# What Drove the First Response to the COVID-19 Pandemic? The Role of Institutions and Leader Attributes

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## The Role of Institutions and Leader Attributes

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ABSTRACT

What determines how a national government reacts in a crisis? The COVID-19 pandemic provides an opportunity to explore leadership behavior and crisis management, and this paper examines what drove the extent of the lockdown in countries around the world during the first wave of coronavirus. In particular, this paper posits that many of the policies undertaken were "extraordinary," that is unlike those ever implemented or complemented by the leaders in charge at the start of the pandemic. Utilizing new and high-frequency data on government responses to COVID-19 and novel statistical techniques, the results of this analysis are that institutions and leadership attributes both matter, but for different policies; where the response called for more 'normal" policies, it appeared that institutional mechanisms were adequate and played the largest role in influencing the extent of the lockdown. On the other hand, where the policies contemplated were very far from the ordinary (including stay-at-home orders or prohibitions on internal travel), the attributes of the leader determined the stringency of the lockdown more than institutions.

Keywords: COVID-19; leadership; crisis management; decision-making; institutions

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**What Drove the First Response to the COVID-19 Pandemic?**

**The Role of Institutions and Leader Attributes**

## I. Introduction

What determines how a national government reacts in a crisis? In "normal" times, when time is abundant and pressures are low, political research has focused on "normal" processes, including institutional mechanisms and the organizations and procedures associated thereof in determining political outcomes, including political structures, parties (Bojar and Kriesi 2020), parliaments, and constitutions. The crisis management literature, on the other hand, focuses heavily on leadership attributes (Blondel 1987, Boin and 't Hart 2010; Boin *et al.* 2010;), delving into personality traits, leader characteristics, and leadership styles to determine how leaders can drive a collective body such as government to prepare for (DeLeo 2018) and respond to various crises (Ansell *et al.* 2010; Boin and Bynander 2015).

The intuition behind such an emphasis is evident, as institutional mechanisms designed for deliberation or consensus may falter when decisions are required rapidly. Crisis situations such as a financial crash or a natural disaster can cause radical shifts in policy, as leaders are forced to experiment (Majumdar and Mukand 2004). This does not mean that political leaders are left alone for unfettered experimentation, however, as leaders also face specific challenges: pressing situations often do not offer full information, forcing leaders to rely on heuristics and rules-of-thumb in developing policy (Boin *et al.* 2016). At the same time, institutional mechanisms do not disappear in a crisis, especially if the crisis is prolonged, meaning that leadership must act within this endogenous set of institutions; although crises may be transformative, responses are necessarily somewhat constrained and become more constrained over time (Swagel 2015).

The COVID-19 pandemic, an ongoing global phenomenon, is an opportunity to explore the question of crisis management, and in particular what drove the response of much of the world to a novel cross-border threat. More importantly for this paper, the pandemic was a crisis unlike any living politician had faced before, and thus both institutions and leaders had little direct experience to rely on. At the same time, the spread of the pandemic was so quick and surprising (one of the very definitions of a crisis, see Hermann [1972]) – and the sense of urgency for a lockdown so unique - that even established institutional mechanisms had little experience on how to deal with it in a policy sense. Bereft of memory or guidance, most countries globally went into some sort of lockdown, creating a blanket prohibition on economic activity in order to prevent increased transmission. However, there were very different types of lockdowns instituted globally, demonstrating the different management styles of political leaders around the world – and their management of crisis response systems.

The purpose of this paper is to understand what drove the extent of the lockdown in countries around the world during the first wave of COVID-19, exploring the ways in which political institutions and political leadership influenced responses to the crisis. The repercussions of these early decisions are ongoing, and thus, while exploration of COVID-19 may seem like a "fad" to some, the real impact of these policy decisions are critical to delving into deeper issues of political leadership. But while the paper offers a theoretical innovation in applying a taxonomy of "normal" policies versus "extraordinary" policies implemented during the lockdown, the real contribution of this note is empirical. In particular, using a historiometric approach (Ligon *et al.* 2012) to quantify attributes of a leader plausibly related to their leadership style, this paper assembles a brand-new dataset on the leaders in 135 countries globally during the crisis. Using this database, I fashion a theory of the drivers of lockdowns as a plausible identification strategy; this is then paired

with novel statistical techniques only beginning to be explored in political science, able to handle both time variant and time invariant regressors in a fixed effects and dynamic panel data setting.

The results of this exercise show that both institutions and the second-order proxies for leadership attributes used here mattered for determining the stringency of the lockdown. Importantly, different attributes mattered for different policies undertaken in the early months of COVID-19; where the response called for more 'normal" policies, it appeared that institutional mechanisms were adequate and played the largest role in influencing the extent of the lockdown. On the other hand, where the policies contemplated were very far from the ordinary (including stay-at-home orders or prohibitions on internal travel), the attributes of the leader (as measured by their personal characteristics) determined the stringency of the lockdown more than institutions.

## II. What Drove the Lockdown Response?

*"Normal" versus "Extraordinary"*

The overall crisis response literature is extensive, focusing on the inputs to decision-making in a stressful situation (Allison 1971 being the gold standard here), how information is disseminated and to whom (Uitdewilligen and Waller 2018), how decisions are bounded within various institutional or policy frameworks (Cram, 2001; Cooper 2007), or the role of psychological factors in shaping decisions (Weisæth *et al.* 2002). Somewhat less explored, however, is the reality that the boundaries of the response set at the governmental level (as noted by Cooper [2007]) may shift according to the type of crisis faced. Each particular crisis brings with it a different level of uncertainty and a different risk/reward matrix (Meder *et al.* 2013), requiring a different possible set of responses; theoretically (and logically), the larger the disaster, the greater the number of

interventions contemplated and the higher the intensity of each intervention (and possibly the contemplation of responses which are less connected with the normal, everyday policies of a government or organization, as shown in van Laere [2013]). As Rosenthal and Kouzmin (1997:277) note, major crises could exhibit what they term the "un-ness of crisis situations: unpleasantness in unexpected circumstances, representing unscheduled events, unprecedented in their implications and, by normal routine standards, almost unmanageable." Indeed, particularly catastrophic events which actors have little experience in dealing with (such as volcanic eruptions, see Doyle *et al.* 2014) – and where the risk/reward matrix may not be readily apparent and where critical infrastructure may collapse (Boin and McConnell 2007) – are likely to push the boundaries of "plausible" alternatives further out than a routinely-encountered issue (Keeler 1993). In this sense, extraordinary times may call for extraordinary measures.

Building on this "un-ness," a simple taxonomy of "normal" responses versus "extraordinary" responses can help to illustrate what is meant here. Somewhat borrowed from the monetary economics literature (see, for example, Medvedev *et al.* 2019), whether or not a policy in response to a crisis is "extraordinary" is dependent upon both the temporal dimension and the spatial dimension in which a policy occurs. The first dimension, time, we have already touched upon, but to further develop this idea, what can be classified extraordinary is a policy which would have been unthinkable and/or was never close to implementation in the past as part of "normal" policy processes. The temporal dimension is thus crucial as it frames the boundaries of what is permissible, as today's policy innovations are tomorrow's business as usual (one only need think of "unconventional monetary policy" such as zero (or negative) interest rates, which seemed revolutionary in 2009 but have been in place in the EU for almost a decade and is now "conventional") but, absent a crisis, tomorrow's standard operating procedure may never come.

Following on this, for a response to be extraordinary, it need not be unprecedented but should be outside of the normal bounds of decision-making and seen as disproportionate in nearly every other situation that a government would face (akin to jumping for the nuclear button at any perceived threat, no matter how slight). Framed through the lens of decision-makers, an extraordinary policy would also be one which living policymakers have no memory of and/or had not been implemented in a country during peacetime; the drastic nature of such a response means that the response itself was used rarely, if ever.[1]

The second dimension, geography, is also required to make a policy "extraordinary," as a policy needs to be expansive, i.e., covering large portions of the country either in terms of geography, population, or the economy. Thus, to return to the monetary policy idea, a policy such as quantitative easing, covering the entire economy of the US or the EU (some could argue, the world) fulfilled the spatial criteria well, while a freeze on public service wages in New York State (as an example) would be much more targeted and not necessarily extraordinary.[2] One could also consider expansive to include either political unanimity or at least an absence of concerted resistance at the point at which a policy is instituted, meaning that unorthodox policies are smoothly implemented; it is this additional aspect which makes policies such as George W. Bush's response to the 9/11 terrorist attacks less "extraordinary" (see Provost and Teske 2009) than the response of an authoritarian leader such as Vladimir Putin to alleged terrorist attacks in Russia in 1999 (Satter 2016).

[1] This does not mean that the response be rational, effective, or free of bias. Christensen and Painter (2003) make an excellent case that, even in a crisis situation, political infighting and organizational incentives rise to the fore, making responses also exercises in political power. In fact, this jockeying for position may even push the envelope of what is a permissible boundary even further, as an agency seeks to aggrandize power and prestige in the midst of a crisis. This is consistent with the "windows of opportunity" school of thought, as shown in Kingdon and Stano (1984), Keeler (1993), and Birkmann *et al.* (2010).

[2] Wage freezes would also fail the temporal criteria, as they have occurred many times in the past.

The ongoing COVID-19 pandemic is a perfect example of such an extraordinary crisis, a public health assault unlike that faced by any living politician, and one which has occasioned extraordinary policies. The closest analogues in living memory are the SARS and H1N1 outbreaks, both of which taxed public health bureaucracies and provided the institutional matrices of countries with a need to devise processes to face a similar threat (however, at least in relation to the H1N1 outbreak, the bureaucratic lessons learned were not necessarily the right ones, reflexive rather than reflective, leading to a diminished ability for flexibility to fight the next crisis, see Barker [2012]). But while both of these two outbreaks led to large absolute numbers of fatalities globally, the treatment for both pandemics were rather "standard" and had been used in previous pandemic responses: as Smith (2019:154) asserted, "the 2003 SARS epidemic was an easy disease to eradicate. Hospital access could be restricted, masks issued, borders monitored, airports screened." Indeed, Lai and Tan (2012) noted that, in the case of Singapore, a panoply of actions against both outbreaks were taken, including case management, outbreak control, surveillance, public education, temperature screening, and, only as a last resort, quarantine but only of the infected (which, although "draconian," was accomplished via moral suasion and in partnership with the Singaporean populace).

By contrast, the rapid increase in COVID-19 cases and, throughout March to May 2020, fatalities, appeared to policymakers as a new and virulent form of crisis, one which required extraordinary policies beyond merely screening and isolating in order to contain its exponential spread. Whereas quarantine was a last resort in the SARS outbreak of 2003, it was contemplated and executed as a first resort in the epicenter of the pandemic, China (Tang *et al.* 2020); as the spread of the virus in the first quarter of 2020 accelerated, governments globally took the unprecedented step of prohibiting most forms of economic activity (in colloquial terms, ordering a "lockdown"), a

decision not even contemplated during the depths of the (far more deadly) Spanish influenza outbreak of 1918 (Scheidel 2020), with increasingly draconian (and somewhat arbitrary) restrictions on "non-essential" business.

**Table 1 – A Taxonomy of COVID-19 Responses**

| Policy | Normal or Extraordinary | Rationale |
|---|---|---|
| Cancellation of public events | Normal | Public events, especially in a crisis situation, are likely to be cancelled owing to worries about circumstances. |
| Restrictions on private gatherings | Extraordinary | In democratic countries, freedom to assemble is often a guaranteed right. While restrictions may exist in both authoritarian and democratic regimes (need for a permit, for example), there are very few examples of setting limits on assembly in peacetime in democracies. |
| Orders to "shelter-in-place" and otherwise confine to the home | Extraordinary | Shelter in place is not a common policy during peacetime but can be instituted during war or war-like events (i.e. terrorism). However, these orders are often time-limited and geographically circumscribed - orders across an entire state or country and for an indeterminate period of time are indeed extraordinary. |
| Restrictions on internal movement between cities/regions | Extraordinary | While authoritarian countries may have regular restrictions on internal movements (internal passports, etc.), they are usually utilized as an impediment rather than a blanket prohibition (North Korea may be the exception). They are unheard of in democracies in peacetime. |

| | | |
|---|---|---|
| Restrictions on international travel (policy for foreign travelers, not citizens) | Normal | For the most part, restrictions on international travel are regular occurrences due to normal bureaucratic procedures (need for passport, visas, immigration procedures, etc.). While expansive or blanket travel restrictions are extraordinary, restrictions on travel have occurred in previous pandemics, including SARS. |

An application of our normal/extraordinary taxonomy to these specific policies undertaken as part of the COVID-19 lockdown can be found in Table 1. A key point to note is that, even in the midst of such an extraordinary crisis, many of the policies which governments pursued were actually "business as usual" or normal. Indeed, drawing on institutional memories and disaster preparedness plans, many of the policies utilized in fighting COVID-19 had been implemented in previous pandemics (Goudarzi 2020), including cancellation of public events, a non-pharmaceutical intervention which had been implemented as early as the Spanish influenza outbreak (Markel *et al.* 2007) or (in a closely related vein) closing of public schools (Klaiman *et al.* 2011). Similarly, restrictions on air travel, coupled with screening measures, were widespread during SARS in 2003 and the H1N1 outbreak of 2009 (Bajardi *et al.* 2011; Lim 2011), and public health bureaucracies around the world were able to implement such restrictions, although in a haphazard manner (see Hartwell *et al.* [2021] for an examination of these policies in the EU).[3]

[3] It can be argued that restrictions on air travel may be "normal" for a government to institute but, if elites are also restricted from travel, they may be "extraordinary" for decision-makers to be subjected to them. However, in the United States case at least, such restrictions have not been binding, as seen by the slew of lawmakers found to have violated their own orders and travelled.

However, many of the specific policies implemented, with varying intensity, globally during the first wave of COVID-19 were unlike those put in place ever before. This reality brings us to the final definition of what is an "extraordinary" response, beyond its novelty and far-reaching effects, mainly if a contemplated (or enacted) policy reorients a country's institutional matrix to explicitly go against its original functions and, indeed, facilitate exactly the opposite behavior. For example, restrictions on internal movement in a democracy are precisely antithetical to normal democratic tenets, which promote freedom of movement within their borders (Møller and Skanning 2013); on the other hand, autocracies may require internal passports, registration upon arrival, and explicitly forbid internal movement as part of greater plans (Garcelon 2018). In order for such a policy to be implemented, thus, institutional memory and tenets must necessarily play far less of a role in their enactment than the specific personalities in the room at the time that these decisions are made. Put another way, if institutions are meant to facilitate X and the midst of a crisis calls for not X as a response, the only way in which not X is implemented is via the pull of leadership. In such a scenario, then, who is in power – and their background – could make the determining factor in what type of policies are pursued and *how* extraordinary they may be, using their own priors to frame the crisis and its response (Boin *et al.* 2009).

## III. An Empirical Test of the Drivers of the Lockdown

*The Model*

We may now use this taxonomy to see which drove both of these normal and extraordinary policies, and the relative effects of both institutions and leaders. In this sense, like the lockdowns and the response to COVID-19, there are few extant models of what would drive the particulars of

an economic lockdown in response to a pandemic, making an identification strategy a trip into unexplored waters. To fashion a theory of drivers of economic lockdown, I rely on the existing literature straddling political science and public health which examines the drivers of either health policy or health efficiency (for example Correa and Namkoong 1992), acknowledging the prominent role for politics in driving various health outcomes (Muntaner *et al.* 2011; de Leeuw *et al.* 2014; Patterson & Veenstra 2016; Gagnon *et al.* 2017) or in responding to natural disasters (Aldrich and Meyer 2015; Haeffele and Storr, 2020).

This work provides a rough guide to understanding the drivers of the stringency of a lockdown in response to COVID-19 and providing a suitable identification strategy. In particular, this body of work would suggest that the lockdown would be a function of several features of the crisis which policymakers faced, including:

- *Severity:* What effect was the disease within the country's borders and how critical did a stringent lockdown appear?
- *Absorptive capacity:* Could a country absorb the possible economic effects that would come with a lockdown, even for a short time, based on its prior economic performance or point on the business cycle?
- *Institutional capacity;* Was a country well-equipped bureaucratically to institute a near-total lockdown, were there checks and balances preventing it, and were there appropriate means in which to weigh the trade-offs?
- *Personality and Background of Leaders:* Were some leaders predisposed because of ideology, leadership style, or personal attributes towards more or less stringent lockdowns?

Bringing this together into a formal econometric model,

$$(1)\ Y_i = \alpha + COVID_{it-1} + \beta MACRO_i + \gamma INSTITUTIONS_i + \delta LEADER_{it} + \varepsilon_i$$

This model incorporates the theory of lockdowns above, using as the Y vector a series of variables taken from the Oxford University "Stringency Index," measuring the extensiveness of lockdown provisions in a particular country across nine policy dimensions (Hale *et al.* 2020).

For the estimation of this model, we utilize the composite Stringency Index as well as five of its constituent pieces, namely "cancellation of public events," "restrictions on gatherings," "stay at home requirements," "restrictions on internal movement," and "international travel controls." Each of these variables is on a scale with lower numbers indicating less stringency and higher numbers more stringency; the index itself runs from 0 to 100, while international controls and restrictions on gathering range from 0 to 4, stay at home ranges from 0 to 3, and cancellation of public events and restrictions on internal movement range from 0 to 2. In each instance, the specific component reveals the stringency of the economic lockdown pursued by leaders in a particular country.

For the right-hand side control variables, perhaps the most obvious variable related to the lockdown is the actual extent of impact that COVID-19 had had on a country (i.e., no pandemic, no lockdown). To account for the pandemic's effects, this paper focuses on the number of new deaths attributed to the virus as of the previous day (information on sources are in Appendix A and summary statistics are in Appendix B). Deaths were utilized as the primary signal of the severity of the virus as, especially in the early stages of the pandemic, testing was only applied to the most severe cases (i.e. those already close to death/likely to lead to death), and thus there was a high correlation between confirmed cases and deaths (0.76, significant at the 0.001% level); more importantly, while caseloads signal the severity of the pandemic's reach, mortality escalated the crisis to a potential political and economic catastrophe (as can be seen by the rising number of

cases globally in July 2020 but a correspondingly much lower level of deaths).[4] Given delays in reporting, the deaths are lagged one day, to feed into the current day's policymaking processes; however, a valid criticism on using deaths is that the reporting of COVID deaths varied wildly by country, and thus cases are also included as a robustness test.[5]

In addition to rising mortality, other covariates which can be plausibly related to the stringency of the lockdown have been drawn from the health and political science literature. For example, the institutions variable shown in Equation 1 comprises a salient attribute of the political system which could have an impact on the response to a pandemic: democratic accountability, which has been linked in earlier work to better health outcomes (Patterson & Veenstra 2016) including life expectancy (Besley & Kudamatsu 2006) and overall human development (Gerring *et al.* 2012). In a pandemic, a more democratic system could be better at handling the informational needs of fighting the crisis, devising policies, and routing resources effectively (Kavanagh 2020). Here we use the ICRG "democratic accountability" measure for that particular month to proxy for democratic access to the system.

At the same time, a lockdown is a highly restrictive and complex policy which requires government capacity to implement, and a highly inefficient government is likely to be unable to effectively enforce such a lockdown. To measure the decision-making which went into determining the extent of the lockdown, I utilize the ICRG "bureaucratic quality" indicator, noting that state capacity is also correlated overall with better health outcomes (Brieba 2018). Moreover, how much leeway the executive has, even in the presence of a competent bureaucracy, is also an institutional factor which may influence the ability of a government to enter into a lockdown, and thus the Polity IV

[4] Robustness checks utilizing cases showed no difference in results and are not reported for reasons of brevity. Results available from author on request.

[5] As shown below, there was no effect on the variables of interest from changing deaths to cases or vice versa.

"executive constraints" metric, taken from the year prior, is also used to proxy for executive leeway.

Alongside bureaucratic quality is also the policies which would be expected to accompany a stringent lockdown, namely whether or not there was any fiscal package to ease the potentially disastrous burden on business. As of this writing (July 2020), the IMF estimates that over $9 trillion has been spent in global fiscal support as a result of the pandemic (Battersby *et al.* 2020), and it is plausible that a country which instituted more generous fiscal support in time *t* was likely to continue to have a restrictive lockdown in time *t+1*. To account for the possibility that strength of lockdown might be correlated with fiscal support, I include here a lag of the Oxford "Economic Support Index," which records measures such as debt relief or income support and also ranges from 0 to 100.[6]

Complementing these public health and institutional indicators are a vector of macroeconomic and country specific indicators derived from the extant literature, a complete list of which is given in Appendix A (along with links to the theoretical justification for their inclusion). Given that much of the data utilized here is available on an annual basis, the macroeconomic/country variables are values current as of the last available datapoint, either 2019 or 2018 (or in a very few instances, 2017).

*Quantifying Leader Attributes*

[6] Looking at the data, the stringency index leads fiscal support, meaning that stringent lockdowns were already in place before support was offered. However, the implementation of a fiscal support program meant that governments anticipated stringency to continue or even increase over time, meaning that the intuition here remains correct.

The most important variable for the purposes of this examination, however, is the "Leader" vector in Equation 1, a vector of various attributes and classifications of a leader which might determine how a particular political leader would act in a given situation. As the difficulties with quantifying personality are legion, I take a page from Hartwell (2013) and utilize a historiometric approach (Ligon *et al.* 2012), observing the background of a leader as a way to classify how their leadership may be expected to behave. This approach is necessarily second-best: while personal traits should be expected to be correlated with the types of policies that the leader enacts, a perfect model would utilize comprehensive profiles of the leadership traits of each of the 180 countries in existence at the time of the COVID-19 pandemic. Given that this note is trying to capture a fast-moving target, we instead rely on the diversity of this vector to capture characteristics of leaders which are plausibly related to leadership style (and which are backed up by existing literature as having an effect):

*Party orientation*: Left-wing parties are generally known to be both much more generous in state healthcare provision (Huber *et al.* 2008) and anti-business/anti-market in general, meaning that they might be more likely to shut down the economy in pursuit of health objectives; additionally, as Bjørnskov and Rode (2019) note, prior ideological orientation often determines the extent of intervention in a crisis. To account for this orientation, I include a dummy taking the value of 1 if a leader is left-wing, 0 otherwise.

*Length of tenure*: A neophyte will likely rely on different (personality-specific) heuristics than someone who has been in power for a long time and who has navigated the complexities associated with a crisis (Wallace and Suedfeld 1988). Alternately, political imperatives might cause a young leader to acquiesce more to political foes in the face of a challenge such as coronavirus, see Gelpi and Grieco (2001); in a similar vein, a challenge like the pandemic might represent a threat to an

entrenched ruler, who would be willing to take more extreme measures to ensure that they remain in power (Ayittey 2008). Tenure also acts as a crude proxy for experience in crisis management, as leaders who have been in power for more than a decade are likely to have experienced SARS and/or H1N1. To capture these effects, we include the number of months a leader has been in power; moreover, we also use as a robustness check a quadratic term to capture any diminishing returns over time.[7]

*Age:* Perhaps it is not how long one has been in power but how long one has been alive which determines personality and/or attitudes towards stressful situations. Yousef (1998) notes that age is especially relevant to leadership in a non-Western context, while Stoker *et al.* (2019) note that age is correlated with "directive leadership," that is, leadership which gives clear instructions and demands compliance (not unlike the lockdown). The numeric age of the leader in question is used in the analysis here to also measure generational and/or cohort effects.

*Gender*: There is a broad literature in political science and psychology (and many popular canards) regarding the role of gender in leadership styles and decisions (Vecchio 2002), and it is possible that such gender attributes may be a comfortable fallback in an environment of uncertainty. In particular, the "relationship-oriented" approach associated with female leaders (Park 1996) may lead to a less strict lockdown (seen as a top-down order), while male leaders would be more likely to act according to masculine traits of assertiveness in a crisis (Saint-Michel 2018). In this examination, gender is coded as 1 for a male leader, and 0 for a female leader.

*Military career*: Finally, the training given to military personnel, whether enlisted or in the officer class, may assist in decision-making under pressure, lending itself to creative "problem solving"

[7] Thanks are due to [BLINDED FOR REVIEW] who suggested this.

approaches to a crisis (Connelly and Zaccaro 2017); alternately, it could also bias a person towards a certain type of decision in fighting an unknown, unseen foe, meaning a much more stringent lockdown.

To test this model, I have put together a brand-new painstakingly assembled panel dataset of 135 countries with daily COVID-19 data from January 1, 2020 to June 26, 2020. However, the peculiar nature of the data shown here, especially the Y variables, requires specialized estimators. In particular, the Stringency Index can be thought of as a continuous variable with little clustering near the top, meaning that conventional linear fixed effects models can be utilized to provide correlational relationships. However, given that some of the leader or country attributes of interest are time invariant (for the most part, this includes gender and whether or not a leader served in the military, while also encompassing most of the macroeconomic variables) over this time sample, two estimators must be utilized in order to recapture their influence in a fixed effects specification: first, a "hybrid" fixed-random-effect model as in Allison (2009), and second, a "Fixed-Effects Filter" model as suggested by Pesaran and Zhou (2018). Both of these approaches will allow for inclusion of time invariant variables and, in theory, should return consistent and unbiased results for the effects of both the time varying and invariant attributes of a leader and/or a country.

On the other hand, the five components of the Stringency Index are categorical variables and thus cannot be captured in a linear fixed effects framework. For this, I utilize instead a hybrid ordered logit, combining fixed effects transformations with random effects to allow for preserving the time invariant variables. As with the hybrid fixed-effects, the time variant variables are transformed by calculating the country-specific mean for each variable, subtracting the mean from the original values of the variables, and then running a random-effects ordered logit (with clustered standard errors) including both the mean values and the de-meaned transformed variables alongside the

time invariant variables. This approach thus offers no gain over efficiency in a standard fixed-effects model (Schunk 2013) but does allow for capture of time invariant variables.

Finally, as linear fixed-effects models have their deficiencies with regard to the problem of endogeneity – making the results from the previous examination correlational rather than causal – an instrumental variables approach is preferred to deal with the reality that (mostly) everything causes everything else (or at least influences it). However, the addition of time-invariant variables makes standard dynamic panel data difficult, and thus we turn to another novel technique, the sequential linear panel data estimator of Kripfganz and Schwarrz (2015) from the European Central Bank. Their method the dynamic panel analogue of the Hausman-Taylor approach, estimating the coefficients of the time-varying regressors in the first stage and then regressing the residuals from this stage on the time-invariant regressors in the second stage. This approach captures the information which would be lost from time-invariant regressors in a standard dynamic model, while providing more robustness against misspecification then the "normal" system-GMM approach. For the examination here, we utilize two-step GMM estimation with the time-invariant regressors used as instruments for the time-varying variables; given the two-week lag period for COVID-19 to exhibit symptoms, we also use lag lengths between 4 to 6 weeks as instruments.[8]

*Results*

[8] Various lag lengths were attempted as robustness tests and to ensure that they fulfilled standard GMM criteria, including AR(n) tests and the Hansen J-test. Results were similar within the window of approximately 3 to 8 weeks but smaller windows were used to avoid overproliferation of instruments. In addition, the presence of serial correlation in the new cases specification required including both the first and second lag of new cases to eliminate such problems.

The results of this examination are shown in Tables 2 (the overall Stringency Index) and 3 (the different sub-components of the index). With regard to the Stringency Index overall, the results are consistent across both the FEF model (odd columns) and the Hybrid model (even columns) that both leader attributes and institutional factors played a role in determining the expansiveness of a country's lockdown during the first wave. In particular, countries which had effective bureaucracies appeared to be much more inclined towards a stringent lockdown, with each increase in the bureaucratic quality index resulting in another 37 points on average in the index (a result which held across all combinations and fixed effects models). However, as shown in the last two columns of Table 2, once endogeneity is controlled for – and it is highly plausible that bureaucratic quality is conditioned on many other influences in an economy – it appears that bureaucratic effectiveness actually correlated with a *less* stringent lockdown. Indeed, the fact that bureaucratic quality is instrumented with the type of political system and healthcare quality may suggest that bureaucratic quality per se may have had a correlation with stronger lockdowns, but when one actually examines the *drivers* of bureaucratic quality in the context of COVID, the overall influence of a good bureaucracy was to lower the stringency.

Across all models, democratic accountability appears to have acted as a check on more stringent measures, with countries with more access to the political system seeing a drop in their Index of approximately 21.5 points for each increase in democracy in the fixed effects regressions (significant consistently at the 5% level), and a smaller effect of approximately four points when endogeneity is accounted for. As expected, increases in economic support were also strongly correlated with increases in stringency, albeit at a much smaller level of economic significance.

Most interestingly, in terms of the leadership variables, age is consistently correlated with a more stringent lockdown (and retains its significance in the GMM regressions in Columns 9 and 10),

while tenure has a negative relationship, one which moderates over time (i.e., leaders in power longer have less stringent lockdowns to start, but gradually increase stringency). The influence of left-wing leaders appears very strong in the fixed effects regressions, both mixed and hybrid, but this effect disappears when accounting for endogeneity. The driver behind this may be the reality that, overall, left-wing governments had more restrictive lockdowns than right-wing or centrist leaders (see Figure 1) and this difference remained constant; thus, the fixed effects specification captures this correlation, while the sequential GMM specification instead shows that this difference can be explained by other underlying characteristics within the country (note that the benefit of the GMM approach is that it also is able to recover an additional 1,750 observations). Finally, in a direct rebuke to many of the press surrounding the early months of the pandemic, a leader's gender had no role in determining the overall restrictiveness of the lockdown.

[INSERT TABLE 2 HERE]

[INSERT FIGURE 1 HERE]

This examination of the drivers of the overall stringency of the lockdown shows the importance of both institutional and leadership attributes, a reality which can be attributed to the overall Stringency Index itself: the index is in fact a mixture of many different components and actions taken as part of the lockdown, meaning a combination of both extraordinary and "normal" policies. To better separate out these extraordinary actions, we now turn our focus to the sub-components of the index and what effect the attributes of specific leaders had on these specific policies rather than just the overall index. Table 3 shows the results of these hybrid ordered logit models, and it is interesting to see that the relative importance of leadership and institutions shifts depending upon which policy is under examination and if they were more "normal" crisis management

policies or those that were truly "extraordinary." For example, while bureaucratic quality appears to be a driving factor in both closure of public events and restrictions on international travel, it has comparatively less significance for the other components (with democracy being a check mainly on expansive stay-at-home orders and, to a lesser extent, restrictions on internal movement). Leadership attributes, on the other hand, appear to be more important for "extraordinary" policies, with older leaders seemingly more likely to push for stay-at-home orders, while shying away from international travel restrictions (and supporting the cancellation of public events). Left-wing leaders appear to be most active in issuing stay-at-home orders and restricting internal movement, directly opposite the effect for leaders who have been in power for longer (and those who have been in power the longest are the most reticent, as shown in the squared tenure results), while leaders with a military background were less likely to cancel public events or public gatherings. As in the overall Index model, gender apparently had absolutely no effect on lockdown policies, whether extraordinary or normal.

As a robustness check,[9] it is possible that countries which were working towards a vaccine/cure for coronavirus anticipated that they would not need as stringent a lockdown; to account for this reality, we have included data for investment on vaccine research, also taken from the Oxford dataset, to see if there was any relationship between *current* targeted health expenditures and the lockdown stringency (as we have already accounted for past healthcare expenditure). Table 4 shows the results of this robustness test, and the results from Tables 2 and 3 hold or are even strengthened: in each instance, leadership attributes are more important for explaining policies on

[9] Additional robustness tests are shown in Appendix C, including the effect of a particular leader having been at the helm during previous public health crises, specifically SARS from November 2002 to July 2003 and H1N1 from January 2009 to August 2010. Even more robustness tests are available from the author on request, including all permutations of the health expenditures/health quality variable and trading out various political level variables.

stay-at-home orders and internal movement (and to some extent overall stringency), while institutional attributes dominate policies on public events and international travel.[10] The only component which does not fit this mold is public gatherings, where the military background of a leader plays a role in dampening such orders, but bureaucratic quality is a strong determinant of stronger restrictions.[11]

## IV. Conclusions

This paper, and in particular the empirical exercise, has pointed the way towards several interesting results, as well as suggesting ways forward in this research. Most importantly is that the empirical work shown above suggests that both institutional mechanisms and leadership attributes matter for policies in a crisis, with institutional mechanisms showing the greatest influence for policies which are closer to "normal" (cancellation of public events or controlling international borders), while leadership attributes came to the fore in the extraordinary policies marshalled against COVID-19 (forbidding large public gatherings, ordering people to stay at home, and stopping internal movement in a country). In one sense, this empirical exercise shows that the bifurcation between political research and crisis management is correct, in that extraordinary crises do cause a reliance on extraordinary leaders rather than extraordinary institutions.

[10] The lag length for instruments in the GMM in Column 3 is shortened from 12 to 18 days as the serial correlation which was problematic in the original regression has been mitigated by the addition of the vaccine variable.
[11] On the whole, this particular model appears to be less robust than others, and future research needs to delve into finding a better identification strategy for why public gatherings might be restricted.

**Table 3 – Leadership and Institutional Drivers of Aspects of the Lockdown – Constituent Components of the Stringency Index**

| | Public events | | Public gatherings | | Stay at home | | Internal movement | | International Travel | |
|---|---|---|---|---|---|---|---|---|---|---|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| *Leadership attributes* | | | | | | | | | | |
| Age | 0.24 | 0.29 | 0.1 | 0.11 | 0.25 | 0.27 | 0.13 | 0.15 | -0.13 | -0.12 |
| | *2.44*** | *3.65**** | *1.45* | *1.61* | *1.96*** | *2.11*** | *1.33* | *1.50* | *3.06**** | *3.01**** |
| Gender | 0.09 | -0.14 | 0.20 | 0.27 | 0.31 | 0.33 | 0.27 | 0.33 | -0.18 | -0.31 |
| | *0.09* | *0.15* | *0.22* | *0.30* | *0.39* | *0.41* | *0.65* | *0.77* | *0.26* | *0.46* |
| Tenure in months | -0.13 | -0.15 | -0.05 | -0.06 | -0.37 | -0.41 | -0.21 | -0.22 | 0.10 | 0.09 |
| | *1.23* | *1.54* | *0.47* | *0.57* | *2.48*** | *2.65**** | *1.79** | *1.81** | *1.78** | *1.77** |
| Tenure squared | 0.001 | 0.0008 | 0.0004 | 0.0003 | 0.0007 | 0.0008 | 0.0003 | 0.0002 | -0.0001 | -0.0001 |
| | *0.81* | *1.25* | *0.88* | *0.77* | *1.70** | *1.87** | *1.09* | *0.99* | *0.20* | *0.20* |
| Left-wing | 1.71 | 2.38 | 3.32 | 3.58 | 11.07 | 11.87 | 6.83 | 6.93 | -2.10 | -2.10 |
| | *0.62* | *1.01* | *1.43* | *1.47* | *3.01**** | *3.15**** | *2.35*** | *2.34*** | *1.77** | *1.76** |
| Military career | -3.25 | -3.50 | -1.75 | -1.51 | -1.27 | -1.25 | -0.93 | -0.86 | -0.45 | -0.49 |
| | *2.11*** | *2.33*** | *2.12*** | *1.78** | *1.64** | *1.62* | *1.28* | *1.18* | *0.78* | *0.85* |
| *Health variables* | | | | | | | | | | |
| New Deaths | 0.02 | | 0.008 | | 0.002 | | 0.004 | | 0.0002 | |
| | *1.72** | | *2.75**** | | *2.23*** | | *1.28* | | *0.31* | |
| New Cases | | 0.005 | | 0.0008 | | 0.001 | | 0.0005 | | 0.000002 |
| | | *2.90**** | | *3.03**** | | *3.91**** | | *1.60* | | *0.04* |
| Healthcare Access and Quality Index | -0.09 | -0.11 | -0.08 | -0.09 | -0.06 | -0.05 | -0.07 | -0.07 | -0.05 | -0.05 |
| | *3.07**** | *3.09**** | *3.28**** | *3.33**** | *1.90** | *1.91** | *2.64**** | *2.61**** | *3.37**** | *3.49**** |
| *Institutional and political variables* | | | | | | | | | | |
| Bureaucratic quality | 9.33 | 6.85 | 7.92 | 8.19 | 4.08 | 4.93 | 8.48 | 8.94 | 1.34 | 1.34 |
| | *1.74** | *2.71**** | *3.29**** | *4.00**** | *1.95** | *2.25*** | *1.98*** | *1.92** | *2.45*** | *2.45*** |
| Democratic accountability | -2.88 | -2.38 | -1.22 | -0.91 | -2.04 | -2.11 | -5.09 | -5.00 | -1.44 | -1.44 |
| | *1.06* | *0.81* | *0.49* | *0.33* | *2.51**** | *2.52**** | *1.85** | *1.81** | *0.88* | *0.88* |

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Election ahead in 2020 | 1.43 | 1.01 | 0.60 | 0.51 | 0.78 | 0.72 | 1.05 | 0.97 | 0.55 | 0.55 |
| | *1.27* | *1.04* | *0.74* | *0.66* | *0.87* | *0.81* | *0.88* | *0.84* | *0.93* | *0.90* |
| Type of system | 0.48 | 0.54 | 0.16 | 0.12 | -0.48 | -0.45 | 0.09 | 0.11 | -0.52 | -0.49 |
| | *1.44* | *1.51* | *0.43* | *0.29* | *1.81** | *1.70** | *0.39* | *0.47* | *1.98*** | *1.90** |
| Federal or unitary | -0.03 | -0.08 | -0.10 | -0.06 | 0.45 | 0.43 | 0.20 | 0.18 | -0.08 | -0.12 |
| | *0.11* | *0.30* | *0.32* | *0.18* | *1.72** | *1.69** | *0.87* | *0.83* | *0.33* | *0.46* |
| Economic support index | 0.05 | 0.05 | 0.05 | 0.05 | 0.05 | 0.05 | 0.05 | 0.05 | 0.04 | 0.04 |
| | *7.59**** | *7.69**** | *9.33**** | *9.12**** | *8.48**** | *8.53**** | *8.65**** | *8.44**** | *7.22**** | *7.15**** |
| FIXED EFFECTS? | YES | YES | YES | YES | YES | YES | YES | YES | YES | YES |
| ADDITIONAL CONTROLS? | YES | YES | YES | YES | YES | YES | YES | YES | YES | YES |
| Wald chi-squared | 375.99 | 519.29 | 423.76 | 503.85 | 279.8 | 290.97 | 255.81 | 280.00 | 722.73 | 708.55 |
| Log pseudo-likelihood | -4312.40 | -4065.66 | -9845.87 | -9769.19 | -10005.02 | -9988.17 | -7589.74 | -7520.54 | -8623.22 | -8625.37 |
| Groups | 92 | 92 | 92 | 92 | 92 | 92 | 92 | 92 | 92 | 92 |
| n | 10832 | 10832 | 10841 | 10841 | 10840 | 10840 | 10839 | 10839 | 10841 | 10841 |

Notes: *** p<0.01; ** p<0.05; * p<0.1. Hybrid ordered logit with country clustered standard errors, absolute value of t-stats reported.

**Table 4 - Leadership and Institutional Drivers of Aspects of the Lockdown – Robustness Test**

| | Stringency Index | | | Public events | Public gatherings | Stay at home | Internal movement | International Travel |
|---|---|---|---|---|---|---|---|---|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
| *Leadership attributes* | | | | | | | | |
| Age | 1.67 | 1.54 | 0.44 | 0.24 | 0.09 | 0.24 | 0.14 | -0.12 |
| | *2.83**** | *2.52*** | *2.54*** | *2.47*** | *1.41* | *1.90** | *1.38* | *3.05**** |
| Gender | 27.91 | 2.02 | -4.09 | 0.13 | 0.26 | 0.21 | 0.28 | -0.15 |
| | *1.11* | *0.64* | *0.45* | *0.14* | *0.28* | *0.26* | *0.67* | *0.23* |
| Tenure in months | -0.92 | -0.75 | -0.24 | -0.12 | -0.05 | -0.36 | -0.22 | 0.09 |
| | *1.83** | *1.49* | *3.81**** | *1.21* | *0.47* | *2.39*** | *1.80** | *1.75** |
| Tenure squared | 0.007 | 0.002 | 0.0004 | 0.0009 | 0.0004 | 0.0007 | 0.003 | -0.0007 |
| | *2.26*** | *1.42* | *3.56**** | *0.82* | *0.88* | *1.65** | *1.13* | *0.18* |
| Left-wing | 37.74 | 36.49 | 1.89 | 1.69 | 3.300 | 10.87 | 6.99 | -2.03 |
| | *3.08**** | *2.92**** | *0.43* | *0.62* | *1.42* | *2.92**** | *2.34*** | *1.75** |
| Military career | -1.69 | -11.28 | -4.58 | -3.25 | -1.81 | -1.13 | -0.90 | -0.48 |
| | *0.03* | *2.64**** | *0.73* | *2.10*** | *2.21*** | *1.50* | *1.23* | *0.81* |
| *Health variables* | | | | | | | | |
| New Deaths | 0.01 | 0.01 | 0.08 | 0.02 | 0.008 | 0.002 | 0.004 | 0.0002 |
| | *3.27**** | *3.26**** | *4.15**** | *1.72** | *2.75**** | *2.22*** | *1.28* | *0.31* |
| Healthcare Access and Quality | -0.68 | -0.51 | | -0.10 | -0.09 | -0.05 | -0.07 | -0.05 |
| | *0.60* | *3.59**** | | *3.07**** | *3.33**** | *1.81** | *2.61**** | *3.44**** |
| Investment in vaccine | 0.000001 | 0.000001 | 0.000001 | 0.000001 | 0.000001 | 0.000001 | 0.000001 | 0.000001 |
| | *2.36*** | *2.44*** | *2.82**** | *0.88* | *0.75* | *0.27* | *0.97* | *1.67** |
| *Institutional variables* | | | | | | | | |
| Bureaucratic quality | 34.78 | 33.11 | -6.18 | 9.17 | 7.73 | 4.12 | 8.43 | 1.34 |
| | *8.50**** | *8.18**** | *2.63**** | *1.79** | *3.26**** | *1.83** | *1.99*** | *2.46*** |
| Democratic accountability | -21.31 | -21.48 | -4.43 | -2.88 | -1.22 | -2.01 | -5.10 | -1.45 |
| | *2.36*** | *2.31*** | *2.35*** | *1.07* | *0.49* | *2.48*** | *1.86** | *0.89* |
| Economic support index | 0.51 | 0.52 | 0.43 | 0.05 | 0.05 | 0.05 | 0.05 | 0.04 |
| | *15.31**** | *16.43**** | *9.36**** | *7.59**** | *9.30**** | *8.44**** | *8.62**** | *7.34**** |
| FIXED EFFECTS? | YES | YES | YES | YES | YES | YES | YES | YES |
| ADDITIONAL CONTROLS? | YES | YES | YES | YES | YES | YES | YES | YES |
| Wald chi-squared | | 8399.59 | | 399.28 | 462.01 | 233.21 | 257.12 | 749.61 |

| | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Log pseudo-likelihood | | | | | -4299.67 | | -9821.14 | | -9937.62 | | -7571.05 | | -8592.63 | | | |
| n | 10771 | 10771 | 12524 | | 10769 | | 10777 | | 11692 | | 11690 | | 11691 | | | |
| AR(1) test | | | 0.003 | | | | | | | | | | | | | |
| AR(2) test | | | 0.2793 | | | | | | | | | | | | | |
| Hansen J-statistic (p-value) | | | 0.551 | | | | | | | | | | | | | |

Notes: *** p<0.01; ** p<0.05; * p<0.1. Fixed effects results (Column 1: FEF, Column 2: hybrid; Column 3: sequential GMM) and ordered logit with country clustered standard errors, absolute value of t-stats reported.

However, this study, coming as it does during the beginning of the pandemic and is thus limited in some sense by data availability, has limitations which may be overcome in time. In the first instance, while some of the models used above are somewhat correlational rather than causational (see Keele 2015), the use of the sequential GMM method should reduce this problem. It may be more interesting to continue to work with data on even more concentrated causational methods, such as difference-in-difference (DiD), although choosing an exact date for the treatment (or even what the "treatment" is) may also be difficult. Other approaches such as coarsened exact matching or synthetic control methods could also be applied to this data; taking this to a much more micro level, it may be interesting to apply these methods to a specific country.

Along these lines, an issue which emerges from this examination is reinforcing how difficult it is to integrate political leadership into a large cross-country model. Can we unequivocally state that the variables used in the empirical exercise here are an accurate reflection of the "personality" of a particular leader? It can be argued that many of the proxies we have used are in fact quite imperfect, overlapping, or dependent upon other unobservable factors, i.e. is there a personality trait which drives a person to join the military that is then responsible for the grace (or lack thereof) under pressure? The historiometric approach used here offered insights and the use of second-order proxies for leadership yield fruitful results, but future work needs to be expanded to go beyond broad-based attributes of a leader and to incorporate specific personality traits or styles of leadership (Hermann 2005); unfortunately, this too is difficult, as once a global database is completed (Nai 2019), it becomes quickly out of date for fast-moving research (such as regarding COVID-19).

Finally, this analysis has suggested not only the value of one's own leadership – here we only look at the reaction of a leader to the virus itself - but the effect of other personalities in the political

ecosystem. Political institutions are complex and chaotic, suspended in a web of other institutions in an economy and, as shown, reliant on the distribution of personalities which exist at any one time. In the US during the pandemic, many political actors set themselves up either in agreement with or in opposition to the outsize personality of US President Donald Trump; thus, personal animus and clashing personalities also drove responses far beyond what an institutionalist approach would predict. While this empirical examination did not account for the ecosystem of personalities, this too is something that we need to understand in order to better examine the environment in which leaders work.

REFERENCES

Aldrich, D. P., & Meyer, M. A. (2015). Social capital and community resilience. *American behavioral scientist*, *59*(2), 254-269.

Allison, G.T. (1971). *Essence of Decision: Explaining the Cuban Missile Crisis*. Boston: Little, Brown, and Company.

Allison, P. D. (2009). *Fixed Effects Regression Models*. Thousand Oaks, CA: Sage.

Ansell, C., Boin, A., & Keller, A. (2010). Managing transboundary crises: Identifying the building blocks of an effective response system. *Journal of contingencies and crisis management*, *18*(4), 195-207.

Ayittey, G. B. N. (2008). The African development conundrum. In Powell, B. (Ed.), *Making poor nations rich: entrepreneurship and the process of economic development.* Palo Alto, CA: Stanford University Press.

Bajardi, P., Poletto, C., Ramasco, J. J., Tizzoni, M., Colizza, V., & Vespignani, A. (2011). Human mobility networks, travel restrictions, and the global spread of 2009 H1N1 pandemic. *PloS one*, *6*(1), e16591.

Barker, K. (2012). Influenza preparedness and the bureaucratic reflex: anticipating and generating the 2009 H1N1 event. *Health & place*, *18*(4), 701-709.

Besley, T., & Kudamatsu, M. (2006). Health and democracy. *American Economic Review*, *96*(2), 313-318.

Birkmann, J., Buckle, P., Jaeger, J., Pelling, M., Setiadi, N., Garschagen, M., ... & Kropp, J. (2010). Extreme events and disasters: a window of opportunity for change? Analysis of organizational,

institutional and political changes, formal and informal responses after mega-disasters. *Natural hazards*, *55*(3), 637-655.

Bjørnskov, C., & Rode, M. (2019). Crisis, ideology, and interventionist policy ratchets. *Political Studies*, *67*(4), 815-833.

Blondel, J. (1987). *Political leadership: Towards a general analysis*. London: Sage Publishing.

Boin, A., & 't Hart, P. (2010). Organising for effective emergency management: Lessons from research. *Australian Journal of Public Administration*, *69*(4), 357-371.

Boin, A., & Bynander, F. (2015). Explaining success and failure in crisis coordination. *Geografiska Annaler: Series A, Physical Geography*, *97*(1), 123-135.

Boin, A., & McConnell, A. (2007). Preparing for critical infrastructure breakdowns: the limits of crisis management and the need for resilience. *Journal of contingencies and crisis management*, *15*(1), 50-59.

Boin, A., Stern, E., & Sundelius, B. (2016). *The politics of crisis management: Public leadership under pressure*. Cambridge: Cambridge University Press.

Boin, A., 't Hart, P., & McConnell, A. (2009). Crisis exploitation: political and policy impacts of framing contests. *Journal of European Public Policy*, *16*(1), 81-106.

Boin, A., 't Hart, P., McConnell, A., & Preston, T. (2010). Leadership style, crisis response and blame management: The case of Hurricane Katrina. *Public Administration*, *88*(3), 706-723.

Bojar, A., & Kriesi, H. (2020). Action repertoires in contentious episodes: What determines governments' and challengers' action strategies? A cross-national analysis. *European Journal of Political Research*. Online first, https://doi.org/10.1111/1475-6765.12386.

Brieba, D. (2018). State capacity and health outcomes: Comparing Argentina's and Chile's reduction of infant and maternal mortality, 1960–2013. *World Development*, *101*, 37-53.

Battersby, B., Lam W.R., & Ture, E. (2020, May 20). Tracking the $9 Trillion Global Fiscal Support to Fight COVID-19. *IMF Blog,* https://blogs.imf.org/2020/05/20/tracking-the-9-trillion-global-fiscal-support-to-fight-covid-19/.

Christensen, T., & Painter, M. (2004). The politics of SARS–rational responses or ambiguity, symbols and chaos? *Policy and Society*, *23*(2), 18-48.

Connelly, S., & Zaccaro, S. J. (2017). Leadership and creativity in military contexts. In *Handbook of Research on Leadership and Creativity*. Edward Elgar Publishing.

Cooper, H. T. (2007). Decision making in a crisis. *Journal of Police Crisis Negotiations*, *7*(2), 5-28.

Correa, H., & Namkoong, K. (1992). Determinants and effects of health policy. *Journal of Policy Modeling*, *14*(1), 41-63.

Cram, L. (2001). Governance 'to go': domestic actors, institutions and the boundaries of the possible. *JCMS: Journal of Common Market Studies*, *39*(4), 595-618.

De Leeuw, E., Clavier, C., & Breton, E. (2014). Health policy–why research it and how: health political science. *Health research policy and systems*, *12*(1), 55.

DeLeo, R. A. (2018). Indicators, agendas and streams: analysing the politics of preparedness. *Policy & Politics*, *46*(1), 27-45.

Doyle, E. E., McClure, J., Paton, D., & Johnston, D. M. (2014). Uncertainty and decision making: Volcanic crisis scenarios. *International Journal of Disaster Risk Reduction*, *10*, 75-101.

Ferreira, F., & Gyourko, J. (2014). Does gender matter for political leadership? The case of US mayors. *Journal of Public Economics*, *112*, 24-39.

Gagnon, F., Bergeron, P., Clavier, C., Fafard, P., Martin, E., & Blouin, C. (2017). Why and how political science can contribute to public health? Proposals for collaborative research avenues. *International journal of health policy and management*, *6*(9), 495-499.

Garcelon, M. (2018). Colonizing the subject: The genealogy and legacy of the Soviet internal passport. In Caplan, J. & Torpey, J. (eds.), *Documenting individual identity: The development of state practices in the modern world.* Princeton, NJ: Princeton University Press, pp. 83-100.

Gelpi, C., & Grieco, J. M. (2001). Attracting trouble: Democracy, leadership tenure, and the targeting of militarized challenges, 1918-1992. *Journal of Conflict Resolution*, *45*(6), 794-817.

Gerring, J., Thacker, S. C., & Alfaro, R. (2012). Democracy and human development. *The Journal of Politics*, *74*(1), 1-17.

Goudarzi, S. (2020). Lessons from Past Outbreaks Could Help Fight the Coronavirus Pandemic. *Scientific American*, March 23, available at https://www.scientificamerican.com/article/lessons-from-past-outbreaks-could-help-fight-the-coronavirus-pandemic1/.

Haeffele, S., & Storr, V. H. (Eds.). (2020). *Government Responses to Crisis*. Heidelberg: Springer Nature.

Hale, T., Petherick, A., Phillips, T., & Webster, S. (2020). Variation in government responses to COVID-19. *Blavatnik School of Government Working Paper*, *31*.

Hartwell, C.A. (2013). *Institutional barriers in the transition to market: examining performance and divergence in transition economies*. Basingstoke: Palgrave Macmillan.

Hartwell, C.A., Lawton, T., & Tingbani, I. (2021). *Identifying Obstacles to Collective Action during a Pandemic: A Meta-Organizational Perspective*. Unpublished manuscript (under review).

Hermann, C.F. (ed.) (1972). *International Crises: Insights from Behavioral Research*. New York: Free Press.

Hermann, M.G. (2005) Assessing leadership style: trait analysis. In Post, J.M. (ed.), *The Psychological Assessment of Political Leaders*. Ann Arbor, MI: University of Michigan Press, pp. 178–212.

Huber, E., Mustillo, T., & Stephens, J. D. (2008). Politics and social spending in Latin America. *The Journal of Politics*, *70*(2), 420-436.

Kavanagh, M. M. (2020). Authoritarianism, outbreaks, and information politics. *The Lancet Public Health*, *5*(3), e135-e136.

Keele, L. (2015). The Statistics of Causal Inference: A View from Political Methodology. *Political Analysis*, *23*(3), 313-335.

Keeler, J. T. (1993). Opening the window for reform: Mandates, crises, and extraordinary policy-making. *Comparative Political Studies*, *25*(4), 433-486.

Kingdon, J. W., & Stano, E. (1984). *Agendas, alternatives, and public policies* (Vol. 45, pp. 165-169). Boston: Little, Brown.

Klaiman, T., Kraemer, J. D., & Stoto, M. A. (2011). Variability in school closure decisions in response to 2009 H1N1: a qualitative systems improvement analysis. *BMC public health*, *11*, 73-73.

Kripfganz, S., & Schwarz, C. (2015). *Estimation of linear dynamic panel data models with time-invariant regressors*. ECB Working Paper 1838. Frankfurt: European Central Bank.

Lai, A. Y., & Tan, T. B. (2012). Combating SARS and H1N1: insights and lessons from Singapore's public health control measures. *ASEAS-Austrian Journal of South-East Asian Studies*, *5*(1), 74-101.

Ligon, G. S., Harris, D. J., & Hunter, S. T. (2012). Quantifying leader lives: What historiometric approaches can tell us. *The Leadership Quarterly*, *23*(6), 1104-1133.

Lim, P. L. (2011). Influenza and SARS: the impact of viral pandemics on maritime health. *International maritime health*, *62*(3), 170-175.

Majumdar, S., & Mukand, S. W. (2004). Policy gambles. *American Economic Review*, *94*(4), 1207-1222.

Markel, H., Lipman, H. B., Navarro, J. A., Sloan, A., Michalsen, J. R., Stern, A. M., & Cetron, M. S. (2007). Nonpharmaceutical interventions implemented by US cities during the 1918-1919 influenza pandemic. *Journal of the American Medical Association*, *298*(6), 644-654.

Meder, B., Le Lec, F., & Osman, M. (2013). Decision making in uncertain times: what can cognitive and decision sciences say about or learn from economic crises? *Trends in Cognitive Sciences*, *17*(6), 257-260.

Medvedev, D., Rama, M., & Ikeda, Y. (2019). Advanced-country policies and emerging-market currencies: The impact of US tapering on India's rupee. *International Finance*, *22*(1), 35-52.

Møller, J., & Skaaning, S. E. (2013). Autocracies, democracies, and the violation of civil liberties. *Democratization*, *20*(1), 82-106.

Muntaner, C., Borrell, C., Ng, E., Chung, H., Espelt, A., Rodriguez-Sanz, M., Benach, J. and O'Campo, P. (2011). Politics, welfare regimes, and population health: controversies and evidence. *Sociology of health & illness*, *33*(6), 946-964.

Nai, A. (2019). Disagreeable narcissists, extroverted psychopaths, and elections: A new dataset to measure the personality of candidates worldwide. *European Political Science*, *18*(2), 309-334.

Park, D. (1996). Gender role, decision style and leadership style. *Women in Management Review*, *11*(8), 13-17.

Patterson, A. C., & Veenstra, G. (2016). Politics and population health: testing the impact of electoral democracy. *Health & Place*, *40*, 66-75.

Pei, S., Kandula, S., & Shaman, J. (2020). Differential Effects of Intervention Timing on COVID-19 Spread in the United States. *medRxiv*. Retrieved from https://www.medrxiv.org/content/10.1101/2020.05.15.20103655v2.

Pesaran, M. H., & Zhou, Q. (2018). Estimation of time-invariant effects in static panel data models. *Econometric Reviews*, *37*(10), 1137-1171.

Provost, C., & Teske, P. (2009). Extraordinary powers, extraordinary policies? In Provost, C., & Teske, P. (eds.), *President George W. Bush's Influence over Bureaucracy and Policy* (pp. 1-15). Palgrave Macmillan, New York.

Rosenthal, U., & Kouzmin, A. (1997). Crises and crisis management: Toward comprehensive government decision making. *Journal of Public Administration Research and Theory*, *7*(2), 277-304.

Saint-Michel, S. E. (2018). Leader gender stereotypes and transformational leadership: Does leader sex make the difference? *M@n@gement*, *21*(3), 944-966.

Satter, D. (2016). *The Less You Know, the Better You Sleep: Russia's Road to Terror and Dictatorship Under Yeltsin and Putin*. New Haven, CT: Yale University Press.

Scheidel, W. (2020). The Spanish Flu Didn't Wreck the Global Economy. *Foreign Affairs,* May 28, available at https://www.foreignaffairs.com/articles/united-states/2020-05-28/spanish-flu-didnt-wreck-global-economy.

Schunck, R. (2013). Within and between estimates in random-effects models: Advantages and drawbacks of correlated random effects and hybrid models. *The Stata Journal*, *13*(1), 65-76.

Stoker, J. I., Garretsen, H., & Soudis, D. (2019). Tightening the leash after a threat: A multi-level event study on leadership behavior following the financial crisis. *The Leadership Quarterly*, *30*(2), 199-214.

Swagel, P. (2015). Legal, political, and institutional constraints on the financial crisis policy response. *Journal of Economic Perspectives*, *29*(2), 107-22.

Tang, B., Xia, F., Tang, S., Bragazzi, N. L., Li, Q., Sun, X., ... & Wu, J. (2020). The effectiveness of quarantine and isolation determine the trend of the COVID-19 epidemics in the final phase of the current outbreak in China. *International Journal of Infectious Diseases*, 95, 288-293.

Uitdewilligen, S., & Waller, M. J. (2018). Information sharing and decision-making in multidisciplinary crisis management teams. *Journal of Organizational Behavior*, *39*(6), 731-748.

Van Laere, J. (2013). Wandering through crisis and everyday organizing; Revealing the subjective nature of interpretive, temporal and organizational boundaries. *Journal of Contingencies and Crisis Management*, *21*(1), 17-25.

Vecchio, R. P. (2002). Leadership and gender advantage. *The Leadership Quarterly*, *13*(6), 643-671.

Wallace, M. D., & Suedfeld, P. (1988). Leadership performance in crisis: The longevity-complexity link. *International Studies Quarterly*, *32*(4), 439-451.

Weisæth, L., Knudsen Jr, Ø., & Tønnessen, A. (2002). Technological disasters, crisis management and leadership stress. *Journal of Hazardous Materials*, *93*(1), 33-45.

Yousef, D. A. (1998). Correlates of perceived leadership style in a culturally mixed environment. *Leadership and Organization Development Journal*, *19*(5), 275-284.

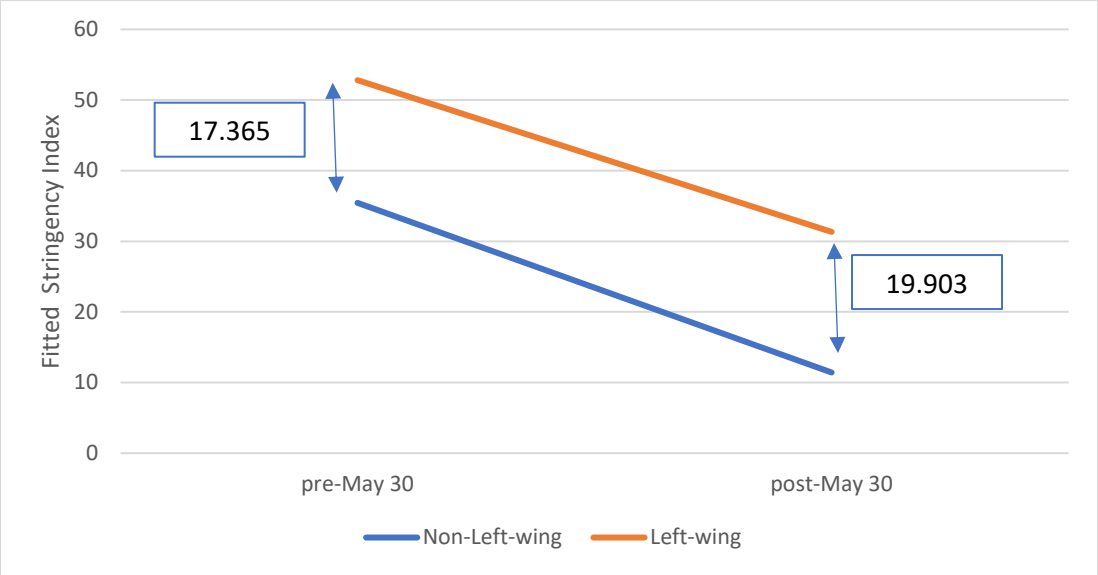
**Table 2 – Leadership and Institutional Drivers of Aspects of the Lockdown – the Stringency Index**

| | Stringency Index | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| | FEF | Mixed | FEF | Mixed | FEF | Mixed | FEF | Mixed | GMM | GMM |
| *Leadership attributes* | | | | | | | | | | |
| Age | 1.69 | 1.54 | 1.74 | 1.61 | 1.69 | 1.56 | 1.74 | 1.63 | 0.36 | 0.28 |
| | *2.87**** | *2.52*** | *3.00**** | *2.69**** | *2.87**** | *2.57**** | *3.00**** | *2.74**** | *2.10*** | *2.00*** |
| Gender | 16.67 | 0.58 | 19.48 | 0.67 | 27.86 | 2.34 | 29.71 | 2.15 | -1.27 | -1.70 |
| | *0.71* | *0.17* | *0.91* | *0.20* | *1.12* | *0.75* | *1.36* | *0.71* | *0.22* | *0.33* |
| Tenure in months | -0.92 | -0.76 | -0.98 | -0.85 | -0.92 | -0.76 | -0.98 | -0.84 | -0.20 | -0.19 |
| | *1.86** | *1.52* | *2.07*** | *1.76** | *1.86** | *1.52* | *2.07*** | *1.76** | *2.54*** | *2.53*** |
| Tenure squared | 0.007 | 0.00 | 0.006 | 0.002 | 0.007 | 0.002 | 0.006 | 0.002 | 0.0003 | 0.0004 |
| | *2.26*** | *1.41* | *2.26*** | *1.52* | *2.26*** | *1.44* | *2.26*** | *1.56* | *2.06*** | *3.75**** |
| Left-wing | 37.92 | 36.73 | 39.80 | 38.76 | 37.92 | 36.71 | 39.80 | 38.72 | 3.21 | 2.57 |
| | *3.11**** | *2.95**** | *3.36**** | *3.22**** | *3.11**** | *2.96**** | *3.36**** | *3.22**** | *0.43* | *0.81* |
| Military career | -8.95 | -11.48 | -11.00 | -11.33 | -1.82 | -11.59 | -4.82 | -11.44 | 0.99 | 33.34 |
| | *0.19* | *2.27*** | *0.28* | *2.25*** | *0.04* | *2.70**** | *0.11* | *2.68**** | *0.73* | *0.60* |
| *Health variables* | | | | | | | | | | |
| New Deaths | 0.01 | 0.01 | | | 0.01 | 0.01 | | | 0.04 | |
| | *3.27**** | *3.23**** | | | *3.27**** | *3.22**** | | | *0.99* | |
| New Cases | | | 0.001 | 0.001 | | | 0.001 | 0.001 | | 0.007 |
| | | | *4.49**** | *4.30**** | | | *4.49**** | *4.30**** | | *1.04* |
| Health expenditures | -12.32 | -2.78 | -12.38 | -2.77 | | | | | | |
| | *2.06*** | *2.89**** | *2.33*** | *2.95**** | | | | | | |
| Healthcare Access and Quality Index | | | | | -0.68 | -0.52 | -0.83 | -0.52 | | |
| | | | | | *0.60* | *3.67**** | *0.86* | *3.70**** | | |
| *Institutional and political variables* | | | | | | | | | | |
| Bureaucratic quality | 34.87 | 34.37 | 39.01 | 38.63 | 34.87 | 33.12 | 39.01 | 37.26 | -8.12 | -8.38 |
| | *8.54**** | *8.60**** | *9.08**** | *9.34**** | *8.54**** | *8.21**** | *9.08**** | *8.93**** | *3.85**** | *4.31**** |

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Democratic accountability | -21.33 | -21.81 | -21.39 | -21.86 | -21.33 | -21.51 | -21.39 | -21.57 | -3.57 | 3.34 |
| | *2.36*** | *2.35*** | *2.39*** | *2.39*** | *2.36*** | *2.31*** | *2.39*** | *2.35*** | *2.02*** | *2.28*** |
| Federal v. Unitary | -8.98 | -0.63 | -8.45 | -0.64 | -8.88 | 0.23 | -8.07 | 0.19 | | |
| | *1.13* | *0.55* | *1.21* | *0.54* | *1.04* | *0.19* | *1.07* | *0.16* | | |
| Type of System | 2.27 | -0.60 | 1.53 | -0.57 | -0.67 | 0.22 | -0.67 | 0.24 | | |
| | *0.22* | *0.37* | *0.17* | *0.35* | *0.05* | *0.16* | *0.06* | *0.18* | | |
| Election ahead in 2020 | 4.12 | 1.25 | 3.76 | 1.10 | 4.12 | 1.85 | 3.76 | 1.66 | | |
| | *0.48* | *0.19* | *0.44* | *0.17* | *0.48* | *0.29* | *0.44* | *0.26* | | |
| Economic support index | 0.51 | 0.52 | 0.51 | 0.52 | 0.51 | 0.52 | 0.51 | 0.52 | 0.336 | 0.35 |
| | *15.33**** | *16.40**** | *15.25**** | *16.31**** | *15.33**** | *16.45**** | *15.25**** | *16.37**** | *6.77**** | *7.48**** |
| FIXED EFFECTS? | YES | YES | YES | YES | YES | YES | YES | YES | YES | YES |
| ADDITIONAL CONTROLS? | YES | YES | YES | YES | YES | YES | YES | YES | YES | YES |
| Wald chi-squared | | 32570.95 | | 27962.71 | | 8313.42 | | 7554.40 | | |
| R-squared | | 0.44 | | 0.44 | | 0.45 | | 0.46 | | |
| Groups | 92 | 92 | 92 | 92 | 92 | 92 | 92 | 92 | 109 | 109 |
| n | 10,834 | 10,834 | 10,834 | 10,834 | 10,834 | 10,834 | 10,834 | 10,834 | 12,589 | 12,481 |
| AR(1) test | | | | | | | | | 0.33 | 0.4537 |
| AR(2) test | | | | | | | | | 0.2677 | 0.5059 |
| Hansen J-statistic (p-value) | | | | | | | | | 0.7789 | 0.6499 |

Notes: *** p<0.01; ** p<0.05; * p<0.1. Fixed-effects results and sequential GMM, estimator noted above model, performed with standard errors clustered on country variable. Absolute value of t-stats reported.

**Figure 1 – Comparison of Left-wing v. Non-left wing government responses**




*Note:* Figure shows the average Stringency Index fitted from a linear difference-in-difference regression run with May 30, 2020 as the break date. Prior to May 30th, there was a difference in average stringency of 17.365 points between left-wing and other leaders, while after May 30th, this difference had slightly widened to an average of 19.903 points.

**APPENDIXES (ON-LINE SUPPORTING INFORMATION)**

## APPENDIX A: Variables and Sources for the Empirical Exercise

### Dependent Variables

All dependent variables are, as noted in the text, taken from the Oxford Stringency Index (Hale *et al.* 2020). The Index itself is described in the main text but the sub-components are described in Hale *et al.* (2020) as below:

| Y Variable | Description |
|---|---|
| Cancellation of public events | 0 - no measures<br>1 - recommend cancelling<br>2 - require cancelling |
| Restrictions on private gatherings | 0 - no restrictions<br>1 - restrictions on very large gatherings (the limit is above 1000 people)<br>2 - restrictions on gatherings between 101-1000 people<br>3 - restrictions on gatherings between 11-100 people<br>4 - restrictions on gatherings of 10 people or less |
| Orders to "shelter-in-place" and otherwise confine to the home | 0 - no measures<br>1 - recommend not leaving house<br>2 - requires not leaving the house with exceptions for daily exercise, grocery shopping, and 'essential' trips<br>3 - requires not leaving house with minimal exceptions (e.g. allowed to leave once a week or only one person can leave at a time) |
| Restrictions on internal movement between cities/regions | 0 - no measures<br>1 - recommendation not to travel between regions/cities<br>2 - internal movement restrictions in place |
| Restrictions on international travel (policy for foreign travelers, not citizens) | 0 - no restrictions<br>1 - screening arrivals<br>2 – quarantining of arrivals from some or all regions<br>3 – banning of arrivals from some regions<br>4 - ban on all regions or total border closure |

**Leadership Attributes**

As noted in the main text, these various attributes of leaders may be plausibly correlated with leadership styles (gender, military career) but also may inform heuristic formation (length of tenure) and cohort or generational approaches (age). In this sense, the list is by no means complete, and future research is needed to be able to link more specifically leadership traits (e.g. the Big Five personality traits or the Dark Triad) to leaders present during the COVID-19 pandemic.

- *Party orientation*: Coding done by the author, based on political biographies taken from both Wikipedia and "Biografías de Líderes Políticos" at the Barcelona Center for World Affairs. As noted in the text, variable is 1 for a left-wing leader and 0 if otherwise (centrist, independent, right, or far right).
- *Age:* Baseline taken from the Rulers, Elections, and Irregular Governance (REIGN) dataset from OEF Research (Bell 2016) and corrected by day and month using biographies from Wikipedia and "Biografías de Líderes Políticos" at the Barcelona Center for World Affairs. Where the REIGN dataset conflicted with biographies, biographies were used to determine the leader's age at that particular date.
- *Length of tenure*: Taken from the REIGN database, specifically the "tenure in months" indicator, for June 26, 2020. The length of tenure was then worked backwards from that date using biographical data regarding when the leader assumed office.
- *Tenure Squared*: The square of the tenure variable, included to capture diminishing effects of leader longevity. In this case, if there is a positive effect for the square, that means that the effects of tenure are strengthened the longer they have been in power.
- *Gender*: Gender is coded as 1 for a male leader, and 0 for a female leader, taken from the REIGN database.

- *Military career*: Like gender and length of tenure, data on a leader's military background comes from the REIGN database and is coded as a 1 for military service and 0 otherwise. Biographies cross-checked for accuracy and a change was made for Khalifa bin Zayed Al Nahyan of the United Arab Emirates, who was Minister of Defense and personally oversaw the building of the armed forces of the UAE. In addition, Bosnia is coded as a 1 in the REIGN dataset, but this too was changed to zero as the current Chairman of the Presidency of Bosnia (Šefik Džaferović) has no military service listed in his official biography.

**COVID-19 Variables**

The number of new deaths are taken from the John Hopkins University COVID-19 tracker database, available at https://github.com/CSSEGISandData/COVID-19. In the rare instance where there is a negative number coded for a particular day (e.g. Spain on May 26th and June 6th), this was due specifically to a national retro-correction of death data; this correction did not affect the statistical exercise shown in the main body of text.

The "investment in vaccines" data comes from the Oxford Stringency dataset (variable H5) and covers "Announced public spending on Covid-19 vaccine development." The data is given in US dollars and is given for the day in which vaccine testing was announced, coded as 0 otherwise.

**Institutional Variables**

Both bureaucratic quality and democratic accountability are taken from the International Country Risk Guide (ICRG) dataset monthly for each month and extrapolated out daily. Thus, they may be time invariant across a month, but they are time variant across the six months of the dataset.

Executive constraints are taken from the Polity IV dataset and are invariant across the entire dataset.

In order to capture various political systems, the "system" variable is calculated using a combination of the World Bank "Database of Political Institutions" and the Quality of Governance "Institution" variable (4.48.12), originally taken from Cheibub *et al.* (2010). The coding shown here is a 1 equals a presidential system, 2 is assembly or indirectly elected, and 3 is parliamentary. Similarly, a dummy variable for the state of a country's political arrangements, and whether they are federal or unitary, is also included, taken from the Institutions and Elections Project (Wig *et al.* 2015) and taking the value of 1 for a unitary system, 2 for a confederation, and 3 for a federal state.

Finally, three election variables were calculated here, of which one is shown in the main text and two which were used for robustness tests. The election variable in the text, "election ahead," takes the value of 1 for every day that is before an election in 2020 and a 0 for the election day itself and every day following. For two-part (runoff) elections, the variable takes a 0 for the day of the election itself but remains a 1 for the period in-between runoffs until the election was resolved. The other two election variables are much more straightforward: election-year, equal to 1 for every day in 2020 if there was an election planned that year, and election day, equal to 1 for the day of the election. All of these variables were calculated by the author on the basis of data from Wikipedia and the Association of World Election Bodies (A-WEB, http://www.aweb.org/eng/bbs/B0000007/list.do?menuNo=300052&option=all) database.

**Macroeconomic/Country variables**

All macroeconomic and country variables are taken from the World Bank's World Development Indicators database for the latest year available, and their inclusion is driven by the health policy and political science literature mentioned in the text. Additional citations are given below.

- *Access to electricity:* Percentage of the population with access to regular electricity. This variable was included as a country with little access to electricity would also likely find a more stringent lockdown to be economically disastrous (i.e. very little chance for working from home). This could then play into decision-making on how stringent a lockdown should be. In addition, access to electricity is often a good measure of development of a country (Weidmann and Schutte 2017; Bruederle and Hodler 2018), which would also be a motivating factor for determining how stringent a lockdown should be.
- *Border with China dummy:* China directly borders 14 countries, and each of these might have taken additional steps to lockdown in order to stem the flow of the virus from its origin. These 14 countries have been coded with a 1 while the rest of the database is coded as a 0.
- *FDI:* Net foreign direct investment inflows as a percentage of GDP. It is plausible that countries with high levels of FDI are both a) developed and b) able to sustain a lockdown even if domestic investment grinds to a halt (OECD 2020).
- *Government expenditures on health:* Domestic general government health expenditure as a percentage of GDP. The intuition here is simple, mainly that governments which had strong health services (Bokhari *et al.* 2007) prior to the pandemic would have less of a need to "flatten the curve," and thus may have gone for less stringent lockdown policies.

- *Health Access Quality:* Taken from Fullman *et al.* (2019), this variable from 2016 measures the quality of a nation's healthcare infrastructure on a scale from 0 to 100 (with 100 being the best). The index itself is done via examining a) risk-standardized cause-specific deaths due to non-cancers and b) mortality-to-incidence data for cancers, totaling 32 specific diseases, while are then aggregated via a principal component analysis into an index.
- *Inflation:* The annual percentage change in consumer prices. A country which is suffering high levels of inflation is likely to be more wary about halting economic activity, perhaps placing a higher value on needed economic exchange rather than halting the spread of the coronavirus. At the same time, countries which are suffering higher levels of inflation are also likely to be correlated with a less healthy populace, especially true in the case of inflation (Williams *et al.* 2016).
- *Island nation:* A dummy taking the value of 1 if the country in question is wholly located on an island (sharing an island also is coded as 1, as with the Dominican Republic and Haiti) and 0 if otherwise. With a natural barrier against the disease, it can be expected that an island nation would have more restrictions on international travel and little to none on internal movement, with likely correspondingly less stringent policies on gatherings and public events.
- *Population density:* Density of the population per square kilometer of land area. More densely populated countries can have more targeted lockdown policies, targeted generally at urban areas, with likely correspondingly larger restrictions on internal movement. On the other hand, there is likely to be less overall stringency, as parts of the country not densely populated would be at lower risk.

- *Tourism expenditures:* Expenditures on international tourism as a percentage of total imports of the country. Countries with higher expenditures on tourism and tourism infrastructure are more likely to see higher risk of virus transmission (Sönmez *et al.* 2019) and thus are more likely to have much more stringent lockdowns.

APPENDIX A REFERENCES


Bell, C. (2016). *The Rulers, Elections, and Irregular Governance Dataset (REIGN).* Broomfield, CO: OEF Research. Available at oefresearch.org.

Bokhari, F. A., Gai, Y., & Gottret, P. (2007). Government health expenditures and health outcomes. *Health Economics*, *16*(3), 257-273.

Bruederle, A., & Hodler, R. (2018). Nighttime lights as a proxy for human development at the local level. *PloS one*, *13*(9), e0202231.

Cheibub, J. A., Gandhi, J., & Vreeland, J. R. (2010). Democracy and dictatorship revisited. *Public choice*, *143*(1-2), 67-101.

Fullman, N., Yearwood, J., Abay, S. M., Abbafati, C., Abd-Allah, F., Abdela, J., ... & Abraha, H. N. (2018). Measuring performance on the Healthcare Access and Quality Index for 195 countries and territories and selected subnational locations: a systematic analysis from the Global Burden of Disease Study 2016. *The Lancet*, *391*(10136), 2236-2271.

Hale, T., Petherick, A., Phillips, T., & Webster, S. (2020). Variation in government responses to COVID-19. *Blavatnik School of Government Working Paper*, *31*.

OECD (2020). *Foreign direct investment flows in the time of COVID-19.* OECD Policy Brief, May 4, available at https://read.oecd-ilibrary.org/view/?ref=132_132646-g8as4msdp9&title=Foreign-direct-investment-flows-in-the-time-of-COVID-19.

Sönmez, S., Wiitala, J., & Apostolopoulos, Y. (2019). How complex travel, tourism, and transportation networks influence infectious disease movement in a borderless world. In *Handbook of Globalisation and Tourism*. Edward Elgar Publishing.

Weidmann, N. B., & Schutte, S. (2017). Using night light emissions for the prediction of local wealth. *Journal of Peace Research*, *54*(2), 125-140.

Wig, T., Hegre, H., & Regan, P. M. (2015). Updated data on institutions and elections 1960–2012: presenting the IAEP dataset version 2.0. *Research & Politics*, *2*(2), 2053168015579120.

Williams, C., Gilbert, B. J., Zeltner, T., Watkins, J., Atun, R., & Maruthappu, M. (2016). Effects of economic crises on population health outcomes in Latin America, 1981–2010: an ecological study. *BMJ open*, *6*(1).

## APPENDIX B: Summary statistics for the data

| Variable | Observations | Mean | Std. Dev. | Min | Max |
|---|---|---|---|---|---|
| *Dependent variables* | | | | | |
| Stringency Index | 30,387 | 43.449 | 35.899 | 0.000 | 100.00 |
| Cancellation of public events | 30,393 | 1.079 | 0.971 | 0.000 | 2.00 |
| Restrictions on public gatherings | 30,402 | 1.705 | 1.786 | 0.000 | 4.00 |
| Stay at home orders | 30,402 | 0.786 | 0.977 | 0.000 | 3.00 |
| Restrictions on internal movement | 30,396 | 0.785 | 0.923 | 0.000 | 2.00 |
| International travel controls | 30,388 | 2.227 | 1.697 | 0.000 | 4.00 |
| *Leader attributes* | | | | | |
| Left-wing | 22,428 | 0.357 | 0.479 | 0.00 | 1.00 |
| Age | 22,078 | 61.062 | 12.129 | 34.00 | 91.00 |
| Gender | 31,684 | 0.916 | 0.278 | 0.00 | 1.00 |
| Military Career | 22,428 | 0.135 | 0.342 | 0.00 | 1.00 |
| Tenure in Months | 22,072 | 73.568 | 98.684 | 0.00 | 630.00 |
| SARS Experience | 31,684 | 0.0846 | 0.2783 | 0.00 | 1.00 |
| H1N1 Experience | 31,684 | 0.1629 | 0 .369 | 0.00 | 1.00 |
| *Health indicators* | | | | | |
| New Deaths | 19,770 | 24.45 | 145.20 | -1918.00 | 6409.00 |
| Investment in a vaccine | 30,345 | 297028.10 | 14800000.00 | 0.00 | 1390000000.00 |
| *Institutional indicators* | | | | | |
| Bureaucratic quality | 24,030 | 2.305 | 1.065 | 0.00 | 4.00 |
| Democratic accountability | 24,030 | 4.163 | 1.428 | 0.50 | 6.00 |
| Economic support index | 30,395 | 24.318 | 31.991 | 0.00 | 100.00 |
| *Macroeconomic and country variables* | | | | | |
| Access to electricity | 24,742 | 89.643 | 21.221 | 11.02 | 100.00 |
| Border with China dummy | 31,684 | 0.073 | 0.260 | 0.00 | 1.00 |
| FDI | 21,538 | 4.988 | 9.699 | -8.60 | 81.10 |
| Government health expenditures | 24,386 | 3.720 | 2.278 | 0.19 | 10.47 |
| Inflation | 23,674 | 5.356 | 8.503 | -0.97 | 63.29 |
| Island nation | 31,684 | 0.163 | 0.369 | 0.00 | 1.00 |
| Population Density | 24,386 | 215.845 | 704.809 | 2.04 | 7953.00 |
| Tourism expenditures | 22,962 | 6.837 | 4.705 | 0.30 | 25.53 |