounding policy diffusion as well as help policy advisors understand how both internal and external political and governmental elements play a crucial role in controlling unexpected crises.

We introduce a theoretical framework that examines the speed of policy adoption by state governments under a health crisis SOE (COVID-19) within a federal system (the US) using a modified unified model of policy diffusion that accounts for vertical effects in addition to regional and internal factors. We comprehensively capture several of the different factors that potentially impinge on state governments' policy responses to a rapidly evolving health crisis such as a pandemic.

Extant policy diffusion literature on SOEs falls short in two major ways. Firstly, it is geared more towards analyzing the spread of policies rather than analyzing the speed of policy adoption. This is particularly true for federal systems such as the US, Brazil, and Germany (Mallinson, 2016), where federal (or so-called 'vertical') effects play a role. Furthermore, when analyzing policies that, by their nature, are limited in time, such as those enacted under a SOE, speed of adoption is a dominant factor as it contributes to the overall level of success states have with respect to how they handle a pandemic. Secondly, prior studies examining policy diffusion under a SOE have not leveraged the framework of a "unified model" of policy diffusion (i.e., one which accounts for both regional and internal effects), nor have they accounted for vertical determinants in explaining the speed of policy diffusion (i.e., effects originating at the federal level). This can hamper the overall explanatory power of these models. Moreover, policy diffusion studies accounting for internal effects, such as political ideology at the state level, have produced mixed results (Savage, 1985; Grossback et al., 2004) and call for further investigation.

The aim of our paper is to address these two shortfalls by examining as our case study statewide lockdown policies in the US during COVID-19. One might expect social distancing measures to have been quickly implemented across the fifty states, but mandating these measures is a difficult and complex decision for any political leader both at the federal and state levels (Adolph et al., 2021). Statewide lockdowns are particularly interesting from a political and policy standpoint as they raise

concerns regarding infringement on people's rights and their freedom of movement. Furthermore, the effectiveness of such measures is debated. Yet, other tools for fighting infectious diseases were either unavailable or ineffective due to the characteristics of this pathogen.

The critical importance of speed in policy adoption under a state of emergency

Imposing measures associated with a SOE are intended to improve the ability of the state to protect the lives of citizens under the extraordinary conditions created by a pandemic. Such measures enable government institutions to leverage exceptional powers, liberating governmental actors from legal restrictions. Further, SOEs are instituted at the international, national, and subnational levels of government (Lundgren et al., 2020).

In recent years, a series of lethal pathogens with pandemic potentials such as MERS-CoV and influenza H7N9 abruptly emerged on the world scene and rapidly spread across populations. Pandemics caused by these pathogens led nations globally to declare a SOE. During a global SOE, such as the one provoked by COVID-19, however, each country needs to decide on an appropriate national action plan based on the assessment of the viability of goals related to slowing the transmission of the virus and reducing its mortality while attempting to preserve healthy economic activity. So as to rapidly respond to evolving epidemiological realities, such action plans must be flexible (WHO, 2019).

Yet, in deciding how to respond to the COVID-19 pandemic, government decision-making was mired in uncertainty (Capano et al., 2020). In the United States, some governors were initially reluctant to impose stay-at-home mandates and supported other less intrusive restrictions. However, they often faced intense and concerted pressure to implement more stringent measures, with pressures emanating from multiple levels of government. Importantly, at the federal level, President Trump declared a SOE under Section 501(b) of the Stafford Act on March 13, 2020. Furthermore, on March 16, 2020, he announced a 15#day plan to 'slow the spread' of the virus.

According to the Centers for Disease Control and Prevention (CDC), globalization has notably raised the risk of cross-border pandemics as the ease of international travel and growth in densely populated regions set the stage for the relatively frictionless spread of deadly diseases across borders. This reality renders countries highly vulnerable to rapidly evolving lethal outbreaks. Further, the rapid adoption of appropriate socio-economic policies is critical to minimizing the strain on health systems and curbing the broader societal damage (CDC, 2020). Analyzing the speed of policy diffusion in response to a pandemic is thus of critical importance. Furthermore, understanding the speed of policy response is also important as we consider that today's governments are increasingly adopting a range of 'social' regulations to preserve lives by attempting to eliminate or significantly reduce risks (Levi-Faur, 2011).

Adoption of statewide lockdowns in the United States

The number of states adopting statewide lockdowns in the United States grew rapidly since President Trump's emergency declaration on March 16, 2020 (Figure 1). As soon as 10 days following the declaration, half of the total number of the states who would eventually adopt statewide lockdowns, already had lockdown orders in place (i.e., 21 of the 42 states).

Figure 1. Speed of adoption of statewide lockdowns during the COVID-19 pandemic

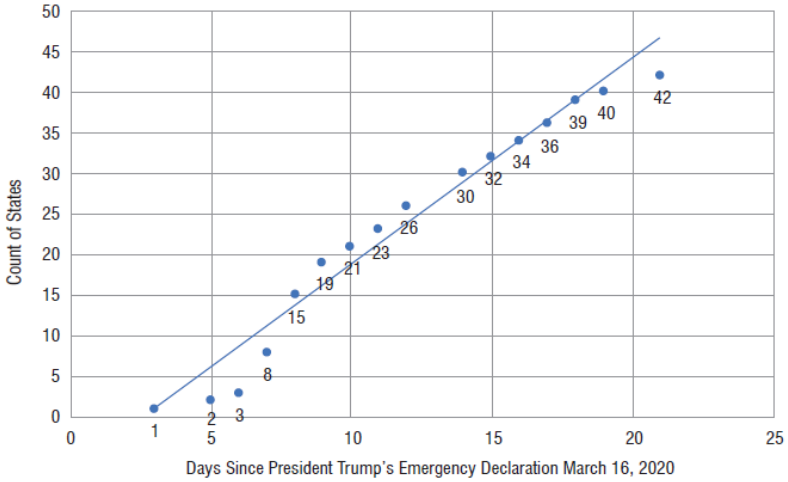

Figure 1
Source: own elaboration based on Mervosh and Swales (2020).

Importantly, US states made different choices in response to the same threat. Understanding why this happened is critically important in the context of policy studies; we explore this phenomenon by leveraging the theoretical frameworks of the policy diffusion literature. Although it may have been reasonable to expect social distancing measures and other restrictions to have been rapidly instituted across all states, mandating these coercive and restrictive policies is a challenging and complex matter for political leaders (Adolph et al., 2021), both at the federal and state levels.

Literature review

Unified models of policy diffusion

Research on policy diffusion typically starts with the debate on external versus internal determinant models. External determinant models refer to policy diffusion frameworks that focus on factors such as interstate learning, competition, and coercion. Internal determinant models refer to policy diffusion frameworks that emphasize internal state characteristics such as wealth and size. Due to the limitations of both external and internal models, scholars have attempted to combine the strengths of both frameworks into a single model. Early studies in the

field recognized that 'pure' models are unlikely to serve as complete explanations to policy adoption; both Walker (1969) and Gray (1973) found support for combining internal and external determinants. This friction between the two competing frameworks eventually led to the development of the unified model, first proposed by Berry and Berry (1990). This unified model of policy diffusion was the first to combine internal determinants with an external determinant model – the external determinant model they used was the 'regional diffusion model', which highlights the effects neighboring polities have on the adoption of policies. The unified model has since become the most used policy diffusion model and is considered to have superior explanatory power over either the internal or external determinant models (Eaton, 2013).

The unified model of policy diffusion under a state of emergency (COVID-19)

Beyond their obligations to respect, protect, and fulfill the right for healthcare (Lundgren et al., 2020), when handling pandemics or other emergencies such as natural disasters or political turmoil, states have a range of policy choices. Based on an assessment of costs and benefits as well as available resources, some states will be more likely to declare a SOE during a pandemic and to do so faster than others. The purpose of declaring a SOE (Lundgren et al., 2020) is to provide authorities with extraordinary powers and resources and to reduce legal constraints. Depending on the institutional structure, SOEs can be regulated at either the international, national, or subnational levels. For example in the US, a SOE may be regulated at the national (i.e., federal) or the subnational (i.e., state) level (Monaghan, 1993). These regulations are often adopted for a limited time only as human rights law protects individuals from sovereign powers in times of crisis. Declaring a SOE involves high costs; furthermore, if seen as an exaggerated policy response, it can lead to low overall public support and prove challenging to implement.

States' declaration of SOEs during COVID-19 was driven by both external and internal factors (Lundgren et al., 2020). States looked to their regional peers for inspiration and legitimation. Internal state characteristics had a measurable impact as well – for instance, younger and comparatively less robust democracies are more probable to declare a SOE relative to both mature democracies and dictatorships. Regarding external factors, states are influenced by each other through emulation and learning, which leads to policy diffusion as states gravitate towards similar solutions (Holzinger, Knill, 2005). Following this logic, states' decision making regarding the declaration of a SOE during COVID-19 was informed by the actions of other states, specifically neighboring ones.

In times of a global pandemic crisis, state-level governments retain sovereignty and substantial power over decisions affecting their constituents, including the power to quarantine "to provide for the health of the citizens" (Parmet, 1985). However, past studies of American federalism have noted that action by state governmental actors is

hobbled by party polarization and federal holdup actions (Bowling, Pickerill, 2013; Rose, Bowling, 2015). Furthermore, Mallinson (2020) examined how states' politics, their relations with other governments, and the nature of federalism help contextualize our understanding of governments' reactions to COVID-19. They found that both vertical and horizontal cooperation was vitally important; however, as they also note, the policy diffusion literature must more effectively link the micro and macro levels (state and federal) to arrive at a broader understanding of the causal pathways involved in policy adoption. Under a SOE such as a health crisis, this is doubly true.

Furthermore, during the COVID-19 pandemic in the US, Republican governors as well as states with a higher number of Trump supporters, were less quick in implementing social distancing policies (e.g., restrictions against public gatherings, mandatory school closures). Mandating social distancing was a difficult decision for political leaders because if these measures were later proven to be unsuccessful in curbing the spread of the virus, then the public may be led to regard these measures as an 'overreaction.' The actions of neighboring states affected the likelihood of social distancing policies and poorer states were less likely to implement social distancing policies. The number of state-level cases produced only a minor effect on the timing of social distancing measures. Furthermore, during the COVID-19 crisis, countries tended to implement stricter measures within compressed timelines, which hints at robust policy diffusion effects (Cheng et al., 2020).

Following Mallinson (2020) and given our focus on the US, we too incorporate the vertical approach in our paper as both the federal government and state governments have used tools during the COVID-19 pandemic to facilitate the statewide diffusion of lockdown policies, for example, by providing concrete financial incentives. Such actions may play a vital role in the speed of policy diffusion of statewide lockdowns and may thus help explain why certain states were more successful than others in controlling the first wave of the pandemic.

Modeling diffusion of statewide lockdown policies

We adopt Mohr's (1969) analysis of organizational innovation, as it provides a strong foundation to develop a theory integrating regional, internal, and vertical influences on the speed of SOE statewide lockdown policies during COVID-19 in a federal system. Our theoretical framework includes three distinct categories: 1. factors affecting states' motivation to adopt policies ('motivators'), 2. factors representing obstacles to states' adoption of policies ('obstacles'), and 3. factors representing states' available resources for the adoption of policies ('resources'). Through this framework, we can critically examine the interplay of different internal and external influences on policy adoption.

In our model, motivators consist of the public's overall confidence in state government, the speed of policy adoption of neighboring states, and the approval rate of politicians at federal and state levels. Obstacles

to adoption relate to the type of policies adopted by the state and its neighboring states. Resources consist of the proportion of overall COVID-19 funding states received from the federal government. Lastly, we controlled for a state's economic vulnerability, governors' political affiliation, the general level of confidence in state governments before the pandemic, the proportion of COVID-19 deaths in the population, neighboring states' speed of policy adoption, population awareness of the virus (as proxied by COVID-19 Google Trends queries) and state and local spending (Adolph et al., 2021; McCannon, 2020).

Innovation motivators

Polls have consistently shown that voters have more trust in their governors than President Trump on COVID-19#related matters (Kamisar, Holzberg, 2020). Further, governors with the lowest approval ratings during the early stages of the pandemic were the ones more reluctant to impose statewide lockdowns (Tamari, 2020). As described by McCannon (2020), a governor's responsiveness to COVID-19 was associated with their approval ratings. In addition, McCannon found that stay-at-home orders were implemented earlier in states that witnessed an increased interest in the coronavirus pandemic (as tracked by Google Trends searches), indicating that governors acted in accordance with the preferences of their constituents.

It is reasonable to assume that the decision to implement a statewide lockdown order, with its ensuing massive socioeconomic disruption, necessitates a certain degree of political buy-in on the part of state residents (Monaghan, 1993). This buy-in may be presumed to be larger for governors who enjoy higher approval ratings. Furthermore, we also believe that these decisions rely in an important way on governors' self-assessments of their handling of the pandemic in its initial stages – that is, if governors perceive that their constituents generally approve of the early steps they are taking to mitigate the impact of the crisis (e.g., by calling to improve public hygiene, explaining the importance of social distancing, closing certain establishments, etc.), they are likely to be more confident in taking the more significant step of locking down their states. Satisfaction with the handling of the pandemic is also likely to be reflected in voter approval ratings. Given the above, we hypothesize that there is a positive association between a governor's approval rating during the COVID-19 crisis and the speed at which statewide lockdown policies were adopted.

Moreover, Republican governors adopted social distancing orders more slowly than Democratic states. However, the effect of the U.S. President on the varying rates of adoption of state lockdown policies is unclear. President Trump has generally been hesitant to call for generalized lockdowns; he moved to rapidly reopen the economy, and as a result, may have stirred doubts on experts' recommendations (Adolph et al., 2021). In this paper, we are interested in examining the President's impact on state lockdown orders further by analyzing President Trump's

approval ratings just before the pandemic in an attempt to analyze whether this was associated with the speed at which state governors adopted lockdown policies. Residents of states where a relatively large proportion of people do not approve of Trump may have been reluctant to trust him on matters related to lockdowns and thus may have exerted greater pressure on their governors to swiftly respond to the looming threat of the pandemic by imposing lockdowns. We, therefore, expect to see those states with Trump's lower pre-pandemic approval ratings to be faster to adopt statewide lockdown policies.

H1: Ceteris paribus, there is a positive association between a governor's approval rating during the pandemic and the speed with which a state adopted a statewide lockdown policy.

H2: Holding everything else constant, there is a positive association between states with low approval ratings for President Trump and the speed with which a state adopted a statewide lockdown policy.

The regional model of policy diffusion specifies that states are more likely to adopt a given policy as the number of nearby states adopting the same policy increases. In this neighbor-based approach, the mechanisms of learning and competition are key to understanding the dissemination of policies. With respect to learning, states are more inclined to examine policies adopted by nearby states with which they share similar economic, geographic, and social elements (Mooney, Lee, 1995; Elazar, 1972). Just as for other policy matters, it is likely that governors take into account their neighbors' reactions to determine appropriate responses to the COVID-19 pandemic (Adolph et al., 2021).

The neighbor-based approach also emphasizes the effects of competition. Studies in policy diffusion have shown that states are also more likely to compete with their neighbors as governments are keen to prevent developments in neighboring states from generating negative impacts (i.e., spillover effects). For example, Berry and Brady (2005) noted that a state neighboring one that offers comparatively low welfare benefits is expected to reduce its own benefits so as to discourage individuals in the neighboring state from migrating. Hence, we expect to see faster statewide lockdown adoption in states whose neighbors adopted tougher statewide lockdowns, presumably in an attempt to prevent a spillover effect of potentially infected patients crossing into their borders to avoid restrictions.

H3: Ceteris paribus, there is a positive association between neighboring states adopting tougher statewide lockdown policies and the speed with which a state adopted a statewide lockdown policy.

State governor COVID-19 approval rating and state's approval rating of President Trump are statistically significant. Given the complexity and fluidity of a dynamic and rapidly evolving social process such as policy adoption under a SOE, these variables need to be understood in a context-specific situation. That is, the variables we found to be statistically significant in our analysis have an impact on the speed of adoption insofar as they are examined in conjunction. Ultimately, they are part of a complex and nuanced social process, and we need to take

into consideration their interconnectedness. With this caveat in mind, the size of the coefficients allows us to impute the approximate magnitude of the variable's effects. For instance, we find that a governor's COVID-19 approval rating was statistically significant and has a negative coefficient. While holding all other variables constant, with a 1% increase in a governor's COVID-19 approval rating, we expect to see a shortening of 1 day in the adoption of a statewide lockdown policy.

A state's approval rating of President Trump was also statistically significant with a negative coefficient. That is, states that were generally favorable of Trump were quicker to adopt lockdown policies. This interesting result is the opposite of what we hypothesized. One possible explanation to this could be that we underestimated the impact of President Trump's SOE declaration. Even though President Trump and his coronavirus task force followed the precepts of federalism and initially deferred to state authorities regarding the strategy to handle the pandemic at a state level and refrained from asking each state to institute stay-at-home orders, President Trump's recommendation clearly carried weight. Higher job approval ratings may reflect higher trust levels, which are critical for a successful relationship between a state and its citizens.

Trust is an important component in effectively responding to a pandemic (Koerth, 2020). Based on a 2006 survey following the SARS epidemic, Americans were less likely to trust their government to provide them with information on an outbreak of disease than citizens of countries such as Hong Kong, Singapore, and Taiwan, where trust in governments is higher. Lower degrees of trust were correlated with lower support for public health measures such as wearing face masks and getting vaccinated. In line with these results, our analysis may indicate that the association we observed between the speed of lockdown adoption and President Trump's approval ratings could be the result of trust in the federal government. That is, states where a greater proportion of citizens approved of President Trump may have been more trusting of the advice and recommendations of his administration. Accordingly, they were more willing to institute rapidly lockdowns following the declaration of the "15 days to slow the spread" campaign.

Innovation obstacles

Social distancing recommendations and lockdowns are stringent and complex measures that involve tough and coercive restrictions on freedom of movement, and that can generate massive economic and social disruption. Generally speaking, a public health heuristic is for governments to rely on the least restrictive mechanism (Gostin, 2020). Importantly, not all lockdown orders involved the same level of stringent and wide-ranging restrictions. Stay-at-home orders required citizens to stay at home to curb transmission of the virus to the greatest extent possible. Shelter-in-place orders are even more restrictive and require individuals to stay inside buildings, rooms, or vehicles until further notice (National League of Cities, 2020). Furthermore, the exact scope of stay-

at-home or shelter-in-place orders varied significantly across states and local governments. During a pandemic, the imposition of a particular type of policy can come at a high cost if it is perceived as over-aggressive with substantial negative economic consequences (Lundgren, et al., 2020). Therefore, we theorize that states will take longer on average to adopt more restrictive lockdown mandates.

H4: Ceteris paribus, there is a negative association between the severity of lockdown orders and the speed with which a state adopted a statewide lockdown policy.

Innovation resources

The effects of lockdown measures have imposed a heavy and perduring toll on economies. To reduce the actual and anticipated severity of the economic and financial fallout, the US federal government authorized the initial disbursement of $ 3 trillion in aid (this amount later grew). One of the initiative's primary goals was to create a public good, while simultaneously lowering the stress on the healthcare sector (McCannon, 2020).

As states grow richer, they can provide higher quality public services, including healthcare (Moore et al., 2015). Wealthier states withstood better the impact of business shutdowns, providing support to both small businesses and schools throughout the periods of closure and maintaining social safety nets. This is critical as both state and local governments bear primary responsibility for the state of public health in their jurisdictions (Parmet, 1985). Researchers have found support for the contention that 'free floating' resources are important in affecting states' willingness to institute novel policies (Rogers, 2010), and with 'slack' resources (e.g., financial resources), governmental entities can more frictionlessly experiment and risk failure (Cyert, March, 1963, as quoted by Valelly, 2009).

As noted above, during the COVID-19 pandemic, the federal government provided emergency relief by distributing trillions in federal funding to all states, with each state receiving a different amount. The amount was not proportional to the scope of each state's epidemiological challenge (Stebbins, Comen, 2020). For instance, the state of Montana was the beneficiary of a disproportionately high amount of federal funding to combat COVID-19 in relation to the severity of the pandemic in the state. Given the relationship described above between the availability of resources and the willingness to adopt new policies, we hypothesize that states that received a comparatively high proportion of overall federal government funding support were faster to adopt statewide lockdown policies.

H5: Controlling for alternative effects, there is a positive association between a state receiving a relatively high proportion of COVID-19 federal funding and the speed with which it adopted a statewide lockdown policy.

Lastly, we controlled for governors' political affiliation, the general confidence in state governments before the pandemic (Jones, 2016), the proportion of COVID-19 deaths in the population (United States Census Bureau, 2019), neighboring states' speed of adoption of lockdown policies, lockdown policy type in neighboring states (i.e., stay-at-home or shelter-in-place orders), population awareness of the virus, economic vulnerability to the effects of COVID-19 pandemic (as measured by an index developed by Moody's Analytics and published in Sauter and Stebbins (2020)), and state and local spending (Adolph et al., 2021; McCannon, 2020; Chantrill, 2020).

Materials and methods: modeling statewide lockdowns during COVID-19

We compiled an original dataset consisting of information for the 42 US states that adopted some form of a SOE statewide lockdown during the COVID-19 pandemic (i.e., stay-at-home or shelter-in-place regulations) (Mervosh, Swales, 2020). On March 16, President Trump declared a state of emergency and "fifteen days to slow the spread." Our outcome variable is the number of days that passed from March 16, 2020 to the day when each state adopted its respective SOE statewide lockdown order (Yit). While some states opened and reclosed, we only accounted for each state's first reopening. Since each state independently adopted its own policy, we were able to study the variability in the speed of adoption across states under reasonably similar environments. Therefore, a relatively high value in our dependent variable reflects a state which took comparatively long to adopt a SOE lockdown policy. We excluded the eight states that did not adopt any form of statewide lockdown policy.

Computing the dependent variable relies on Mallinson's (2016) reflections on the speed of policy adoption. Mallinson insists that, unlike what has been done in past studies, one should not require a cutoff point for defining what can be considered a 'rapid' policy adoption. Instead, the aim should be to capture the continuous nature of policy adoption. The nature of SOE policies warrants a different approach than the event history analysis (EHA) model used in unified models of policy diffusion, mainly because of the time-sensitive nature of SOE policies and the limitations of excessive power.

We used a time-series ordered logistic regression model to estimate the speed of policy diffusion under a SOE. For comparison, we separately analyze the original unified model (Berry, Berry, 1990), which includes only regional and internal characteristics.

Table 1 summarizes the independent variables included in the two models and equations (1) and (2) represent the regression models we estimated.

Table 1. Independent variables summary

Effects	Internal Factors	External Regional Factors	External Vertical Factors
Innovation Motivators	State's Approval Rating of President Trump		
	State Governor COVID-19 Approval Rating		
Innovation Obstacles	Type of Lockdown Policy Adopted	Type of Lockdown Policy Adoption by Neighboring States (Average)	
Innovation Resources			Proportion of COVID-19 Federal Funding

Table 1
Source: own elaboration

(1) Specification of the Unified Model (Under a State of Emergency):

$y_i = \alpha_i + \beta_{1i}$ **Type of Lockdown Policy Adopted +** β_{2i} **Type of Lockdown Policy Adopted by Neighboring States (Average) +** β_{3i} **control variable Average Speed of Lockdown Policy Adoption By Neighboring States [Rank] +** β_{4i} **control variable Rel- evant Google Trends Searches +** β_{5i} **control variable State's Proportion of COVID-19 Deaths +** β_{6i} **control variable State Governor's Political Affiliation +** β_{7i} **control variable General Confidence in State Government +** β_{8i} **control variable State and Local Spend- ing +** β_{9i} **control variable States' Economic Vulnerability to COVID-19 +** εi

(2) Specification of the Modified Unified Model (Under a State of Emergency):

yi= α**i +** β_{1i} **State's Approval Rating of President Trump +** β_{2i} **State Governor COVID-19 Approval Rating +**β_{3i} **Type of Lockdown Policy Adopted +** β_{4i} **Type of Lockdown Policy Adopted by Neighboring States (Average) +** β_{5i} **Proportion of COVID-19 Federal Funding +** β_{6i} **control variable Average Speed of Lockdown Policy Adoption By Neighboring States [Rank] +** β_{7i} **control variable Relevant Google Trends Searches +** β_{8i} **control variable State's Proportion of COVID-19 Deaths +** β_{9i} **control variable State Governor's Political Affiliation +** β_{10i} **control variable General Confidence in State Government +** β_{11i} **control variable State and Local Spending +** B_{12i} **control variable States' Economic Vulnerability to COVID-19 +** εi

Data and research methodology

We collected data on the governor's COVID-19 approval ratings from The Washington Post's report conducted by using SurveyMonkey polling data (Blake, 2020). To account for the vertical effects emanating from the federal government on the state's SOE public health actions, data on Trump's 2020 approval rating by state was included in the model. These data were collected by CIVIQS (2020). The variable for the different types of statewide lockdown policies assumes a value from 0–2, ordered from least to most restrictive lockdown policy: a value of 0 implies no lockdown was imposed in the state (this is relevant only for the analysis

of the neighboring states as states that did not impose a lockdown were excluded from the analysis). A value of 1 represents stay-at-home orders and a value of 2 represents shelter-in-place orders. The data on this variable were taken from reports by Mervosh and Swales (2020), and Cillizza (2020).

Analysis and evaluation of findings

In Table 2, we present the results for the unified model, which accounts for regional and internal determinants. Table 3 displays the results for the modified unified model, which accounts for regional, internal, and vertical determinants.

Table 2

Table 2. Results for the unified model under a state of emergency

Variables	Unified Model Coefficient (Standard Errors)
1. Innovation Motivators	
External Regional Factors	
Average Speed of Lockdown Policy Adoption by Neighboring States [Rank]	0.03 (0.05)
Internal Factors	
Relevant Google Trends Searches	–0.03 (0.02)
State's Proportion of COVID-19 Deaths	–20,510.97 (17,430.32)
State Governor's Political Affiliation	–1.16 (0.71)
General Confidence in State Government	0.01 (0.05)
2. Innovation Obstacles	
External Regional Factors	
Type of Lockdown Policy Adopted by Neighboring States (Average)	–0.42 (0.11)
Internal Factors	
Type of Lockdown Policy Adopted	0.72 (1.44)
3. Innovation Resources	
Internal Factors	
State and Local Spending	–0.007 (0.003)
States' Economic Vulnerability to COVID-19	0.0008 (0.02)
Standalone External Model: $N = 42$; $R^2 = 0.12$	
One-tailed tests where directionality hypothesized: $*p < 0.05$.	
No multicollinearity or high correlation was detected.	

Source: own elaboration

Table 3

Table 3. Results for the modified unified model under a state of emergency

Variables	Unified Model Coefficient (Standard Errors)
1. Innovation Motivators	
External Regional Factors	
Average Speed of Lockdown Policy Adoption by Neighboring States [Rank]	0.05 (0.05)
Internal Factors	
State's Approval Rating of President Trump	–8.84* (4.46)
State Governor COVID-19 Approval Rating	–12.96* (4.08)
Relevant Google Trends Searches	–0.05* (0.02)
State's Proportion of COVID-19 Deaths	–5,017.97 (19,106)
State Governor's Political Affiliation	–2.4* (0.81)
General Confidence in State Government	0.356 (4.46)
2. Innovation Obstacles	
External Regional Factors	
Type of Lockdown Policy Adopted by Neighboring States (Average)	–2.81 (1.55)
Internal Factors	
Type of Lockdown Policy Adopted	–3 (1.77)
3. Innovation Resources	
External Vertical Factors	
Proportion of COVID-19 Federal Funding	–0.08* (0.04)
Internal Factors	
State and Local Spending	–0.01* (0.004)
States' Economic Vulnerability to COVID-19	0.04 (0.03)
Standalone External Model: N = 42; R2 = 0.198	
One-tailed tests where directionality hypothesized: *p < 0.05.	
No multicollinearity or high correlation was detected.	

Source: own elaboration

In Table 2, the unified model under a SOE has an Rr2 of 0.12, while our modified unified model has an Rr2 of 0.2. Therefore, the unified modified model displays greater explanatory power, and furthermore,

includes more variables that were statistically significant (the vertical determinants).

Obstacles to innovation

Unlike what we hypothesized, the type of lockdown policy adopted was not statistically significant. That is, the severity of a lockdown order was not associated with the speed with which lockdown orders were adopted. Further, in our model, we find that the regional diffusion variable (which accounts for the type of lockdown policy adopted by neighboring states) was not statistically significant, either.

The lack of a statistically significant association between either of these two variables and the speed of adoption is interesting. The speed of a state's adoption of lockdown policy was not affected by the strictness of the policy it implemented nor the stringency of the lockdown measures adopted by neighboring states. There is little evidence to support the proposition that states 'emulated' their neighbors' policy responses or 'competed' with them. To a certain extent, this can be explained by the fact that the distinction between stay-at-home and shelter-in-place orders may be too coarse. Differences in scope between stay-at-home orders of different states were often significant.

Moreover, states with a Democratic governor, general population awareness of the virus, and local state spending showed a positive association with the speed of adoption of statewide lockdowns. These results are in line with past studies. Other control variables such as the proportion of COVID-19 deaths in the population, the average speed of adoption of lockdown policies by neighboring states, states' economic vulnerability to COVID-19, and general confidence in state government were not found to be statistically significant. Unlike the clear association of political party on lockdown policies Adolph et al. (2021) found (i.e., Democratic governors were quicker to adopt statewide lockdowns), our results did not produce a clearly discernible relationship between political party and speed of lockdown adoption. That is, whereas Democratic governors were associated with the faster imposition of statewide lockdown policies, so were states with comparatively higher approval ratings for President Trump.

We also ran a separate regression for confirmed COVID-19 cases as a proportion of the population, excluding state's proportion of COVID-19 deaths due to high correlation. The results were substantively indistinguishable, suggesting that statewide lockdown policies under a federal SOE pandemic were characterized more by political strategies, as opposed to factors related to the severity and scope of a state's crisis, the safeguarding of state borders, and states' economic vulnerability. Of note, our model does not support the contention that the speed with which neighboring states adopted lockdown policies affected the speed with which the state adopted a lockdown policy (Adolph et al., 2021).

We also found that states' economic vulnerability to COVID-19 did not impact the speed of adoption of lockdown policies. Even though each

state was impacted differently by the pandemic from an economic point of view, the severity of cases in a state and the resources to control the pandemic did not impact the speed with which statewide lockdowns were adopted. Furthermore, we also noticed that the general confidence in state governments did not impact the speed of lockdown adoption.

Finally, we ran a separate regression on the length of time a statewide lockdown was in place for the 42 states and found that governors' political affiliation and governors' approval ratings were the only statistically significant variables; both had positive coefficients, see appendix for the results. Hence, Democratic governors, on average, kept lockdowns in place for longer than Republican governors. Governors with comparatively higher COVID-19 approval ratings were able to keep the lockdowns longer because they had higher support in implementing their policies in the first place. These results are interesting because we see that the speed of adoption of statewide lockdown policies and the length of time they lasted were positively driven by governors' political affiliation and governors' approval ratings during the pandemic.

Resources for innovation

When examining the significance of vertical effects, we see that COVID-19 federal funding between states was statistically significant with a negative coefficient. Hence states that received proportionally low amounts of COVID-19 federal funding were overall faster to adopt statewide lockdown policies. A possible explanation could be those states that received lower federal funding felt the need to 'fend for themselves' as they could have perceived the federal government as falling short in its ability or willingness to provide the resources required to successfully tackle the challenges posed by the pandemic. As a result, these states implemented statewide lockdowns as a policy to maximally reduce transmission of the virus, following the lead of China and trying desperately to avoid the scenarios they were witnessing in Italy, which had become the first epicenter of the COVID-19 pandemic in the Western world (Capano et al., 2020; Mei, 2020; Ellerbeck, 2021).

***

Internal and vertical variables such as approval ratings of state governors and of President Trump, as well as the proportion of COVID-19 federal funding were positively associated with the speed of adoption of statewide lockdown policies. On the other hand, regional effects such as the average type of lockdown policy adopted by neighboring states had no noticeable relationship with the speed of adoption. That is, regional elements were not shown to have a statistically significant effect in our study. Further, the type of lockdown policy adopted bore a minimal association with the speed of adoption of lockdown policies.

Surprisingly, control variables such as a state's proportion of COVID-19 deaths in the population, the average speed of lockdown policy adopted by neighboring states, states' economic vulnerability to COVID-19 and general confidence in state government were not associated with the speed of adoption of statewide lockdown policies. Together with the results described above, this suggests that patterns of statewide lockdown adoption in the US were shaped at least partly by political dynamics. Importantly, states did not seem to emulate their neighbors' responses. Hence, we did not find evidence to support a clear relationship between regional effects and speed of adoption of statewide lockdowns, as previously seen (Adolph et al., 2021). Furthermore, the general level of confidence in state governments before the pandemic does not seem to have played a role in the speed of adoption of statewide lockdown policies.

States have found it challenging to strike the right balance between effective policies and ethical, legal, economic, and logistical problems associated with statewide lockdowns. Further, some research has suggested that lockdown policies may actually contribute to increasing the rate of transmission of a virus by concentrating people into one area and into the same households (CDC, 2019). This further complicates the analysis of how different states responded to the evolving crisis.

The COVID-19 pandemic has revealed much about how political and economic structures affect the ability of governments to respond and manage global crises. Ultimately, our conceptual framework, which enables us to factor in significant vertical, regional, and internal effects in examining the diffusion of policies under a SOE proves helpful in improving our understanding of the speed at which statewide lockdown policies were adopted by independent state structures operating in the context of a federal system.

Acknowledgments

The authors would like to thank Ms. Yasmin Alkalay (RIP) for her valuable statistical advice

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Appendix

Length of adoption of statewide lockdowns
(Y) = Length of time statewide lockdown policies lasted

Table 1A

Table 1A. Modified unified model under a state of emergency

Variables	Modified Unified Model Coefficient (Standard Errors)
1. Innovation Motivators	
External Regional Factors	
Average Speed of Lockdown Policy Adoption by Neighboring States [Rank]	–0.07 (0.05)
Internal Factors	
State's Approval Rating of President Trump	–2.19 (4.43)
State Governor COVID-19 Approval Rating	7.51* (3.62)
Relevant Google Trends Searches	0.003 (0.02)
State's Proportion of COVID-19 Deaths	19,635.22 (16,459.85)
State Governor's Political Affiliation	2.26* (0.74)
General Confidence in State Government	7.51 (3.62)
2. Innovation Obstacles	
External Regional Factors	
Type of Lockdown Policy Adopted by Neighboring States (Average)	0.94 (1.4)
Internal Factors	
Type of Lockdown Policy Adopted	–2.7 (1.9)
3. Innovation Resources	
External Vertical Factors	
Proportion of COVID-19 Federal Funding	–0.03 (0.03)
Internal Model	
State and Local Spending	0.003 (0.003)
States' Economic Vulnerability to COVID-19	0.01 (0.03)
Standalone External Model: $N = 42$; $R^2 = 0.146$	
One-tailed tests where directionality hypothesized: * $p < 0.05$.	
No multicollinearity or high correlation was detected.	

Source: own elaboration

Table 2A

Table 2A. Correlation table for speed of adoption of statewide lockdowns

	Speed of Adoption	Average Speed of Lockdown Policy Adoption by Neighboring States [Rank]	Type of Lockdown Policy Adopted	State Governor's Political Affiliation	Proportion of COVID-19 Federal Funding	State's Proportion of COVID-19 Deaths	Proportion of COVID-19 Federal Funding
Speed of Adoption	1						
Average Speed of Lockdown Policy Adoption by Neighboring States [Rank]	0.4065	1					
Type of Lockdown Policy Adopted	0.3147	0.252	1				
State Governor's Political Affiliation	–0.4183	–0.0956	–0.2582	1			
Proportion of COVID-19 Federal Funding	–0.1524	–0.1047	–0.2975	–0.0628	1		
State's Proportion of COVID-19 Deaths	–0.3558	–0.0948	–0.0184	0.2643	–0.2569	1	
Proportion of COVID-19 Federal Funding	–0.4803	–0.5521	–0.2977	0.2841	0.3265	0.0567	1
State and Local Spending	–0.2453	0.0316	–0.0595	0.1124	–0.1417	0.3481	–0.027
General Confidence in State Government	0.1238	0.267	0.0602	–0.1426	0.3135	–0.3076	0.2084
Type of Lockdown Policy Adopted by Neighboring States (Average)	0.1481	0.335	–0.0319	–0.1676	–0.5398	0.1019	–0.4007
State's Approval Rating of President Trump	0.3758	0.4491	0.1748	–0.3513	–0.0314	–0.1694	–0.6643
State Governor COVID-19 Approval Rating	–0.4523	–0.2767	–0.3634	0.0451	0.0245	0.1643	0.2464
State's Economic Vulnerability to COVID	0.1586	0.2785	–0.1743	–0.1841	0.481	–0.3579	0.0519

Source: own elaboration

Table 3A

Table 3A. Correlation table for speed of adoption of statewide lockdowns

	State and Local Spending	General Confidence in State Government	Average Speed of Lockdown Policy Adoption by Neighboring States [Rank]	State's Approval Rating of President Trump	State Governor COVID-19 Approval Rating	Economic Vulnerability to COVID-19
State and Local Spending	1					
General Confidence in State Government	–0.0233	1				
Average Speed of Lockdown Policy Adoption by Neighboring States [Rank]	0.1437	–0.2725	1			
State's Approval Rating of President	–0.2354	–0.0465	0.0757	1		
State Governor COVID-19 Approval Rating	–0.0409	–0.0391	0.055	–0.3158	1	
Economic Vulnerability to COVID-19	–0.0701	0.1587	0.0996	0.0718	–0.039	1

Source: own elaboration

Table 4A

Table 4A. Correlation table for length of time statewide lockdowns were in place

	Length of time a statewide lockdown was in place	Average Speed of Lockdown Policy Adoption by Neighboring States [Rank]	Type of Lockdown Policy Adopted	State Governor's Political Affiliation	Proportion of COVID-19 Federal Funding	State's Proportion of COVID-19 Deaths	Proportion of COVID-19 Federal Funding
Length of time a statewide lockdown was in place	1						
Average Speed of Lockdown Policy Adoption by Neighboring States [Rank]	–0.3632	1					
Type of Lockdown Policy Adopted	–0.3244	0.252	1				
State Governor's Political Affiliation	0.5355	–0.0956	–0.2582	1			
Proportion of COVID-19 Federal Funding	–0.1548	–0.1047	–0.2975	–0.0628	1		
State's Proportion of COVID-19 Deaths	0.4517	–0.0948	–0.0184	0.2643	–0.2569	1	
Relevant Google Trends Searches	0.3578	–0.5521	–0.2977	0.2841	0.3265	0.0567	1
State and Local Spending	0.3265	0.0316	–0.0595	0.1124	–0.1417	0.3481	–0.027
General Confidence in State Government	–0.189	0.267	0.0602	–0.1426	0.3135	–0.3076	0.2084
Type of Lockdown Policy Adopted by Neighboring States (Average)	0.0414	0.335	–0.0319	–0.1676	–0.5398	0.1019	–0.4007
State's Approval Rating of President Trump	–0.4912	0.4491	0.1748	–0.3513	–0.0314	–0.1694	–0.6643
State Governor COVID-19 Approval Rating	0.3789	–0.2767	–0.3634	0.0451	0.0245	0.1643	0.2464
State's Economic Vulnerability to COVID	–0.2173	0.2785	–0.1743	–0.1841	0.481	–0.3579	0.0519

Source: own elaboration

Table 5A

Table 5A. Correlation table for length of time statewide lockdowns were in place

	State and Local Spending	General Confidence in State Government	Type of Lockdown Policy Adopted by Neighboring States (Average)	State's Approval Rating of President Trump	State Governor COVID-19 Approval Rating	State's Economic Vulnerability to COVID-19
State and Local Spending	1					
General Confidence in State Government	–0.0233	1				
Type of Lockdown Policy Adopted by Neighboring States (Average)	0.1437	–0.2725	1			
State's Approval Rating of President Trump	–0.2354	–0.0465	0.0757	1		
State Governor COVID-19 Approval Rating	–0.0409	–0.0391	0.055	–0.3158	1	
State's Economic Vulnerability to COVID-19	–0.0701	0.1587	0.0996	0.0718	–0.039	1

Source: own elaboration