DISCUSSION PAPER SERIES

DP15791

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PUBLIC ECONOMICS

CEPR

ISSN 0265-8003

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Discussion Paper DP15791
Published 10 February 2021
Submitted 09 February 2021

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This Discussion Paper is issued under the auspices of the Centre's research programmes:

- Public Economics

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Abstract

Due to its high contagiousness, and the lags in development and administration of vaccines, containment of the COVID-19 pandemic is highly dependent on public behavior and on the focus and transparency of instructions issued by governing bodies. Democratic governments can mobilize support for painful measures if their decisions inspire broad-based confidence and legitimacy. Mobilizing public support for well-focused sanitary actions can also be achieved by coercion. Although coercive measures, can be used temporarily by democratic governments authoritarian governments have a comparative advantage in enforcing them. Results from a cross section of over 150 countries show that, in the absence of controls cumulative death per million people (CD) are lower in less democratic countries. When controlling for the fraction of old population and other variables the impact of democracy on CD in the entire sample vanishes. But splitting the sample into high democracy countries and low democracy countries reveals that mobilization of collective action is more (less) effective in the first (second) group the higher the level of democracy. An overtime average of the stringency of government responses to the pandemic (S) has a highly significant positive impact on CD suggesting reverse causality from CD to stringency. The paper formulates this dual relation as a 2x2 simultaneous model with a CD schedule and an S schedule and shows theoretically that the observed intersection points (CD, S) nearly trace a relatively immobile governmental, positively sloped, stringency response schedule. An overtime -- cross country estimate of the S schedule confirms this result yielding a highly significant but small coefficient.

JEL Classification: D7, P16, I1, J1, C30

Keywords: democracy, collective action, pandemic deaths, lockdowns, stringency

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February 9 2021

Effectiveness of collective action against the pandemic: Is there a difference between democratic and authoritarian regimes?

Alex Cukierman[1]

Preliminary

ABSTRACT

Due to its high contagiousness, and the lags in development and administration of vaccines, containment of the COVID-19 pandemic is highly dependent on public behavior and on the focus and transparency of instructions issued by governing bodies. Democratic governments can mobilize support for painful measures if their decisions inspire broad-based confidence and legitimacy. Mobilizing public support for well-focused sanitary actions can also be achieved by coercion. Although coercive measures, can be used temporarily by democratic governments authoritarian governments have a comparative advantage in enforcing them.

Results from a cross section of over 150 countries show that, in the absence of controls cumulative death per million people (CD) are lower in less democratic countries. When controlling for the fraction of old population and other variables the impact of democracy on CD in the entire sample vanishes. But splitting the sample into high democracy countries and low democracy countries reveals that mobilization of collective action is more (less) effective in the first (second) group the higher the level of democracy.

An overtime average of the stringency of government responses to the pandemic (S) has a highly significant positive impact on CD suggesting reverse causality from CD to stringency. The paper formulates this dual relation as a 2x2 simultaneous model with a CD schedule and an S schedule and shows theoretically that the observed intersection points (CD, S) nearly trace a relatively immobile governmental, positively sloped, stringency response schedule. An overtime -- cross country estimate of the S schedule confirms this result yielding a highly significant but small coefficient.

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1. Introduction

Due to its high contagiousness, and the lags in development and administration of vaccines, containment of the COVID-19 pandemic is highly dependent on public behavior and on the focus and transparency of instructions issued by governing bodies. Democratic governments can mobilize support for painful measures if their decisions inspire broad-based confidence and legitimacy. In the absence of adequate trust, fake news and diverging interests, mobilizing public support for well-focused sanitary actions can also be achieved by coercion. Although coercive measures, such as lockdowns, can be used temporarily by democratic governments authoritarian governments have a comparative advantage in enforcing them.

In a recent background blog (Cukierman (2020)) I show that at least two thirds of the huge difference in COVID-19 related deaths between the democratic US and authoritarian China since April 2020 is due to centralized, strictly enforced, sanitary measures imposed by the Chinese Communist Party (CCP) along with pandemic denial by president Trump and absence of a centralized sanitary policy in the US. Although this case is striking there also are examples of democratic governments, such as Taiwan, in which the pandemic is well under control.

Those considerations and the US-China comparison raise a couple of general questions: First, does the evidence that accumulated so far imply that there are systematic differences in the mobilization of public action against the pandemic between democratic and dictatorial regimes? Second, what other factors affect the cross sectional distribution of COVID-19 deaths. This paper attempts to shed light on those questions by running cross-country regressions of corona related deaths normalized by population on an index of democracy controlling for age structure, healthcare access, religious and cultural diversity, stringency of government response to the pandemic, population density, average temperature, air connectivity and GDP per capita.

Unlike most of the quickly evolving recent literature on the factors governing the pandemic, which utilizes over time daily data or focuses on a small number of countries, the bulk of this paper uses over time aggregates of variables that vary at daily frequencies in order to focus on

cross-country variations in the incidence of the pandemic and in the structural factors that affect it.[2]

The paper organization follows: Section 2 takes a first look at the simple relationship between Covid-19 deaths and the Economist Intelligence Unit democracy index over 160 countries and reports that the cumulative corona deaths (CD) are lower in more authoritarian countries. But introduction of the fraction of population above 65 reveals that the impact of democracy vanishes suggesting that, democracy was significant only because population is older in high democracies. Section 3 takes a broader look at the factors affecting CD by expanding the number of regressors. Interestingly, in the presence of additional regressors, and when separate regressions are estimated for high democracy countries (HD) and low democracy countries (LD) the democracy index (DI) becomes significant again with opposite signs in the two groups (negative in HD and positive in LD). Section 4 adds an aggregate index of the stringency of government response to the pandemic (S) to the regression. Contrary to apriori expectation this index is invariably positive and highly significant supporting the view that there is reverse causality operating from CD to S; countries with higher cumulative deaths respond by imposing more stringent restrictions on mobility and public gatherings. The section casts this into simultaneous two schedules relation between CD and S and, given the data, shows that the observed intersection points nearly trace the location of an S schedule rather than a CD schedule. Section 5 utilizes daily, over-time cross-sectional data to estimate the response of stringency to past values of new confirmed corona cases. This is followed by a conclusion. The data, its sources, definition of variables and various summary statistics appear in the appendix.

2. Covid19 deaths and the degree of democracy in the world: A first look

The comparison between China and the US in Cukierman (2020) suggests that a totalitarian country such as China is more effective in mobilizing public action against Covid19 mortality than a democracy like the US. Yet there are democratic countries like Vietnam, Thailand and

[2] Much of this research is reviewed and expanded in Balazs et. al. (2020). Conway et. al. (2020) estimate the impact of governmental responses to the pandemic by comparing, during the first half of 2020, its evolution in Denmark which took restrictive measures with its evolution in Sweden which did not. A similar comparison is applied by Weber (2020) across the German states. Deb et. al. (2020) use daily panel data with a large cross section of countries to estimate the impact of specific restrictive measures on the incidence of the pandemic.

Taiwan that have achieved similar results through other means such as public discipline and trust in government.

As a first step toward examining the more general cross-country relation between Covid19 incidence and the degree of democracy in a country I focus on the relation between cumulative deaths (CD) from the World Health Organization (WHO) data set and an index of democracy provided by the Economist Intelligence Unit (EIU). CD stands for total confirmed deaths per million people due to the pandemic as of December 8 2020. The democracy index (DI) is based on five categories: electoral process and pluralism; civil liberties; the functioning of government; political participation; and political culture. Based on their scores on 60 indicators within these categories, each country is then itself classified as one of four types of regime: full democracy; flawed democracy; hybrid regime; and authoritarian regime. The index is shown on a scale of 0-10 with 10 corresponding to the highest level of democracy and 0 to staunch totalitarian regimes.

A graph of the relation between CD and DI is shown in Figure 1 and a regression of CD on DI appears in the first column of Table 1. The graph suggests cumulative deaths are higher in more democratic countries and the regression shows that this positive association is statistically significant at the 0.001 level. This preliminary experiment supports the view that less democratic regimes are more effective in mobilizing public action against spread of the pandemic. The second column of Table 1 adds GDP per capita from the World Bank (WB) data set to this regression. This variable is insignificant and the democracy index remains significant at the previous level.

The third column of Table 1 relates cumulative deaths to democracy and to the fraction of the population above age 65 (OLD). OLD has a positive and highly significant positive impact on deaths while the democracy variable becomes statistically insignificant. This outcome is consistent with the view that, since the fraction of old individuals in democratic countries is relatively high, the initially found positive association between deaths and democracy is due to the older age of the population in relatively more democratic countries.[3]

[3] Table A2 in the Appendix shows that the coefficient of correlation between democracy and the fraction of individuals older than 65 is 0.681 and is significant at more than the 0.001 level.

Figure 1: Confirmed Deaths per Million and Democracy

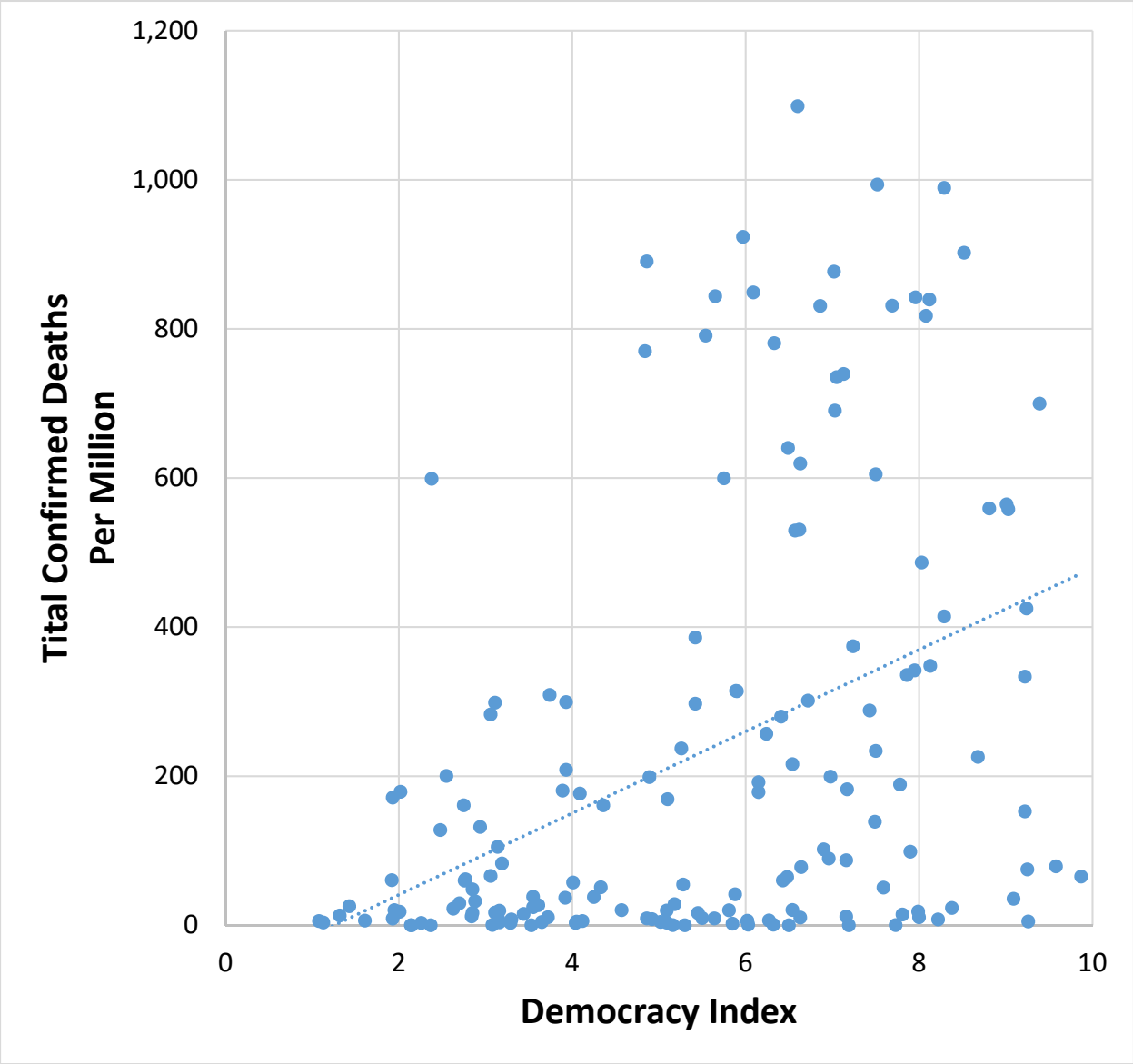

Table 1: Regressions of Cumulative Deaths per Million on a Democracy Index, GDP per Capita and Percent of Population above 65

Coefficients & Other Statistics	Democracy Index (DI) Only	DI & GDP per Capita	DI & % of Population above 65 (OLD)
Intercept	-63.31 (-1.0)	-67.36 (-1.0)	-30.23 (-0.5)
Democracy Index (DI)	55.05*** (5.5)	53.50*** (4.1)	15.95 (1.23)
GDP per Capita		0.0008 (0.6)	
Population above 65 (%)			19.81*** (4.5)
Adjusted R^2	0.16	0.16	0.25
F statistic	30.6	15.0	27.7
N	160	152	156

*** Significant at more than the 0.001 level.
t-statistics are in parenthesis under the coefficients.

3. A broader look at the factors impacting Covid19 deaths

This section broadens the investigation by exploring the impact of additional explanatory variables on Covid19 related deaths. The additional variables are: 1. An index of Healthcare access and quality (HAQ) in 195 countries in 2015 provided by Our World in Data (OWD). It is measured on a scale from 0 (worst) to 100 (best) based on death rates from 32 causes of death that could be avoided by timely and effective medical care. 2. A Religious Diversity Index (RDI) provided by the Pew Research Center (PRC). The index is based on eight religious groups. It is measured on a scale of 0 (one religion only) to 10 (equal shares to all eight religions). 3. A Cultural Diversity index from Wikipedia, 4. Population Density measured by the number of people per square kilometer of land from the World Bank (WB). 5. Average Temperature from

Wikipedia. 6. An index of Air Connectivity from the International Air Transport Association (IATA).

Table 2 presents in the last memo column a regression of CD on all nine regressors and in the first column a trimmed regression that contains only variables that were significant in some of the background experiments (not shown). To detect possible differences in behavior between democratic and less democratic countries the sample was further divided into two groups: High Democracy countries (HD) with scores above the mean of DI (5.46) and Low Democracy countries (LD) with scores below the mean. The trimmed regressions for HD and LD appear in the second and third columns of the Table. Overall, the following four variables have a significant impact on CD in all or at least some of the regressions: The democracy index, the percent of population above age 65, the healthcare access and quality index and the religious diversity index. The rest of the discussion focuses on the first three regressions.

In the overall sample The democracy index is insignificant, as it was in the absence of HAQ and RDI in the last column of Table 1. However, as can be seen from columns 2 and 3 the overall impact masks different behavioral modes in HD and LD: It is negative and significant in HD and positive and significant in LD. Those different impacts can be understood by noting that mobilization of collective action against the pandemic can be achieved through two channels. One is trust in government and discipline as in Taiwan. The other is coercion as in China. The difference in results on the impact of DI between HD and LD is consistent with the view that the first channel is dominant in HD while the second is more important in LD. OLD has a positive and significant impacts on CD in the overall sample, as well as in LD confirming that Covid19 related deaths are more frequent among the elderly but is insignificant in HD.

RDI exerts a negative and significant impact on CD in the overall sample as well as in the two subgroups. This might appear surprising at first blush. A possible explanation for this uniformly negative impact is that religious diversity proxies for built in mechanisms of social distancing. In many countries different religious groups tend to be concentrated geographically resulting in a relatively large concentration of social encounters within their respective areas than in areas inhabited by other religious groups. Interestingly, when the regression is re-estimated separately for OECD and Non-OECD countries (not shown) the significant negative impact of RDI on CD survives only in the second group. A possible explanation is that in countries that

Table 2: Regressions of Cumulative Deaths per Million for all Countries, High Democracy Countries and Low Democracy Countries

Coefficients & Other Statistics	All countries	High Democracy countries (HD)	Low Democracy countries (LD)	Memo: All countries and Regressors
Intercept	-161.46 (-1.4)	176.35 (0.677)	-286.17** (-3.3)	-428.76* (-2.2)
Democracy Index (DI)	15.24 (1.2)	-91.70* (-2.11)	36.23** (2.7)	24.59 (1.5)
Percent of population above 65 (OLD)	12.85* (2.2)	1.22 (0.11)	15.53** (3.0)	13.16 . (1.66)
Healthcare access and quality Index (HAQ)	4.66* (2.3)	13.65* (2.6)	4.23** (3.2)	7.95** (2.9)
Religious Diversity Index (RDI)	-31.27** (-3.3)	-41.17* (-2.3)	-15.60* (-2.2)	-34.96 (-2.9)
Cultural Diversity				145.84 (1.1)
Population density				-0.02 -0.5
GDP per capita				-0.00 (-1.6)
Temperature				1.18 (0.3)
Air connectivity				0.00 (1.3)
Adjusted R^2	0.32	0.21	0.37	0.34
F statistic	18.8	6.2	11.4	8.5
N	151	80	71	132

** Significant at the 0.001 level
* Significant at the 0.01 level
. Significant at the 0.1 level
t-statistics are in parenthesis under the coefficients.

manage to survive with many religions individual reliance and trust in government is higher making it easier to mobilize public action against the pandemic. A case that comes to mind is Singapore.

Contrary to apriori expectations HAQ exerts a uniformly positive and significant impact on CD. This might be related to the fact that CD statistics are collected and reported by the healthcare systems. In many countries there is under-reporting of CD and the extent of under-

reporting is, most likely, larger in countries with poorer health care systems. Repetition of the regression (not shown) in the first column of Table 2 separately for OECD and Non-OECD countries yields indirect support for this explanation. In that regression the healthcare coefficient becomes insignificant for the OECD but remains highly significant for the Non-OECD group. This is consistent with the view that the impact of the downward bias in reporting deaths is important in Non-OECD countries but small in OECD countries with relatively better healthcare systems. In addition, the healthcare index is more variable in Non-OECD countries than in OECD countries (its standard deviation is more than twice that of the standard deviation of its counterpart in OECD countries). This higher variability contributes to the detection of a significant positive relation between CD and HAQ in the Non-OECD supporting the view that it is due to varying degrees of corona deaths under-reporting within that group of countries.

The remaining variables are insignificant. In particular, once healthcare and old age have been controlled for, GDP per capita is redundant. The insignificance of the, average over time, temperature variable does not necessarily imply that this variable has no effect if allowed to vary across the seasons of the year. Using over time data Hubert (2020) finds that restrictions on air travel reduce the number of corona casualties. Logic would therefore imply that countries with naturally lower air connectivity should have less casualties. But air connectivity is found to be insignificant possibly because of the large number of countries with relatively low levels of natural air connectivity.

Broader discussion in the context of recent work by Karabulut et. al. (2021): In a very recent CEPR discussion paper Karabulut et. al investigate the impact of democracy on the infection rate and on the case fatality rate. The infection rate (IR) is defined as the total number of corona cases divided by population and the case fatality rate (CFR) is the total number of deaths divided by the total number of corona cases. They find that in the absence of controls democracy is positively related to IR and has no significant impact on CFR. In the presence of controls, such as the fraction of the population above age 65 (OLD), democracy retains a positive and significant impact on IR but the impact on CFR becomes significantly negative.

I find that, in the full sample and in the absence of controls, CD (defined as total deaths divided by population) is positively related to democracy and that this effect disappears in the presence of OLD. Abstracting from some differences in the measures of democracy and in econometric specification it may be of interest to take a broad look at the conjunction of their

results and those reported in this paper.[4] Using the definition of the variables involved and elementary algebra it can be shown that

$$CD = (CFR)(\text{IR}). \quad (1)$$

Thus the Cummulative death variable of this paper is the product of the CFR and IR variables investigated by Karabulut et. al.. A possible explanation for the conjunction of results in the two papers follows:

In the absence of controls democracy has positive impacts on IR and CD and no significant impact on CFR implying that the positive impact on CD is due only to its impact on IR. A possible interpretation for the absence of impact on CFR may be due to the operation of the two following offsetting effects: On one hand, in the absence of controls, since the population of established democracies is relatively older, democracy is capturing some of the positive impact of OLD on CFR. On the other hand, more democratic countries assign higher values to human lives. This operates in the opposite direction yielding an overall insignificant coefficient. The positive impact of democracy on IR confirms the view that autocratic regimes have a comparative advantage in mobilizing preventive public action against the pandemic.

In the presence of OLD and other controls the impact of democracy on IR remains positive and significant, the impact on CFR becomes negative and the impact on CD vanishes. Those outcomes are consistent with the following view: Once old age is controlled for the positive impact of democracy on CFR through its association with old age disappears leaving only the significantly negative, value of life, impact of democracy on CFR. This effect, in conjunction with the significantly positive impact of democracy on IR, combine to eliminate the impact of democracy on CD.

4. Stringency of governmental responses and Covid19 deaths: Two ways causality?!

Following the beginning of the pandemic Thomas Hale et. al. (2020) from the Blavatnik School of Government have been computing a Government Response Stringency index to the pandemic. This is a composite measure based on nine response indicators including school

[4] Karabulut et. al. (2021) use three democracy indices from Freedom House and logarithmic specifications.

closures, workplace closures, travel bans, restrictions on gatherings and on internal movements, closures of public transport and face masks, rescaled to a value from 0 to 100 (100 = strictest).[5]

The first column of table 3 is identical to the first regression in Table 2 augmented with a daily average of the stringency index for each country between March 1 2020 and November 30 2020 (S). At first blush S is expected to exert a negative influence on CD. However, its coefficient is positive rather than negative and is highly significant. This phenomenon reoccurs in other (unreported) variants of this regression supporting the view that there is two ways causality between S and CD. On one hand higher stringency should reduce CD. But, on the other hand, the higher CD the more likely is government to impose more stringent restrictions on social encounters and economic activities. Consequently, the impact of CD on S should be positive. For the cross sectional data used here those two relation can be cast as a the following (linear for simplicity) two equations simultaneous system between CD and S.

$$CD = \beta_S S + A_{CD}$$

$$S = \beta_{CD} CD + A_S$$

β_S characterizes the partial impact of S on CD and is expected to be negative. β_{CD} characterizes the partial impact of CD on S and is expected to be positive. A_{CD} is an autonomous factor that affects CD and A_S is an autonomous factor that affects S. Clearly, the observed values of CD and S correspond to the intersection points of the CD and S schedules. To the extent that A_{CD} is sufficiently more variable than A_S those intersection points approximately identify a relatively immobile S schedule. Conditions under which this is the case are discussed below.

The second column in Table 3 re-estimates the CD schedule using an instrument for S. For each country the instrument is constructed by running an overtime regression of S on confirmed new cases lagged by ten days and using the constants from each such regression as an instrument for the average impact of S at the country level. This, at least partially, neutralizes the impact of new cases on S leaving the constant plus the sum of the residuals in a country as an instrument for the cross sectional regression. Since, by the properties of least squares in each over time regression the sum of residuals is zero this sum drops. It can be seen from the second column in table 3 that, although this procedure weakens the estimated relation between S and

[5] This data is publicly available on the OWID homepage.

CD, it remains significantly positive implying that the instrument did not neutralize all reverse causality factors.

This implies that the relation between CD and S in the second column of Table 3 is likely to reflect intersection points between the CS and S schedules in Figure 2 rather than the impact of stringency on deaths. Although the paper does not offer a satisfactory instrument for the estimation of a CD schedule it is possible to show, given the orders of magnitudes of the data, that the autonomous component of the CD schedule (A_{CD}) is substantially more variable than that of the S schedule (A_S). This observation implies that the positive association between S and CD is nearly identifying shifts of the CD schedule along a relatively immobile S schedule. This is illustrated in Figure 2. The remainder of this section demonstrates that A_{CD} is substantially more variable than A_S.

Figure 2: The Cumulative Deaths (CD) and Stringency (S) Schedules

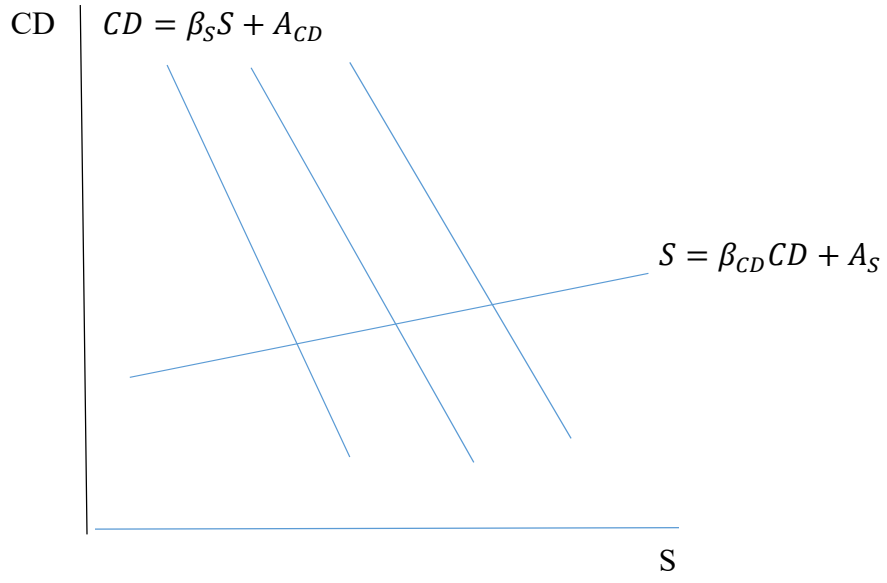

Table 3: Addition of a Government Response Stringency Index to regressions of Cumulative Deaths per Million for entire sample

Coefficients & Other Statistics	Addition of Stringency	Instrumenting Stringency
Intercept	-504.27*** (-3.6)	-455.54*** (-3.2)
Democracy Index (DI)	7.81 (0.6)	11.00 (0.9)
Percent of population above 65 (OLD)	20.11** (3.1)	18.08** (2.8)
Healthcare access and quality Index (HAQ)	3.1 (1.4)	3.99 . (1.8)
Religious Diversity Index (RDI)	-27.59** (-2.7)	-28.07** (-2.6)
Stringency index (S)	6.80*** (4.1)	
Instrument for Stringency Index (S_I)		5.05** (3.36)
Adjusted R^2	0.41	0.39
F statistic	19.15	17.33
N	130	130

*** Significant at more than the 0.001 level.
** Significant at the 0.001 level
* Significant at the 0.01 level
. Significant at the 0.1 level
t-statistics are in parenthesis under the coefficients.

The variances of the CD and S schedules are given by

$$V(CD) = \beta_S^2 V(S) + V(A_{CD}) + 2Cov(S, CD)$$

$$V(S) = \beta_{CD}^2 V(CD) + V(A_S) + 2Cov(S, CD)$$

Rearranging and requiring that

$$V(A_{CD}) = V(CD) - \beta_S^2 V(S) - 2Cov(S, CD) \gg V(S) - \beta_{CD}^2 V(CD) - 2Cov(S, CD) = V(A_S)$$

From the data $V(CD)$ = 94316 and V(S) = 190. Using those figures in the inequality above, noting that $2Cov(S, CD)$ drops, and rearranging a necessary and sufficient condition for the inequality is

$$94126 \gg 190\beta_S^2 - 94316\beta_{CD}^2$$

Since the range of values of CD is greater than that of S, β_S is larger than β_{CD} (the means of CD and S are 239 and 60 respectively). Just to make the right hand side of this equation zero rather than negative β_S would have to be larger than β_{CD} by a factor of 22. Obviously this factor would have to be even bigger to raise the right hand to one tenth of the left hand side. In view of the fact that the ratio between the mean of CD and that of S is only 4 it is very likely that the last inequality is satisfied implying that $V(A_{CD}) >> V(A_S)$.

5. Over time estimation of stringency of government response to recent new confirmed cases using daily data.

This section makes a first step toward the utilization of overtime data. In particular, it focuses on daily data within each country in order to estimate the response of government stringency measures to changes in new confirmed cases. To capture the fact that government policies do not respond immediately to changes in new cases, stringency on day t (S_t) is regressed on New Cases Lagged (NCL_{t-10}) by 10 days. Other individual country effects on (S_t) are captured by country specific intercepts. In the first subsection the slope coefficient is allowed to vary across countries. In the second subsection the slope coefficient is constrained to be uniform within the group of countries under consideration. The daily data used comes from Our World in Data (detailed source appears in the Appendix). It starts, depending on the country. at various dates during the first quarter of 2020 and ends on January 8 2021.

Different response coefficients: The coefficients of (NCL_{t-10}) are relatively small confirming part of the discussion in section 4. Although Governmental responses to New Cases Lagged vary across countries their range of variation is small. The largest but insignificant value (for Fiji) is 3.15 and the smallest (for Burkina Faso) is -0.18. More importantly, in about two thirds of the countries the responses are positive and most of them are statistically significant. In the remaining countries, with negative coefficients, the absolute values of the coefficients are relatively small and frequently insignificant.[6]

Table 4 shows summary statistics for the response coefficients within the group of countries with positive coefficients and (in absolute values) for the group of countries with negative

[6] The goodness of fit of most individual country regressions is relatively small

responses. The mean of the positive responses is five time larger than the mean of the negative responses but the medians are similar suggesting a strong skew to the right within the first group. The standard deviation of the positive response coefficients is ten times larger than that of the negative response coefficients.

The general conclusion from those experiments is that in a majority of countries the stringency of governmental responses to lagged new cases is positive with relatively small coefficients below the median.

Table 4: Summary Statistics for Positive and Negative Response coefficients

Positive NCL Coefficients	
Number of Countries	87
Mean	0.10
Median	0.01
Standard Deviation	0.40
Variance	0.16
Minimum	0.00
Maximum	3.15

Absolute values of Negative NCL Coefficients	
Number of Countries	43
Mean	0.02
Median	0.01
Standard Deviation	0.04
Variance	0.00
Minimum	0.00
Maximum	0.18

Uniform response coefficient within each of the high democracy (HD) and low democracy (LD) groups: This subsection examines the case in which the response coefficient is constrained to be uniform across countries. Since the cross country variation in the response coefficients is small a single worldwide response coefficient is relatively informative. This experiment is performed separately for HD and LD countries. Within each group the typical regression is now

$$S_t = \sum_{c-1}^{N} \{\alpha_c + \beta(NCL_{t-10}^{c})\}$$

where N is the number of countries within either the HD or the LD group. In both groups the goodness of fit increases dramatically in comparison to the country specific response coefficients. The estimated value of β is positive and highly significant but quantitatively small in HD (β=0.0002) and insignificant in LD. Those finding yield further support to the view that the S schedule is relatively flat (see Figure 2 in section 4). The range of estimated country specific intercepts is (82, 35) in HD and (92, 14) in LD.

6. Conclusion

The main results and conclusions are:

Over the entire sample of 160 countries the impact of democracy alone on cumulative COVID19 deaths (CD) is significantly positive seemingly supporting the view that less democratic regimes are more efficient in mobilizing collective action in the struggle against the pandemic. However, when one controls for the fraction of population above 65 (OLD) democracy becomes insignificant and OLD is found to have a positive impact on CD. This supports the view that, in the entire sample of countries, democracy alone has been significant because the fraction of old population in those countries is relatively larger than in less democratic countries.

Splitting the sample of countries into High Democracy countries (HD) (above the mean Democracy Index (DI)) and into Low Democracy countries (LD) (below the mean of DI), controlling for OLD, healthcare and religious diversity reveals the following difference in the impact of democracy on CD between the two groups of countries. Democracy has a negative and significant impact on CD in HD and a negative and significant impact on CD in LD. This implies that mobilization of collective action is more efficient the **higher** is the level of democracy

within the group of HD while it is more effective the **lower** is the level of democracy within LD that are more likely to rely on coercive measures.

At first blush Stringency (S) of measures against the pandemic such as partial or full lockdowns and reductions in air traffic are expected to have a negative and significant impact on CD. However, when the S variable is added to the CD regression the sign of its coefficient is invariably positive and significant. This outcome points to the existence of reverse causality; when CD are higher government impose tighter restrictions on mobility – which raises S. This can be cast into a 2x2 simultaneous model involving two schedules. The first one characterizes the impact of various mobility restrictions on CD and its coefficient is expected to be negative. The second characterizes government response to CD and its coefficient is expected to be positive. It follows that a regression of CD on S traces the variation of intersection points across countries rather than either one of those two schedules. Based on the relative numerical magnitudes of S and CD it is shown that in the (S, CD) plane the CD schedule is substantially more variable than the S schedule implying that the intersection points nearly identify a relatively immobile (across countries) S schedule. This establishes that the relation between S and CD should be positive as found in the regressions.

Over time estimates of government response to lagged new daily cases for each country reveal that, in a majority of cases the response is positive and significant but the response coefficients below the median are relatively small. When the response coefficient is constrained to be uniform across countries its estimate is positive and highly significant but small in high democracies and insignificant in low democracy countries.

Before closing this paper, the following qualification is in order. In order to focus on the differential cross country impact of variables that do not change at daily frequencies, such as the level of democracy the bulk of the paper utilizes an overtime average of the stringency index. Although this methodology is suited for describing a simultaneous cross country relationship between cumulative deaths and averages stringency it cannot capture the short run effects of daily changes in stringency on new deaths. Hence the inability of this paper to identify a cross country cumulative deaths schedule does not mean that higher stringency is ineffective in moderating new deaths at daily frequencies. As a matter of fact, using daily data from the second half of January till the beginning of May 2020, and controlling for country specific

characteristics, Deb et. al. (2020) find that stringency and some of its components were effective in reducing the number of infections and deaths.

APPENDIX

Appendix 1: Definition of variables, Sources, Summary Statistics and Correlation matrix

1. Cumulative Confirmed Deaths (CD) is the total number of corona related deaths per million people as of December 8 2020.
   Source: World Health Organization (WHO), https://covid19.who.int/?gclid=EAIaIQobChMIkseBl7y37gIVC0CRBR2gVAK0EAAYASAAEgLktvD_BwE

2. Cummulative Confirmed Cases (CC) is the total number of corona cases per million people as of December 25 2020.
   Source: Our World in Data: Corona Virus Pandemic (COVID19)- the Data (OWID COVID), https://ourworldindata.org/coronavirus-data

3. Democracy Index (DI) is based on five categories: electoral process and pluralism; civil liberties; the functioning of government; political participation; and political culture. Based on their scores on 60 indicators within these categories, each country is then itself classified as one of four types of regime: full democracy; flawed democracy; hybrid regime; and authoritarian regime. The index is calculated yearly by the Economist Intelligence Unit (EIU). The 2019 index is used here.
   Source: EIU DI, https://www.eiu.com/topic/democracy-index

4. GDP Per Capita in current US $ in 2019.
   Source: The World Bank Data Set, https://data.worldbank.org/indicator/NY.GDP.PCAP.CD?end=2019&start=2019

5. Percent of Population above 65 (OLD),
   Source: The World Bank Data Set, https://data.worldbank.org/indicator/SP.POP.65UP.TO.ZS

6. Population Density is measured as the number of people per square km of land
   Source: The World Bank Data Set, https://data.worldbank.org/indicator/en.pop.dnst

7. Healthcare Access and Quality (HAQ) is measured on a scale from 0 (worst) to 100 (best) based on death rates from 32 causes of death that could be avoided by timely and effective medical care (also known as 'amenable mortality'),

Source: Our World in Data: Corona Virus Pandemic (COVID19)- the Data (OWID COVID), https://ourworldindata.org/coronavirus-data

8. Cultural Diversity is approximated by a measure of similarity between languages, varying from 1 = the population speaks two or more unrelated languages to 0 = the entire population speaks the same language. This index of cultural diversity is biased towards linguistic variations as opposed to genetic diversity and other variations.
   Source: ChartsBin, http://chartsbin.com/view/41545#:~:text=The%20lists%20are%20commonly%20used,not%20from%20the%20same%20group

9. Religious Diversity Index (RDI) is a Herfindahl-Hirschman concentration index. It is based on the shares of eight major world religions (Buddhism, Christianity, folk or traditional religions, Hinduism, Islam, Judaism, other religions considered as a group, and the religiously unaffiliated). It varies between 0 (lowest diversity) to 10 (highest diversity).
   Source: Pew Research Center, https://www.pewforum.org/2014/04/04/religious-diversity-index-scores-by-country/

10. Government Response Stringency Index (S) is a composite measure based on nine response indicators including school closures, workplace closures, and travel bans, rescaled to a value from 0 to 100 (100 = strictest). A detailed account of government responses and their codings appear following the listing of all variables. The original data is daily. Excluding section 5 the variable S is an overtime average of the daily figures over the period between March 1 2020 and November 30 2020.
    Source: Hale et.al. (2020), https://www.bsg.ox.ac.uk/research/research-projects/oxford-covid-19-government-response-tracker. (The data is also available on the OWID COVID page).

11. Air Connectivity is an aggregate measure of air connectivity in 2019.
    Source: Air Connectivity, IATA, First column in table on page 95 of the appendix, https://www.iata.org/en/iata-repository/publications/economic-reports/air-connectivity-measuring-the-connections-that-drive-economic-growth/

12. Temperature is average yearly temperature in degrees Celsius calculated by averaging the minimum and maximum daily temperatures in the country, averaged for the years 1961–1990.
    Source: Wikipedia, https://en.wikipedia.org/wiki/List_of_countries_by_average_yearly_temperature

13. Daily data on S_t and NCL_t
    Source: Our World in Data: Corona Virus Pandemic (COVID19)- the Data (OWID COVID), https://ourworldindata.org/coronavirus-data

Stringency (S): Detailed codings of specific policy responses

School closures:
0 - No measures
1 - recommend closing
2 - Require closing (only some levels or categories,
eg just high school, or just public schools)
3 - Require closing all levels

Workplace closures:
0 - No measures
1 - recommend closing (or work from home)
2 - require closing (or work from home) for some
sectors or categories of workers
3 - require closing (or work from home) all but essential workplaces (eg grocery stores, doctors)

Cancel public events:
0- No measures
1 - Recommend cancelling
2 - Require cancelling

Restrictions on gatherings:
0 - No restrictions
1 - Restrictions on very large gatherings (the limit is above 1000 people)
2 - Restrictions on gatherings between 100-1000 people
3 - Restrictions on gatherings between 10-100 people
4 - Restrictions on gatherings of less than 10 people

Close public transport:
0 - No measures
1 - Recommend closing (or significantly reduce volume/route/means of transport available)
2 - Require closing (or prohibit most citizens from using it)

Public information campaigns:
0 -No COVID-19 public information campaign
1 - public officials urging caution about COVID-19
2 - coordinated public information campaign (e.g. across traditional and social media)

Stay at home:
0 - No measures
1 - recommend not leaving house
2 - require not leaving house with exceptions for daily exercise, grocery shopping, etc
3 - Require not leaving house with minimal exceptions (e.g. allowed to leave only once every few days, or only one person can leave at a time, etc.)

Restrictions on internal movement:
0 - No measures

1 - Recommend movement restriction
2 - Restrict movement

International travel controls:
0 - No measures
1 - Screening
2 - Quarantine arrivals from high-risk regions
3 - Ban on high-risk regions
4 - Total border closure

Testing policy
0 – No testing policy
1 – Only those who both (a) have symptoms AND (b) meet specific criteria (eg key workers, admitted to hospital, came into contact with a known case, returned from overseas)
2 – testing of anyone showing COVID-19 symptoms
3 – open public testing (eg "drive through" testing available to asymptomatic people)

Contact tracing
0 - No contact tracing
1 - Limited contact tracing - not done for all cases
2 - Comprehensive contact tracing - done for all cases

Face coverings
0- No policy
1- Recommended
2- Required in some specified shared/public spaces outside the home with other people present, or some situations when social distancing not possible
3- Required in all shared/public spaces outside the home with other people present or all situations when social distancing not possible
4- Required outside the home at all times regardless of location or presence of other people

Vaccination policy
0 - No availability
1 - Availability for ONE of following: key workers/ clinically vulnerable groups / elderly groups
2 - Availability for TWO of following: key workers/ clinically vulnerable groups / elderly groups
3 - Availability for ALL of following: key workers/ clinically vulnerable groups / elderly groups
4 - Availability for all three plus partial additional availability (select broad groups/ages)
5 - Universal availability

*When data is missing cells entries are left blank

Table A1: Summary Statistics

	Cumulative Confirmed Deaths (CD)	Cumulative Confirmed Cases (CC)	Democracy Index (DI)	GDP Per Capita	Percentage of Population Above 65 (OLD)	Population Density
N	151	150	151	145	151	149
Missing	0	1	0	6	0	2
Mean	242	15993	5.51	15424	9.32	202
Median	83.0	8679	5.75	6184	7.02	79.8
Standard deviation	307	18118	2.26	20955	6.72	686
Variance	94316	3.28e+8	5.13	4.39e+8	45.2	470270
Minimum	0.0800	8.52	1.08	261	1.16	2.97
Maximum	1494	73154	9.87	114705	28.0	7953

	Healthcare Access and Quality (HAQ)	Cultural Diversity Index	Religious Diversity Index (RDI)	Stringency Index (S)	Air Connectivity	Temperature
N	151	140	151	144	149	151
Missing	0	11	0	7	2	0
Mean	64.6	0.310	3.24	60.3	217413	18.0
Median	64.4	0.278	2.90	62.3	29439	21.4
Standard deviation	16.9	0.213	2.20	13.5	819888	8.41
Variance	287	0.0452	4.85	182	6.72e+11	70.7
Minimum	28.6	0.00	0.00	13.5	109	-5.35
Maximum	93.6	0.733	9.00	88.5	8130508	28.3

N=Number of observations

Table A2: Correlation Matrix

		Cumulative Confirmed Deaths (CD)	Cumulative Confirmed Cases (CC)	Democracy Index (DI)	GDP Per Capita	Percentage of Population Above 65 (OLD)	Population Density	Healthcare Access and Quality (HAQ)	Cultural Diversity Index	Religious Diversity Index (RDI)	Stringency Index (S)	Air Connectivity	Temperature
Cumulative Confirmed Deaths (CD)	Pearson's r	—											
	p-value	—											
Cumulative Confirmed Cases (CC)	Pearson's r	0.754***	—										
	p-value	< .001	—										
Democracy Index (DI)	Pearson's r	0.411***	0.401***	—									
	p-value	< .001	< .001	—									
GDP Per Capita	Pearson's r	0.293***	0.487***	0.586***	—								
	p-value	< .001	< .001	< .001	—								
Percentage of Population Above 65 (OLD)	Pearson's r	0.515***	0.559***	0.681***	0.580***	—							
	p-value	< .001	< .001	< .001	< .001	—							
Population Density	Pearson's r	-0.073	0.021	0.024	0.213*	0.044	—						
	p-value	0.379	0.796	0.768	0.011	0.597	—						
Healthcare Access and Quality (HAQ)	Pearson's r	0.500***	0.640***	0.564***	0.743***	0.800***	0.138	—					
	p-value	< .001	< .001	< .001	< .001	< .001	0.092	—					
Cultural Diversity Index	Pearson's r	-0.200*	-0.259**	-0.292***	-0.240**	-0.427***	0.007	-0.409***	—				
	p-value	0.018	0.002	< .001	0.005	< .001	0.931	< .001	—				
Religious Diversity Index (RDI)	Pearson's r	-0.092	0.006	0.170*	0.286***	0.216**	0.239**	0.202*	0.089	—			
	p-value	0.260	0.946	0.037	< .001	0.008	0.003	0.013	0.294	—			
Stringency Index (S)	Pearson's r	0.243**	0.139	-0.036	-0.099	-0.146	-0.008	0.007	-0.019	-0.099	—		
	p-value	0.003	0.097	0.669	0.244	0.081	0.922	0.933	0.826	0.239	—		
Air Connectivity	Pearson's r	0.141	0.126	0.105	0.239**	0.192*	0.010	0.190*	-0.077	0.165*	0.077	—	
	p-value	0.086	0.128	0.204	0.004	0.019	0.904	0.020	0.369	0.044	0.362	—	
Temperature	Pearson's r	-0.384***	-0.470***	-0.388***	-0.459***	-0.694***	0.126	-0.588***	0.245**	-0.029	0.144	-0.174*	—
	p-value	< .001	< .001	< .001	< .001	< .001	0.125	< .001	0.003	0.727	0.084	0.034	—

Note. * p < .05, ** p < .01, *** p < .001

Appendix 2

Table A3: Raw Data

Country	Cumulative Confirmed Deaths (CD)	Cumulative Confirmed Cases (CC)	Democracy Index (DI)	GDP Per Capita	Percentage of Population Above 65 (OLD)	Population Density	Healthcare Access and Quality (HAQ)	Cultural Diversity Index	Religious Diversity Index (RDI)	Stringency Index (S)	Air Connectivity	Temperature
Afghanistan	48.17	1,305.22	2.85	502.12	2.62	56.94	32.5	0.68	0.1	52.02	13,131	12.60
Algeria	57.38	2,222.09	4.01	3,948.34	6.55	17.73	63.7	0.24	0.5	71.91	40,686	18.79
Angola	10.77	520.26	3.72	2,973.59	2.20	24.71	40.7	0.24	2.0	69.66	7,424	21.55
Argentina	876.90	34,838.52	7.02	10,006.15	11.24	16.26	68.4	0.00	3.0	84.22	75,586	14.80
Armenia	791.03	52,902.67	5.54	4,622.73	11.48	103.68	67.5	0.12	0.3	NA	10,747	7.15
Australia	35.61	1,109.69	9.09	54,907.10	15.92	3.25	89.8	0.15	5.6	63.23	592,245	21.65
Austria	414.37	38,756.33	8.29	50,277.28	19.08	107.13	88.2	0.10	3.8	53.88	140,985	6.35
Azerbaijan	160.96	20,885.72	2.75	4,793.59	6.45	120.23	64.5	0.19	0.7	77.78	19,009	11.95
Bahrain	200.40	53,658.27	2.55	23,503.98	2.52	2,017.27	79.0	0.46	5.4	65.86	47,721	27.15
Bangladesh	41.52	3,080.13	5.88	1,855.74	5.18	1,239.58	51.7	0.14	2.1	77.10	50,616	25.00
Belarus	127.73	19,367.11	2.48	6,663.30	15.20	46.72	74.4	0.23	4.7	16.33	11,657	6.15
Belgium	1,494.44	54,984.22	7.64	46,116.70	19.01	377.38	87.9	0.46	5.7	60.14	101,273	9.55
Benin	3.63	264.37	5.09	1,219.43	3.26	101.85	43.0	0.40	7.2	45.42	849	27.55
Bolivia	770.32	13,157.68	4.84	3,552.07	7.34	10.48	59.2	0.66	1.3	81.17	8,591	21.55
Bosnia and Hercegovina	890.63	33,190.23	4.86	6,073.27	17.20	64.92	78.2	0.15	6.0	57.32	6,114	9.85
Botswana	14.46	5,963.96	7.81	7,961.34	4.37	3.98	51.1	0.16	5.0	59.39	1,817	21.50
Brazil	830.96	35,042.25	6.86	8,717.19	9.25	25.06	64.9	0.02	2.3	68.17	422,917	24.95
Bulgaria	690.37	28,339.43	7.03	9,737.60	21.25	64.71	71.4	0.25	3.5	47.37	32,119	10.55
Burkina Faso	3.25	293.45	4.04	774.84	2.41	72.19	42.9	0.35	6.2	44.99	1,566	28.29
Burundi	0.08	66.10	2.15	261.25	2.31	435.18	40.4	0.04	1.8	13.54	218	20.80
Cabo Verde	188.85	21,036.43	7.78	3,603.78	4.70	134.93	61.7	NA	2.3	NA	NA	23.30
Cameroon	16.69	989.87	2.85	1,497.91	2.72	53.34	44.4	0.73	5.3	52.30	4,071	24.60
Canada	333.55	14,274.25	9.22	46,194.73	17.65	4.08	87.6	0.50	5.3	63.42	539,072	-5.35
Central African Republic	13.04	1,024.48	1.32	467.91	2.81	7.49	28.6	0.51	2.2	49.84	109	24.90
Chad	6.21	119.99	1.61	709.54	2.49	12.29	37.7	0.73	6.0	65.31	649	26.55
Chile	817.53	31,168.89	8.08	14,896.45	11.88	25.19	76.0	0.17	2.2	74.84	83,663	8.45
China	3.23	66.32	2.26	10,261.68	11.47	148.35	74.2	0.15	7.3	71.82	5,368,567	6.95
Colombia	739.60	30,947.68	7.13	6,432.39	8.77	44.75	67.8	0.02	1.6	75.31	168,097	24.50
Comoros	8.05	822.22	3.15	1,393.52	3.06	447.24	47.7	NA	0.4	NA	146	25.55
Congo	17.03	1,190.81	3.11	2,011.07	2.72	15.36	43.5	0.56	2.9	62.91	1,690	24.55
Costa Rica	348.05	31,995.75	8.13	12,238.37	9.88	97.91	72.9	0.08	1.9	64.54	29,049	24.80
Croatia	529.56	49,682.99	6.57	14,853.24	20.86	73.05	81.6	0.19	1.4	49.01	40,951	10.90
Cuba	12.01	962.34	2.84	NA	15.56	109.00	73.5	0.02	6.5	71.88	34,548	25.20
Cyprus	50.52	22,109.86	7.59	27,858.37	14.05	128.71	85.3	0.36	4.6	62.94	39,703	19.45
Czech Republic	831.26	62,084.61	7.69	23,101.78	19.80	137.66	84.8	0.06	4.1	51.38	69,367	7.55
Democratic Republic of Congo	3.84	183.92	1.13	545.22	3.02	37.08	40.4	0.63	0.9	55.37	2,276	24.00
Denmark	152.79	25,884.11	9.22	59,822.09	19.97	137.98	85.7	0.13	3.3	54.40	137,251	2.70
Djibouti	61.74	5,874.48	2.77	3,408.85	4.61	41.37	44.7	0.40	0.7	55.66	2,110	28.00
Dominican Republic	216.17	15,213.54	6.54	8,282.12	7.30	219.98	62.5	0.00	2.4	76.19	64,970	24.55
Ecuador	780.93	11,836.27	6.33	6,183.82	7.37	68.79	61.2	0.48	1.3	69.83	21,348	21.85
Egypt	66.17	1,271.58	3.06	3,020.03	5.28	98.87	61.0	0.00	1.1	64.96	101,219	22.10
El Salvador	178.69	6,879.07	6.15	4,187.25	8.47	309.88	64.4	0.18	2.4	75.44	20,504	24.45
Equatorial Guinea	60.59	3,732.04	1.92	8,131.92	2.42	46.67	48.4	NA	2.4	NA	671	24.55
Estonia	98.75	18,530.93	7.90	23,659.87	19.99	30.41	81.4	0.49	5.5	38.05	10,643	5.10
Ethiopia	15.20	1,060.16	3.44	857.50	3.52	109.22	44.2	0.56	5.6	68.29	45,126	22.20
Fiji	2.23	51.31	5.85	6,220.05	5.62	48.36	46.6	0.55	5.8	60.25	9,333	24.40
Finland	74.90	6,253.34	9.25	48,685.85	22.14	18.15	89.6	0.13	3.5	42.71	95,303	1.70
France	839.42	39,902.79	8.12	40,493.93	20.39	122.30	87.9	0.25	5.9	64.05	582,298	10.70
Gabon	26.96	4,266.92	3.61	7,667.37	3.54	8.22	51.4	0.38	4.5	70.30	2,194	25.05
Gambia	50.90	1,568.69	4.33	751.29	2.56	225.31	49.7	0.55	1.1	62.59	1,352	27.50
Georgia	386.05	54,829.38	5.42	4,769.19	15.06	65.20	62.1	0.40	2.3	68.49	16,165	5.80
Germany	225.81	19,487.46	8.68	46,258.88	21.56	237.31	86.4	0.09	5.3	60.07	924,731	8.50
Ghana	10.46	1,739.23	6.63	2,202.12	3.10	130.82	49.7	0.39	4.7	50.45	11,004	27.20
Greece	288.11	12,937.86	7.43	19,582.54	21.94	83.27	87.0	0.05	2.5	61.94	162,980	14.44
Guatemala	237.22	7,539.81	5.26	4,619.99	4.93	152.55	55.7	0.49	1.1	76.90	14,260	23.45
Guinea	5.79	1,039.08	3.14	1,064.13	2.94	50.52	38.6	0.49	3.1	59.77	970	25.70
Guinea-Bissau	22.36	1,243.40	2.63	697.78	2.86	66.65	36.3	0.57	7.5	NA	324	26.75
Guyana	191.98	7,995.59	6.15	5,468.36	6.71	3.96	49.8	0.46	5.7	72.96	1,675	26.00
Haiti	20.43	859.90	4.57	754.59	5.06	403.60	38.5	0.00	2.7	55.02	5,794	24.90
Honduras	297.34	11,980.18	5.42	2,574.91	4.83	85.69	53.9	0.17	2.5	88.47	8,123	23.50
Hungary	619.44	32,520.98	6.63	16,475.74	19.69	107.98	79.6	0.19	3.5	56.79	56,758	9.75
Iceland	79.12	16,653.48	9.58	66,944.83	15.19	3.52	93.6	NA	1.1	44.56	31,374	1.75
India	101.86	7,368.90	6.90	2,104.15	6.38	454.94	44.8	0.67	4.0	75.41	1,247,297	23.65
Indonesia	64.86	2,559.55	6.48	4,135.57	6.05	147.75	49.2	0.52	2.6	61.28	838,855	25.85
Iran	598.98	14,158.37	2.38	NA	6.36	50.22	71.1	0.54	0.1	55.95	61,825	18.25
Iraq	309.08	14,666.99	3.74	5,955.11	3.40	88.53	60.1	0.35	0.2	77.68	37,192	21.40
Ireland	425.09	17,031.49	9.24	78,660.96	14.22	70.65	88.4	0.16	1.7	66.54	138,042	9.30
Israel	335.74	45,565.15	7.86	43,641.40	12.21	410.48	85.5	0.25	4.5	67.44	92,982	20.20
Italy	993.65	33,547.68	7.52	33,189.57	23.01	205.42	88.7	0.04	3.3	65.80	607,532	13.45
Jamaica	89.49	4,254.08	6.96	5,582.26	8.92	270.99	63.7	0.03	4.3	72.20	32,234	24.95
Japan	18.46	1,696.56	7.99	40,246.88	28.00	347.07	89.0	0.01	6.2	37.20	1,622,029	11.15
Jordan	299.52	27,962.57	3.93	4,330.33	3.89	112.14	76.5	0.05	0.6	67.40	42,142	19.30
Kazakhstan	131.92	10,449.97	2.94	9,731.15	7.65	6.77	61.1	0.62	5.0	76.06	32,326	6.40
Kenya	28.38	1,780.00	5.18	1,816.55	2.42	90.30	48.7	0.60	3.1	73.34	29,439	24.75
Kuwait	208.64	34,954.88	3.93	32,031.98	2.76	232.17	82.0	0.54	4.8	73.95	78,323	25.35
Kyrgyzstan	198.80	12,265.89	4.89	1,309.39	4.60	32.97	60.4	0.62	2.4	70.18	7,493	1.55
Latvia	138.90	18,778.48	7.49	17,836.36	20.34	30.99	77.7	0.44	5.7	50.07	22,908	5.60
Lebanon	161.02	24,623.90	4.36	7,784.32	7.27	669.49	80.0	0.20	5.5	67.61	44,765	17.40
Lesotho	20.54	1,272.03	6.54	1,157.54	4.93	69.44	35.7	0.06	0.7	59.59	187	11.85
Liberia	16.41	351.74	5.45	621.89	3.29	50.03	45.4	0.64	2.8	66.15	477	25.30
Libya	179.15	14,211.75	2.02	7,683.75	4.46	3.80	69.9	0.13	0.7	83.88	4,647	21.80
Lithuania	233.99	46,497.97	7.50	19,455.45	20.16	44.72	76.6	0.26	2.1	52.16	15,107	6.20
Luxembourg	559.13	72,221.62	8.81	114,704.59	14.27	250.19	89.3	NA	4.9	50.09	19,202	8.65
Madagascar	9.21	636.78	5.64	522.22	3.04	45.14	43.7	0.19	3.0	58.01	2,649	22.65
Malawi	9.67	331.37	5.50	411.55	2.64	192.44	47.0	0.29	3.4	53.87	914	21.90
Malaysia	11.80	3,138.02	7.16	11,414.84	6.92	95.96	66.6	0.56	6.3	61.51	430,540	25.40
Mali	8.30	320.38	4.92	890.74	2.50	15.64	45.6	0.59	1.6	47.51	2,590	28.25
Malta	341.98	27,431.33	7.95	29,416.23	20.82	1,514.47	85.1	NA	0.7	54.02	22,556	20.20
Mauritania	36.99	2,852.68	3.92	1,677.92	3.16	4.27	52.0	0.27	0.2	43.45	1,137	27.65
Mauritius	7.86	414.38	8.22	11,203.54	12.00	623.30	65.7	0.45	6.7	35.83	18,034	22.40
Mexico	848.94	10,643.09	6.09	9,863.07	7.42	64.91	62.6	0.43	1.1	68.43	512,324	21.00
Moldova	599.66	34,767.30	5.75	4,498.52	12.01	94.26	73.1	0.40	0.6	62.61	8,785	9.45
Montenegro	843.86	73,153.61	5.65	8,832.04	15.39	46.26	80.7	NA	4.0	NA	6,410	10.55
Morocco	169.19	11,600.83	5.10	3,204.10	7.30	80.73	61.3	0.36	0.0	71.17	75,684	18.10
Mozambique	4.26	579.36	3.65	491.80	2.88	37.51	43.0	0.28	7.0	58.26	2,349	23.80
Namibia	60.21	8,367.85	6.43	4,957.46	3.61	2.97	53.7	0.59	0.6	53.48	3,779	20.95

Table A3: Raw Data – Continued

Country	Cumulative Confirmed Deaths (CD)	Cumulative Confirmed Cases (CC)	Democracy Index (DI)	GDP Per Capita	Percentage of Population Above 65 (OLD)	Population Density	Healthcare Access and Quality (HAQ)	Cultural Diversity Index	Religious Diversity Index (RDI)	Stringency Index (S)	Air Connectivity	Temperature
Nepal	54.71	8,827.32	5.28	1,071.05	5.78	195.94	50.8	0.54	3.8	77.90	29,854	8.10
Netherlands	564.58	44,064.41	9.01	52,447.83	19.61	511.48	89.5	0.08	6.4	57.37	249,411	9.25
New Zealand	5.18	441.29	9.26	42,084.35	15.99	18.39	86.2	0.36	6.2	41.79	100,126	10.55
Nicaragua	24.30	904.36	3.55	1,912.90	5.46	53.73	64.3	0.10	2.8	15.00	2,877	24.90
Niger	3.18	124.14	3.29	554.60	2.60	17.72	41.0	0.60	0.4	28.44	1,386	27.15
Nigeria	5.72	401.41	4.12	2,229.86	2.74	215.06	51.3	0.66	5.9	64.00	29,753	26.80
North Korea	5.72	NA	1.08	NA	9.26	212.19	62.3	0.00	5.3	NA	1,087	5.70
Norway	65.30	8,530.89	9.87	75,419.63	17.27	14.55	90.5	0.10	3.1	48.01	150,173	1.50
Oman	282.77	25,122.28	3.06	15,474.03	2.45	15.60	77.1	0.40	2.9	74.14	77,065	25.60
Pakistan	37.85	2,125.39	4.25	1,284.70	4.32	275.29	43.1	0.29	0.8	64.16	87,337	21.00
Panama	735.38	52,531.21	7.05	15,731.02	8.31	56.19	64.4	0.17	1.5	75.90	45,631	25.40
Papua New Guinea	0.78	87.18	6.03	2,845.18	3.51	19.00	38.6	N/A	0.2	50.80	3,333	25.25
Paraguay	256.99	14,565.38	6.24	5,414.80	6.62	17.51	60.4	0.04	0.7	76.68	4,273	23.55
Peru	1,098.85	30,449.68	6.60	6,977.70	8.39	24.99	69.6	0.51	1.0	80.83	83,192	20.60
Philippines	78.06	4,267.17	6.64	3,485.08	5.31	357.69	52.0	0.12	1.6	77.49	348,092	25.85
Poland	530.80	33,003.73	6.62	15,595.23	18.12	124.02	79.6	0.04	1.2	54.71	120,933	7.85
Portugal	486.73	38,422.40	8.03	23,145.04	22.36	112.26	84.5	0.04	1.4	66.71	179,542	15.15
Qatar	82.96	49,542.18	3.19	64,781.73	1.52	239.59	85.2	NA	5.7	72.13	161,805	27.15
Romania	640.41	31,831.95	6.49	12,919.53	18.79	84.63	74.4	0.27	0.1	57.86	60,999	8.80
Russia	298.74	20,305.62	3.11	11,585.00	15.09	8.82	71.7	0.31	4.9	60.57	438,477	-5.10
Rwanda	3.94	597.81	3.16	801.66	3.03	498.66	47.8	0.00	1.4	70.60	3,272	18.85
Saudi Arabia	171.34	10,395.37	1.93	23,139.80	3.41	15.68	79.4	0.41	1.5	66.55	323,732	24.65
Senegal	20.19	1,097.05	5.81	1,446.83	3.10	82.35	44.4	0.40	0.8	48.76	8,865	27.85
Serbia	279.88	47,051.58	6.41	7,402.35	18.74	79.84	75.4	NA	1.6	58.36	28,875	10.55
Sierra Leone	9.28	319.54	4.86	504.46	2.95	105.99	41.3	0.53	4.0	42.79	161	26.05
Singapore	4.96	10,000.95	6.02	65,233.28	12.39	7,953.00	86.3	0.39	9.0	56.32	353,748	26.45
Slovenia	605.12	54,746.86	7.50	25,739.25	20.19	102.96	87.4	0.17	4.0	55.69	7,688	8.90
South Africa	374.41	16,580.35	7.24	6,001.40	5.42	47.63	52.0	0.53	3.6	64.80	113,147	18.75
South Korea	10.71	1,090.36	8.00	31,761.98	15.06	NA	85.8	0.00	7.4	52.64	500,951	11.50
Spain	989.25	39,674.04	8.29	29,613.67	19.65	93.68	89.6	0.26	3.9	65.67	793,379	13.30
Sri Lanka	6.40	1,857.82	6.27	3,853.08	10.84	345.56	72.8	0.39	5.6	53.99	50,662	26.95
Sudan	29.53	531.73	2.70	441.51	3.63	NA	50.1	0.70	2.0	62.11	12,301	26.90
Suriname	199.44	10,023.29	6.98	6,854.91	7.02	3.69	56.7	NA	7.6	70.74	2,844	25.70
Sweden	699.75	39,215.51	9.39	51,610.07	20.20	24.98	90.5	0.19	5.4	56.64	143,064	2.10
Switzerland	558.31	49,476.13	9.03	81,993.73	18.84	215.47	91.8	0.42	3.7	49.48	239,979	5.50
Syria	25.54	618.32	1.43	NA	4.69	92.07	74.6	0.23	1.6	62.43	583	18.75
Tajikistan	9.12	1,377.49	1.93	870.79	3.09	65.57	58.6	0.49	0.7	39.14	4,286	2.00
Tanzania	0.35	8.52	5.16	1,122.12	2.62	63.58	49.9	0.56	5.7	26.27	12,931	22.35
Thailand	0.66	86.25	6.32	7,808.19	12.41	135.90	70.8	0.43	1.5	54.91	696,422	26.30
Togo	7.85	428.33	3.30	675.54	2.89	145.05	44.3	0.60	7.5	54.32	1,437	27.15
Trinidad and Tobago	87.17	5,071.13	7.16	17,276.47	11.12	270.93	62.1	0.38	5.8	70.16	7,545	25.75
Tunisia	301.30	10,879.28	6.72	3,317.54	8.59	74.44	70.1	0.03	0.1	51.89	32,695	16.30
Turkey	176.67	25,115.94	4.09	9,042.49	8.73	106.96	76.2	0.30	0.4	62.43	519,726	9.90
Uganda	4.50	729.32	5.02	776.77	1.96	213.06	42.9	0.65	2.7	72.47	7,574	22.80
Ukraine	314.01	23,816.45	5.90	3,659.03	16.70	77.03	72.7	0.26	3.1	64.13	72,988	8.30
United Arab Emirates	59.86	20,187.76	2.76	43,103.32	1.16	135.61	72.2	0.65	4.4	56.28	421,965	27.00
United Kingdom	902.17	32,818.95	8.52	42,300.27	18.51	274.71	84.6	0.18	5.1	66.72	916,314	8.45
United States of America	842.31	56,665.29	7.96	65,118.36	16.21	35.71	81.3	0.27	4.1	66.35	8,130,508	8.55
Uruguay	23.32	4,562.25	8.38	16,190.13	14.94	19.71	72.0	0.00	5.7	44.86	7,136	18.55
Uzbekistan	18.26	2,287.72	2.01	1,724.84	4.60	77.47	62.3	0.44	0.7	60.51	20,408	12.05
Venezuela	32.21	3,924.72	2.88	NA	7.61	32.73	64.7	0.02	2.2	80.98	7,548	25.35
Vietnam	0.36	14.78	3.08	2,715.28	7.55	308.13	66.3	0.21	7.7	64.45	409,894	24.45
Yemen	20.35	70.14	1.95	NA	2.90	53.98	49.6	0.08	0.2	36.21	NA	23.85
Zambia	19.80	1,064.57	5.09	1,291.34	2.12	23.34	41.6	0.19	0.5	46.00	4,773	21.40
Zimbabwe	19.58	866.59	3.16	1,463.99	2.98	37.32	48.7	0.14	2.7	72.36	3,392	21.00

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