Pandemic Leadership: Did “Scientists” Lock Down More Quickly?

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Commentators have suggested a link between leaders having a “science” background and the speed of lockdown after the outbreak of COVID-19. We examine possible underlying mechanisms and test this relationship empirically with a global dataset of the educational background of 188 leaders in office at the start of the pandemic. Using several statistical tests, we find no support for a systematic relationship between a leader having studied a natural science or medicine and the timing of the first lockdown. There are no systematic effects for female leaders and populists either. We caution against generalizations based on a small number of high-profile anecdotes about how certain leadership traits translate into different policy responses during the pandemic.

Did leaders with natural science or medical backgrounds lock down more quickly following the outbreak of the COVID-19 pandemic? The effectiveness of governments in fighting the disease has been under intense public and media scrutiny. As infection and mortality data began to show distinct patterns, commentators quickly pointed to the quality of leadership (e.g., Al Saidi et al. 2020, Gallu and Delfs 2020). Media coverage highlighted the divergent capacity of leaders to grasp relevant concepts and scientific evidence, and to act on it. US President Donald Trump, a real estate developer with an economics degree, resisted a national lockdown. Instead, he mused about treating COVID-19 with “very powerful light” and injecting disinfectant (Rucker et al. 2020). In contrast, German Chancellor Angela Merkel declared the pandemic her country’s greatest challenge since World War II, urged citizens to avoid unnecessary contact, and explained the epidemiological basis of her strategy with “the calm confidence expected of a former research scientist with a doctorate in quantum chemistry” (Oltermann 2020). That Merkel was a “scientist” was touted as “the secret to Germany’s Covid-19 success” as she emerged as “the political leader who executed, celebrated, and personified evidence-based thinking when it mattered most” (Miller 2020). It is easy to find anecdotes such as these to suggest a “science” education mattered. Why might there be a link? And what do the data say?

Why education might matter

There are at least two reasons why we might expect a link between a government’s response to the pandemic and the academic training of its leader. The first stems from the fact that crisis situations require speedy decisions, taken by a small group of high-level politicians without the luxury of lengthy analysis. In such contexts, the capability of a leader immediately to grasp the

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problem may be crucial. Prior research shows that the characteristics of leaders shape the performance of organizations and countries (Besley et al. 2011, Dube and Harish 2020, Malmendier et al. 2011). In complex emergencies that require immediate decisions, there is a twist to this argument. This relates to the fit between a leader's specific expertise and the nature of the crisis – in a banking crisis, an understanding of the financial system may help (Hallerberg and Wehner 2020); in a public health crisis, expertise in medicine or the natural sciences may be key (Rachman 2020).

The second reason why the nature of a leader's educational background may matter is that individuals select into particular academic subjects, which has been linked to their personality types (Gambetta and Hertog 2016). In our context, this implies that some leaders intuitively take data and evidence seriously, others not, and this leads them to pursue different educational choices. While it is difficult to distinguish this channel from the first one, their empirical implications point in the same direction: Leaders who studied a relevant academic subject – a natural science or medicine – are more likely to understand the pandemic, take evidence seriously, and hence, act quickly in response.

One counterargument is that leaders may not require specific expertise when they can rely on highly trained advisors to help them make the right decisions. However, leaders choose their advisors, and their closest confidants are often cut from the same cloth. For example, Angela Merkel's chief of staff is a medical doctor, Helge Braun. Boris Johnson's chief advisor during most of 2020 was Dominic Cummings, who was privately educated and studied humanities at Oxford – just like the prime minister. Such advisors, if anything, reflect and reinforce the skill set of their respective leader.

Also uncertain is the influence on leaders of health ministers or other experts. During April and May 2020, Brazilian President Jair Bolsonaro, who opposed strict pandemic control measures, fired two medically trained health ministers he disagreed with before appointing an army general to the portfolio (Schipani 2020). Alternatively, leaders can simply ignore experts when their advice does not suit them, as did US President Donald Trump with his top infectious diseases expert, Anthony Fauci (Viglione 2020). Whether experts can compensate for shortcomings in the analytic capacity of politicians during crisis situations is thus far from certain, and likely contingent on how open these politicians are to receiving such advice in the first place. This again leads us back to the personal characteristics of political leaders.

Few leaders are “scientists”

Moving this discussion beyond anecdotes requires systematic data on the personal traits of political leaders, specifically their educational background. We set out to collect official and other biographical information for the leaders of all 193 United Nations member states who were in office at the start of 2020. In Guatemala and Austria, elections had taken place in the previous year and a new president (Alejandro Giammattei) and chancellor (Sebastian Kurz) took office in January 2020, so we code these as in office at the start of that year. We could not

identify a single individual as effective leader in some politically unstable countries (Libya, Yemen, Sudan and Haiti) and in one diarchy (San Marino).

To classify the educational background of leaders, we used the International Standard Classification of Education (ISCED) developed by the United Nations Educational, Scientific and Cultural Organization (1997). This yields some information of overall levels of educational attainment, with the caveat that the equivalence of levels of education across countries is at times difficult to assess. Of 188 leaders in our dataset, 87% (164) had a university degree, defined as ISCED level 5 or 6. Of those with a degree, we estimate that about half had an advanced degree (ISCED level 6), including 34 leaders (18%) with a doctorate or PhD.

We categorized degree subjects following ISCED 1997 (Andersson and Olsson 1999). Where a leader studied more than one subject, we coded all of them. In most cases, we could classify subjects in a straightforward way, but there were exceptions. For example, Australia's Prime Minister Scott Morrison has a degree in economic geography, which may be considered a subfield of geography or of economics – in this case, we classified it as the latter. For three countries (Marshall Islands, Palau, and Tuvalu), we could confirm that the leader had completed a degree, but not the subjects studied. Figure 1 shows the distribution of the degree subjects of all other 185 world leaders in our dataset across ISCED “broad fields”. By far the most popular category is “social sciences, business, and law”, followed by “humanities and arts”. The “services” category ranges from “hair and beauty services” to “military and defense”, which is not very informative. To add precision, Figure 2 identifies the six most popular “detailed fields”, to which we add the less popular life and physical sciences.

It is striking that, even with our generous definition of having studied a subject, there are very few world leaders with a university degree in medicine or the life or physical sciences. The 15 leaders (8% of the total) listed in Table 1 studied at least one relevant subject and we classify them as “scientists” for the purpose of our analysis. Most studied medicine. They rule in industrialized and developing countries, democracies and dictatorships, and they are geographically dispersed across four continents (Africa, Asia, Europe, and South America). At first glance, these leaders appear to represent a variety of pandemic responses. Apart from Angela Merkel, the only other leader who studied a natural science and completed a doctorate in chemistry is President John Magufuli of Tanzania, who denied the existence of COVID-19 – and later died, officially of “heart complications” and amidst rumors he had caught the virus (Economist 2021). Among medical doctors, the Irish Taoiseach Leo Varadkar was praised for his hands-on involvement in the early stages of the pandemic (Landler 2020), while the Turkmen President Gurbanguly Berdimuhamedow declared his country free of COVID-19 and recommended licorice as a cure (AFP 2020).

What do the data say?

The key outcome of interest is the speed of lockdown. Facing extreme uncertainty about the disease and how best to fight it (Gibney 2020), how quickly governments adopted containment

and closure policies had direct consequences for subsequent mortality rates. By one estimate, the UK government could have saved 20,000 lives by locking down just one week earlier (Stewart and Sample 2020). However, not all central governments have the constitutional authority to impose a lockdown, notably in federal countries (Olson 2020). To acknowledge these differences, we operationalize lockdowns in two alternative ways.

Our first measure of lockdown is the number of days from the start of 2020 to the initial nationwide “stay at home” recommendation or order. All national leaders could have issued the former, irrespective of their constitutional authority. Whether and when to do so was an essential decision they faced at the start of the pandemic. We extract this information from the Oxford COVID-19 Government Response Tracker dataset (Hale et al. 2021). This covers 169 countries in our dataset, with 151 of them adopting such a measure in 2020. The dataset indicates Monaco was the first to do so, after 24 days. The median number of days was 83, but the distribution of this variable has a longer tail as reflected in a mean of 95 days.

Our second measure of lockdown is based on a broader “stringency index” that also captures other containment and closure policies, such as school closures, restrictions on internal movement, or international travel controls (Hale et al. 2021). The index is additive and thus allows for substitutability between different policy measures. It also counts measures targeted at – or adopted by – specific subnational authorities, giving them a lower weight than those with nationwide applicability when calculating the overall score. We construct an indicator of the day on which countries reach the median stringency index score of 54.63, which 160 out of 169 countries did during 2020. On this measure, China was the first to adopt a “stringent” policy response after 26 days. The median number of days was 78, with a mean of 82.

An examination of the number of days since the first of January is a rather blunt measure. One could think of others, such as the date of lockdown after the first case in a country’s borders, or after a given threshold of cases. These alternatives have problems of their own. Early in the pandemic, the testing regimes varied widely, and even to this day some countries do no testing. Even more problematic, the level and quality of testing is likely correlated with other variables we care about, such as the overall quality of the health system. We do include as a control the date of the first reported death in a given country in one regression model. The fact that someone is reported as dying from the virus may put pressure on the government to act. But we cannot say with any precision the date when the first actual death occurred.

In terms of explanations, leaders differ on many other dimensions, not only their educational background, and we code some of these attributes as well. Commentators have also related COVID-19 deaths to whether governments were led by women (Garikipati and Kambhampati 2020, Maclean 2020, North 2020) or populists (Rachman 2020). These characteristics overlap: Angela Merkel is a woman with a doctorate in chemistry, and anything but a populist; Jair Bolsonaro has a military background, is a man, and is a populist. We thus need to consider these traits jointly. Hence, we coded whether a national leader in January 2020 was a man or a woman, and identified “populists” based on the list by Kyle and Meyer (2020). Of the 169

leaders of countries for which we have COVID-19 response data, 13 had a natural science or medical education, 13 were women, and 17 were populists.

Figure 3 reports Kaplan-Meier survivor functions that relate these leader traits to the probability of a nationwide stay at home measure. Most governments did so during the 2020 calendar year, and it mattered little whether they were led by a scientist, woman, or populist. Log-rank tests for the equality of the survivor functions indicate no significant differences. Figure 4 looks at those 151 governments that took this step and when they did so. The median date is March 21 for governments led by scientists, and it falls in between March 17 and 18 for both women and populists (against March 23 for all three: non-scientists, men, and non-populists). Only the difference in medians for populists and non-populists is borderline statistically significant with a Wilcoxon rank-sum test ($z = 1.865$, $p = .062$).

We replicate this analysis with our alternative outcome measure. Again, log-rank tests for the equality of survivor functions in Figure 5 do not detect any significant differences. Looking at the 160 countries in which the government adopted a “stringent” policy response, the median date falls between March 19 and 20 for scientists (March 19 for non-scientists), between March 17 and 18 for women (March 20 for men), and March 16 for populists (March 20 for non-populists). Here, we reject the hypothesis of equal medians for populists and non-populists with a Wilcoxon rank-sum test ($z = 3.470$, $p < .001$).

So far, we have no evidence that leaders with a “science” education are linked to differences in the speed of lockdown. Yet, whether a government has a certain type of leader may covary with other variables that also affect the outcome we examine. We thus assessed these relationships in a Cox regression framework, using a dataset structured by country-day and covering the entire 2020 calendar year. To account for resources, we control for the natural log of GDP per capita (in constant 2010 US\$; World Bank 2020) and purported capacity to handle an infectious disease outbreak according to the 2019 Global Health Security Index (Nuclear Threat Initiative et al. 2019; but see Aitken et al. 2020). We further include a measure of liberal democracy from the V-Dem dataset (Coppedge et al. 2020, Pemstein et al. 2020). While dictators are unincumbered by the checks and balances of democratic constitutions and can act more swiftly, democracies have an advantage due to the free flow of information that promotes responsive government (Besley and Dray 2020, Kavanagh 2020).

Finally, we attempt to control for country-specific dynamics of the pandemic in two ways. First, we account for whether a government has officially confirmed any COVID-19 deaths or not, as recorded in the Oxford dataset (Hale et al. 2021). Our expectation is that doing so would speed up the policy response. We use a simple binary indicator as there is little consistency in fatality data, and misinformation is rife (Besley and Dray 2020). As noted above, this is also the reason why the period we examine is the 2020 calendar year, rather than choosing a starting point with reference to recorded cases or deaths. Second, we include an indicator for island countries, which could stop international travelers importing the disease more easily than countries with land borders.

The resulting Hazard ratios reported in Tables 2 and 3 lend no support to the hypothesis that leaders with a natural science or medical background were any quicker in locking down. We find no significant effects for female leaders and populists either. This pattern is stable across the different specifications and not substantively affected by variations in control variables, irrespective of the outcome measure that we use.

Implications

There is a perception based on anecdotal evidence that leaders who are “experts” in a natural science or medicine understood the pandemic better than their counterparts and enforced earlier lockdowns – which were important because they saved lives. We do not find such a relationship using a worldwide dataset.

One possible explanation for these results is that our data are too inexact, or too plagued with measurement error, to find any meaningful relations. Yet we do find a statistically meaningful and plausible relationship with two independent variables, namely that lockdowns came more quickly after a first reported death and that island nations were less likely to lock down.

A second would be that we are dealing with observational data that might be riddled with endogeneity problems. Countries differ in various respects that may be correlated with the traits of their leaders and their policy response, giving rise to omitted variable bias. Yet our findings are consistent even in a regression framework with controls, which provides some reassurance. Moreover, some features of our dataset rule out other potential sources of bias. As the leaders themselves were appointed prior to the pandemic, reciprocal causation is not a concern. And we counter sample selection bias, which motivated our analysis, by achieving 90% coverage of the eligible population (169 out of 188 UN members with identifiable leaders).

A third would be that the dependent variable itself, namely the lockdown date, is a very incomplete measure of what governments did to fight the pandemic. “Scientists” may pay more attention to the details of the bigger steps. The Hale et al. (2021) dataset includes other dimensions of the policy response to the crisis, such as contact tracing and tests. Yet we looked at the broader “stringency” index in the Hale et al. (2021) dataset to consider the speed of a “stringent” policy response and similarly found null results. We prefer to look specifically at nationwide stay at home recommendations, given that key information can be obscured in an additive index as combinations of different variables may lead to the same index value. But again, the null results remain even with the more broadly-based alternative measure.

Rather, we think our results provide a cautionary tale concerning generalizations about how certain leadership traits translate into different policy responses during the pandemic. A woman with a doctorate in a natural science may initiate an early lockdown, as was the case in Germany. But there does not appear to be a systematic relationship between these traits and the date of lockdown.

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Figure 1: Leader university degree subjects by broad field

Notes: Based on authors' collection of biographical data for 185 political leaders in office in January 2020.

Figure 2: Selected detailed fields in leader university degrees

Notes: Based on authors' collection of biographical data for 185 political leaders in office in January 2020.

Figure 3: Kaplan-Meier survivor functions for nationwide stay at home measure

Figure 4: Days to first nationwide stay at home measure

Figure 5: Kaplan-Meier survivor functions for stringent policy response

Figure 6: Days to first stringent policy response

Table 1: Leaders who studied a natural science or medicine (“scientists”)

Leader	Country	Subjects studied
Hubert Minnis	Bahamas	Biology, medicine
Lotay Tshering	Bhutan	Medicine, management
Angela Merkel	Germany	Physics, chemistry
Keith Mitchell	Grenada*	Chemistry, mathematics, statistics
Alejandro Giammattei	Guatemala	Medicine
Leo Varadkar	Ireland	Medicine
Mahathir Mohamad	Malaysia	Medicine
Saadeddine Othmani	Morocco	Islamic law and theology, psychiatry, medicine
Kim Jong-un	North Korea*	Physics, military
James Marape	Papua New Guinea	Environmental science, business
Bashar al-Assad	Syria	Medicine
John Magufuli	Tanzania	Education, mathematics, chemistry
Keith Rowley	Trinidad and Tobago	Geology
Gurbanguly Berdimuhamedow	Turkmenistan	Medicine
Tabaré Vázquez	Uruguay	Medicine

Notes: Based on authors’ collection of biographical data for 185 political leaders in office in January 2020.

* There are no COVID-19 response data for this country.

Table 2: Hazard ratios from Cox regression models for stay at home measure

	(1)	p-value	(2)	p-value	(3)	p-value
Scientist	1.031 (0.555-1.916)	0.923	0.833 (0.419-1.658)	0.603	0.936 (0.470-1.865)	0.851
Woman	1.370 (0.756-2.484)	0.299	0.832 (0.431-1.606)	0.584	0.842 (0.436-1.627)	0.609
Populist	1.035 (0.594-1.804)	0.904	0.693 (0.373-1.287)	0.245	0.628 (0.336-1.172)	0.144
GDP per capita in 2019 ^a			1.123 (0.941-1.339)	0.198	1.135 (0.941-1.367)	0.185
Global Health Security Index 2019			1.011 (0.993-1.030)	0.223	1.002 (0.983-1.022)	0.824
Liberal Democracy Index 2019			1.493 (0.630-3.538)	0.362	1.860 (0.771-4.486)	0.167
At least one COVID-19 death confirmed					1.572 (1.046-2.363)	0.029
Island country					0.587 (0.365-0.945)	0.028
Observations / time at risk	20,926		19,111		19,111	
Countries	169		154		154	
Nationwide stay at home measures	151		138		138	

Notes: This table reports results from Cox regressions using the Breslau method for ties. There are no substantive differences when using the Efron method; supplementary results are in the replication package. We analyze daily observations for the 2020 calendar year period. The failure event is the first nationwide stay at home recommendation or order as identified by Hale et al. (2021). The table reports hazard ratios with 95% confidence intervals in parentheses.

^a Natural log, constant 2010 US\$. We used 2018 or 2017 if later data were unavailable.

Table 3: Hazard ratios from Cox regression models for stringent policy response

	(1)	p-value	(2)	p-value	(3)	p-value
Scientist	0.937 (0.518 - 1.695)	0.830	0.728 (0.380 - 1.394)	0.338	0.720 (0.375 - 1.383)	0.324
Woman	1.245 (0.690 - 2.248)	0.467	0.860 (0.458 - 1.617)	0.640	0.925 (0.491 - 1.740)	0.808
Populist	1.453 (0.846 - 2.494)	0.175	1.166 (0.649 - 2.095)	0.607	0.973 (0.536 - 1.765)	0.927
GDP per capita in 2019 ^a			1.126 (0.953 - 1.331)	0.162	1.230 (1.026 - 1.474)	0.025
Global Health Security Index 2019			1.011 (0.995 - 1.028)	0.189	0.995 (0.977 - 1.013)	0.567
Liberal Democracy Index 2019			1.132 (0.477 - 2.689)	0.778	1.616 (0.659 - 3.963)	0.295
At least one COVID-19 death confirmed					1.690 (1.132 - 2.522)	0.010
Island country					0.375 (0.229 - 0.614)	0.000
Observations / time at risk	16,435		14,584		14,584	
Countries	169		154		154	
Stringent policy responses	160		147		147	

Notes: This table reports results from Cox regressions using the Breslau method for ties. There are no substantive differences when using the Efron method; supplementary results are in the replication package. We analyze daily observations for the 2020 calendar year period. The failure event is the first adoption of a “stringent” policy as identified by a score of at least 54.63 (the median for 2020) on the “stringency index” calculated by Hale et al. (2021). The table reports hazard ratios with 95% confidence intervals in parentheses.

^a Natural log, constant 2010 US\$. We used 2018 or 2017 if later data were unavailable.

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