Social and political correlates of Covid-19

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25 April, 2020 draft. Not yet for circulation. Most recent version here

Abstract

Do political and social characteristics of states help explain the evolving distribution of reported Covid-19 deaths? We identify national-level political and social measures that past research suggests may help explain variation in a society's ability to respond to adverse shocks. We then set up an analysis structure to (i) report on the evolving covariance between these measures and the cross national distribution of Covid-19 burdens, and (ii) assess whether these political or social characteristics are selected by a Lasso variable selection procedure. Currently, a small set of demographic and health variables explain a large share (about 72%) of cross-national variation in deaths. Political and social variables provide limited additional traction at this time and are generally not selected by the Lasso procedure. This includes features that have received attention in public discussions, such as the role of populist governments, right leaning governments, or women led governments. These patterns may change considerably over time with the evolution of the pandemic, however. A dashboard with daily updates, extensions, and code is provided at https://wzb-ipi.github.io/corona/

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1 Introduction

We review major literatures from political science and cognate disciplines that highlight political and social factors that plausibly render governments and societies better able to promote effective policies and counter threats. We then assess the extent to which measures suggested by these accounts can help explain cross-national differences in Covid-19-related mortality.[1]

With a number of important exceptions (Lieberman 2007, 2009; Dionne 2011; Blair, Morse, and Tsai 2017), political scientists do not typically focus on disease outcomes. But they do examine the ways societies and governments behave, how individuals overcome (or fail to overcome) problems of collective action, sometimes in the wake of crises that represent correlated risks, such as economic collapse or natural disasters. If disease outcomes prove to be a function of swift and appropriate government responses, and the ability and willingness of groups in diverse societies to comply with government health directives, knowledge from political science may prove helpful in understanding how states fare in the wake of Covid-19. There are also reasons however why existing theories may have limited application for this question. In general, as noted by Carpenter (2012), the extent to which knowledge on political processes applies to public health outcomes is an open and understudied empirical question. Moreover, there are features of the current pandemic that may limit the applicability of classic accounts of political processes; we describe a number of these below. Finally we note that political theories often focus on understanding *causal* relations and, in some ways, asking these theories to make claims about observational patterns puts a more challenging question to them.[2]

Our goal here is modest: to evaluate the extent to which different accounts of social and political processes can help shed light on simple cross-sectional patterns of spread and the distribution of the current disease burden. We do not focus on time series properties of

[1] Covid-19, "Coronavirus," was declared a pandemic by the World Health Organization. The disease, a severe acute respiratory syndrome coronavirus 2, was first seen in Wuhan, China, with further major outbreaks in Iran, Italy, Spain, and the United States. At the time of writing infections are global.

[2] In the treatment in Pearl and Mackenzie (2018), asking questions about patterns of association rank at the lowest rung of the 'ladder of causation,' questions regarding the effects of interventions are on the second rung, and counterfactual questions on the third. However, although calculating associations is in general easier than ascertaining effects, knowledge of effects does not in general licence claims about associations. Making inferences to associations requires knowledge about the distribution of other covariates as well as selection processes.

spread, and our primary substantive focus is not on epidemiological features, but rather on the characteristics of states that have differential death rates. The goal here differs from that of short-term prediction, which uses real-time information, such as current burdens, or the content of internet searches (see Zhang et al. (2019)), to predict the evolution of disease spread. Machine learning approaches can also, in principle, be very effective in producing and cross-validating predictions and in identifying correlates, though with models that typically do not connect with theoretical accounts or focus on explanation. These approaches are better suited to the task of assessing where next, at least in the short term, these burdens are likely to fall.

Given multiple inferential risks, we frontload key precautions in interpreting the results that follow:

Causal Inference. Although causal accounts motivate the set of covariates we focus on, none of the empirical analysis we provide lays claim to causal identification. For instance, wealthy countries are currently experiencing more deaths than poorer countries. We do not know whether this is *because* they are wealthy or because of many other attributes that correlate with wealth. For this reason, strong evidence of a relationship between a covariate and Covid-19 should not, in itself, be used to infer that a change in the covariate will induce a change in the disease burden.[3] We note, moreover, that well-identified estimates of causal effects, though desirable when possible, are not themselves sufficient to explain disease distributions. For instance, Carelton and Meng (2020) provide valuable causal evidence on the effects of exogenous changes in temperature on transmission, yet whether hotter places experience greater transmission than cooler places can depend on other ways that these places are different, including ways in which they have adapted to different temperatures in different periods.

Measurement concerns. We rely on outcome data on deaths from the European Centre for Disease Prevention and Control, which provides daily updates. We focus in particular

[3]The limitations on causal inference in this case are myriad. The most obvious concern is that explanatory variables of interest are not randomized and so correlations can reflect self-selection and confounding. There are other concerns, however. First, this is a setting where there are obvious spillover dynamics which can introduce bias in estimation of effects. Second, models control for features of societies—such as overall wealth—that are themselves plausibly "post treatment" relative to other measures–such as social structure. Third, measurement errors may be correlated with potential outcomes. Fourth, the analysis often takes place at a macro level, making it difficult to infer causal relations that operate at a more micro level.

on deaths data, which is arguably less affected by underreporting than cases data. Even so, cross-national differences in recording and classification of deaths can contribute to observed correlations. These differences in reporting can reflect both variation in state capacity and political choices on the part of states (DW 2020). To partially account for this, all estimates including controls include a measure of the quality of health reporting, which is at present strongly positively correlated with deaths. Another way to capture the full scope of the pandemic's health toll is to look at "excess mortality"—the difference between the total number of people who died for any reason during a particular period, and the historical average for the same place and time of year. With a few exceptions in Western Europe, this data will be released more slowly, with a more complete picture likely emerging in 2021 (Economist 2020). We will use excess mortality as one of our core outcome measures in planned future analysis described below.

Changing skew, changing scale. The distribution of the outcome variable is highly skewed at present, with many cases with 0 deaths and a handful with deaths in the thousands—and is changing daily. Moreover, the scale of the outcome variable is changing over time, which means that steeper slopes over time can reflect the trajectory of spread within countries more than systematic differences across countries.

With these caveats in mind, we highlight several patterns in the data to date. First, there is substantial global variability in reported dates with, currently, both levels and growth rates considerably lower in developing areas. Second, a small set of demographic and health variables—population, age structure, respiratory disease prevalence, and features of health systems—currently predicts a very large share of variation. Quality of health reporting does not figure prominently once these other features are accounted for. Third, at this point, most of the social and political characteristics of countries we examine correlate weakly with the current severity of the crisis and often not in the direction expected by standard theories of government responsiveness and collective action. These measures of political systems in general do not account for significant residual variation.

We emphasize however, that we are still in early stages of the pandemic and the effects of political and social structures may take time to leave a mark. We accompany this article with a real-time tracker that provides continuous updates of all figures as more data about the pandemic's progress are made available and we will return to this analysis as the pandemic recedes.[4]

We describe the outcomes of interest in the next section. Section 3 is the heart of the paper and describes political and social logics that might explain variation in outcomes. Section 4 gives an overview of the estimation strategy and shows expected mortality given the control variables (see Figure 10). We present the main results on deaths in section 5 (jump to Table 1 for major patterns to date). Section 6 provides more inductive results, using a Lasso variable selection procedure. Section 7 describes future analyses and Section 8 concludes. Results on policy outcomes and for subgroups are provided in appendices.

2 Outcomes

2.1 Reported Cumulative Deaths

We focus analysis on the reported cumulative deaths from Covid-19 (logged), drawing from the ECDC daily reports https://www.ecdc.europa.eu. The distribution of the unlogged outcome for 25 April, 2020 is shown in Figure 1, for countries with at least 10 deaths, broken down by per capita income. Figure 2 shows the growths in deaths by World Bank classification of world regions; the graph, based on John Burn-Murdoch's designs for the *Financial Times*[5] uses a log scale and rescales the x-axis to comparable starting points.

In both graphs, one can see substantial cross-national variation. This variation persists when we condition on outbreak onset time in different countries. The figures also highlight the current concentration of reported deaths in wealthy countries, the US and Western Europe in particular. From Figure 2 shows that other regions not only have much lower reported deaths but that, currently, they are on substantially lower growth trajectories.

Given the substantial skew in the data, we use logged values.[6] This means that the distribution of our outcome data looks like the distribution on these graphs with logged scales.

We emphasize that analysis is implemented on *reported deaths*. There are substantial concerns

[4] We describe in section 7 the outcome measures and timing of this future analysis.
[5] https://www.ft.com/coronavirus-latest
[6] More precisely we transform according to $f(x) = \log(x + 1)$ so that cases with zero deaths remain in the data.

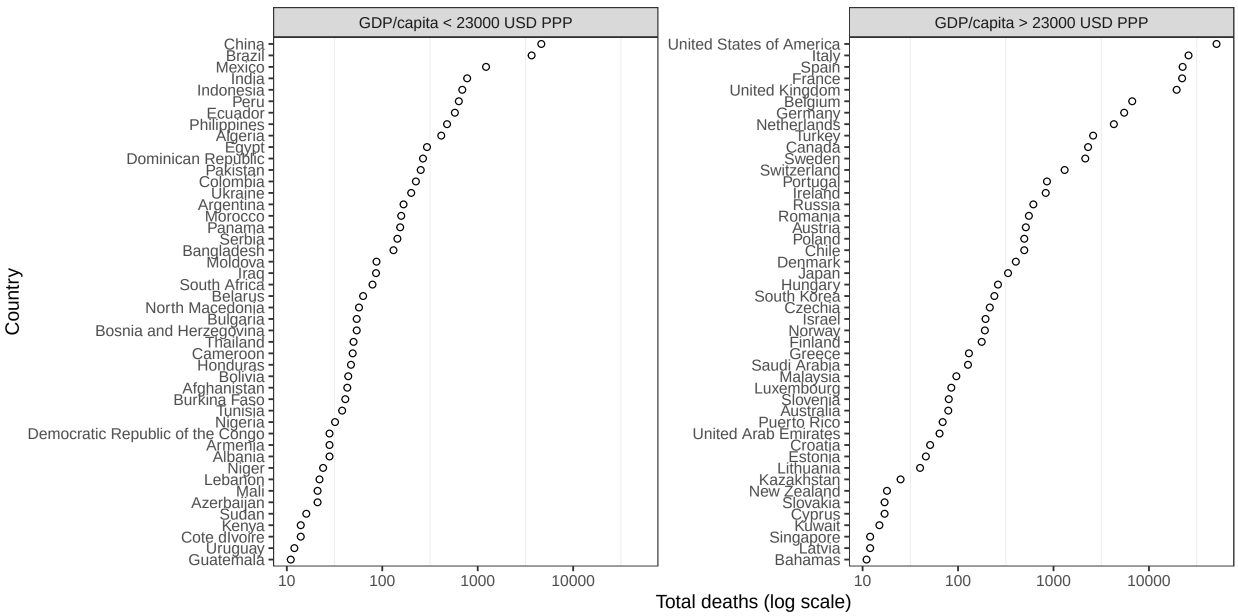

Figure 1: Distribution of reported deaths

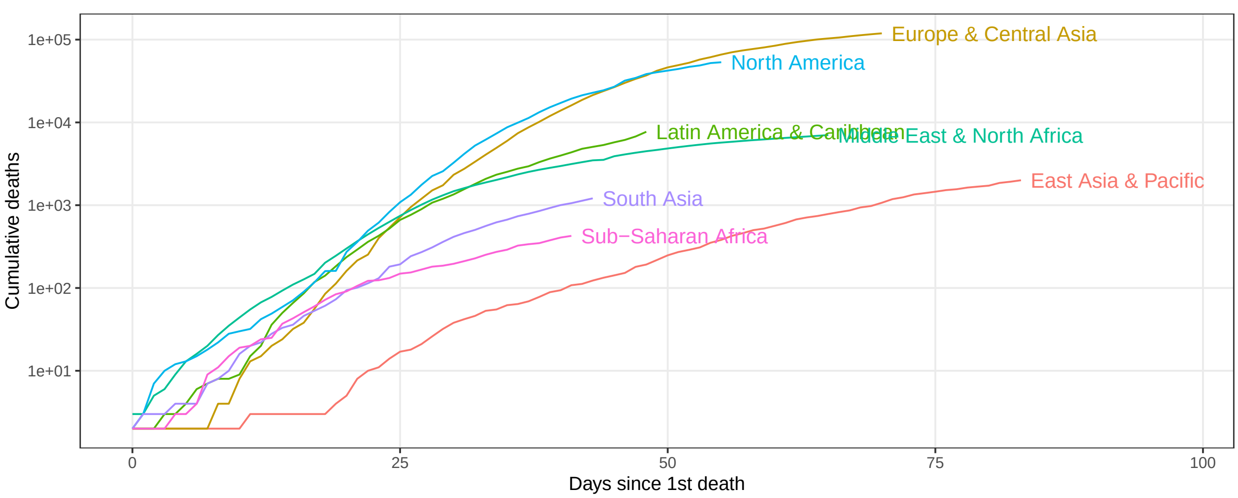

Figure 2: Distribution of deaths by regions (China excluded))

around underreporting and reasons for concern that the degree of underreporting can be related to other characteristics of countries relevant for our analysis (Onder, Rezza, and Brusaferro 2020b; Economist 2020).

One approach to addressing this concern is to try to take measurement weaknesses into account. We include an index of the quality of early detection and reporting of epidemics in our set of possible controls (though we note that this measure is in practice often not selected). According to GHSI, the indicators used to construct this index assess "laboratory systems; real-time surveillance and reporting; epidemiology workforce; and data integration between the human, animal, and environmental health sectors." The US is the top-ranked country on this measure, followed by Australia and Latvia. Syria ranks at the bottom. In additional analyses in the appendix (see Figure 22) we also condition all results on countries in the top two thirds of this index (that is, removing the "least prepared" category).

2.2 Deaths per capita

As a secondary outcome, we also use deaths per capita. Deaths per capita puts countries on a more comparable scale, and other welfare outcomes, including disease burdens, are often examined in per capita terms. Under some conditions, however, absolute numbers might be more informative. Imagine there was a single disease outbreak in each country. Under this scenario, population size would only matter for cumulative deaths if size affects the speed of transmission or if ceiling effects came into play. The question would simply be how bad did things get before the outbreak was brought under control. If the number of outbreaks were to increase with population size, then larger countries would face greater challenges.

As an empirical matter, although population size accounts for just 3.02% of the variation in deaths—reflecting in part the low death rates in India and China—log population is a powerful predictor of log deaths, explaining 22.9% of the variation. For reference, we provide both sets of results, though we treat total deaths as the primary outcome.[7]

[7] Note moreover, that a model with the log of deaths per capita on the left hand side is equivalent to a model with log deaths on the left and log population on the right but with a coefficient on log population constrained to equal -1.

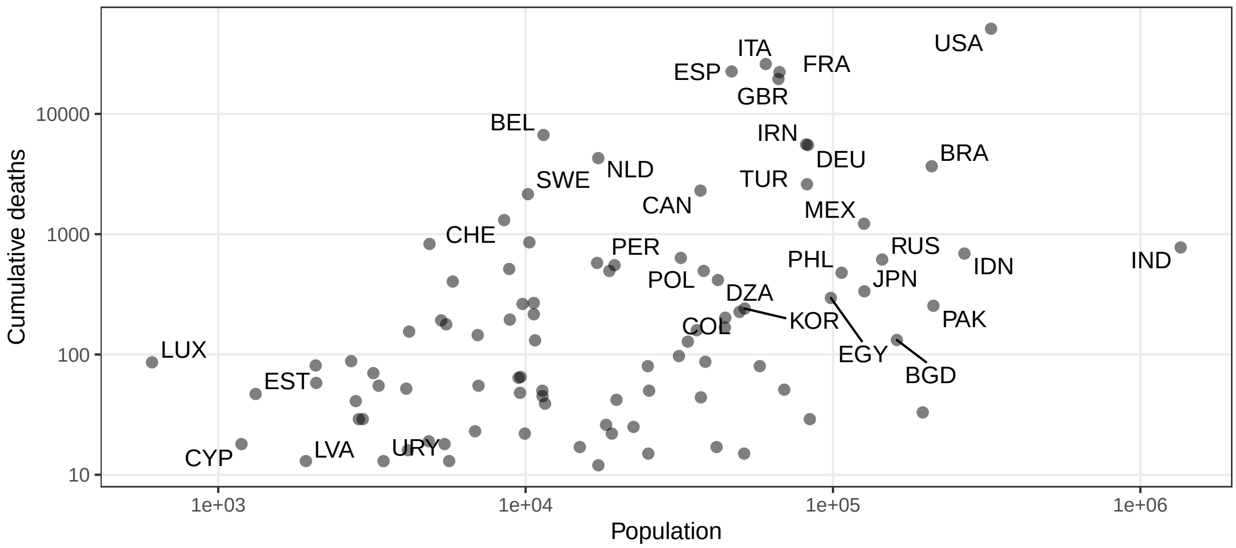

Figure 3: Population sizes and total deaths

2.3 Deaths since onset

In examining the distribution of deaths at a given point in time, we ignore the fact that the disease arrived in different countries at different times. One can account for this by examining outcomes x days since onset – for example 30 days since the first 10 cases (Figure 4). For purposes of comparison, we implement this analysis and report results in the Appendix (Figure 26). We do not treat this analysis as primary however for two reasons. First, the timing of onset can depend on country responses (for instance, countries could delay onset by rapid border closures). Second, in the long run, if curves flatten across cases, this measure should be similar to our primary measure.

2.4 Policy Outcomes

In supplementary material (Figure 24) we also report patterns linking the same sets of political and social variables and a potentially important policy measure: implementation of distancing and lockdown procedures. We note, however, that inferences on this measure are difficult in our static setting, since implementation of lockdown policies might reflect states moving effectively to contain the spread of Covid-19, but might also reflect earlier failures to act effectively, leading to the need for more extreme measures.

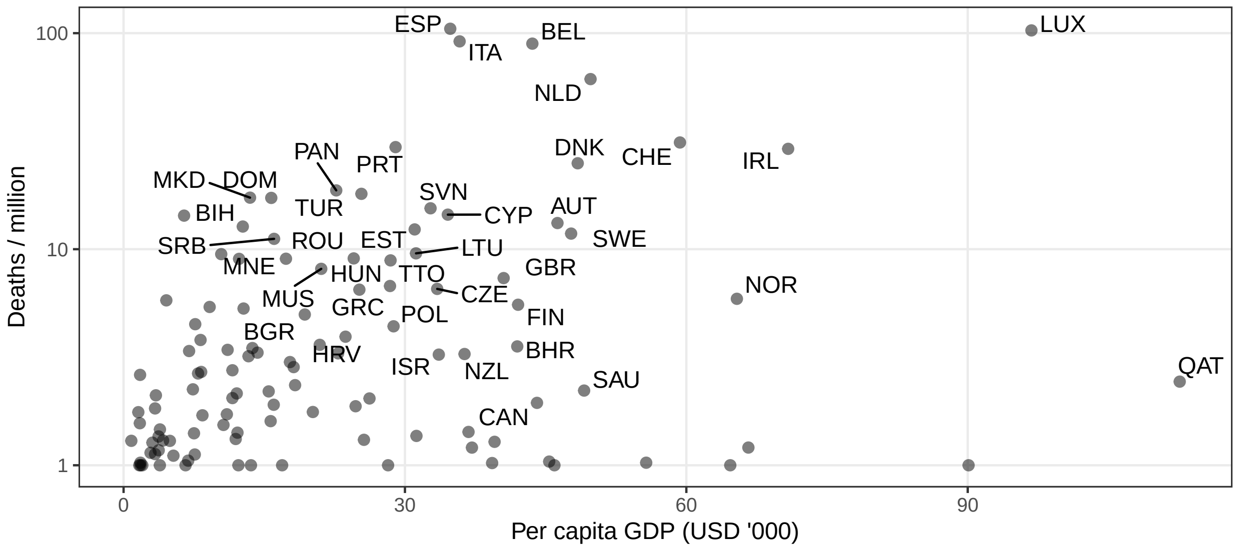

Figure 4: Distribution of deaths, 30 days after 10th reported case

The data for this analysis is from ACAPS https://www.acaps.org.

3 What insights from political economy?

3.1 Framework

We draw on a simple framework designed to organize thinking around how different features of a society, and its political structures, might matter for ultimate outcomes of interest (see Figure 5). There is no claim that the framework captures all the variables important for explaining the outcome; moreover, many of these variables may be connected to each other in ways not described here. An obvious limitation of the model is that it focuses on cross-sectional variation rather than dynamics of spread and, therefore, does not represent potentially important feedback processes—such as the effects of infections on policy choices. Nevertheless it captures, we hope, major channels through which features of a society that predate the pandemic are causally related to later measures of reported deaths.

In this framework, political variables enter through two major families: one reflects **state capacity**, which matters for what a state *can* do, and **political structures**, which, by shaping government incentives, matter for what a government is *willing* to do. State capacity and political structures affect the responses states take, and help to determine their ability

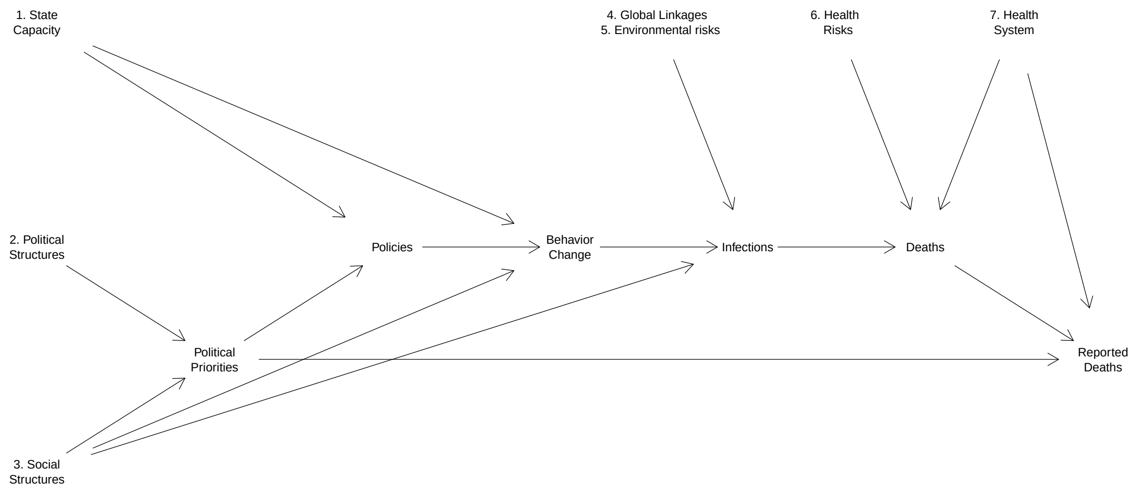

Figure 5: Model connecting background variables to reported outcomes

to enlist cooperation of their populations.

States have responded to the pandemic by enacting policies that require behavioral change on the part of their populations. The degree to which people comply depends on the nature of the policies enacted and on how much people trust their governments, which may be affected by **social structures** (e.g., social diversity, pervasive marginalization of social groups), as well as on states' capacities to enforce them.

Actual infections (as opposed to just reported ones) are plausibly favored by global physical connectedness, and other features that aid rapid virus diffusion, such as urbanization, population density, and according to some evidence, temperature (Wang et al. 2020). These features are grouped here as **global linkages** and **environmental risks.** Compliance with policies is also plausibly linked to the prevalence of infections. Social structures, such as organization into distinct social groups (e.g., on the basis of ethnicity or social class), may also matter for disease spread by conditioning the number of intended or involuntary[8] interactions in the population.

Whether infections lead to deaths depends on underlying **health risks** in populations and

[8]Such as those facilitated by a low level of geographic segregation.

health systems capacities. Last, we observe reported deaths and not actual ones. In the model, we emphasize that reported deaths may not accurately reflect actual ones given political incentives to underreport, or limited access to health care, which means people dying of the disease outside of health systems are not counted.

In the following sections, we describe in greater detail the links illustrated in this framework. Crucially, we draw on existing theories in political science to connect political and social variables to our outcome variable.

3.2 Explanatory variables

We now flesh out logics linking variables in these families to outcomes, recognizing, that in some cases the placement of particular variables into a given family is imperfect.[9]

3.2.1 State capacity

Multiple arguments connect state capacity to the spread of communicable diseases. They start with the recognition that such disease outbreaks generate problems of collective action that often require coordinated government-led responses. The quality of responses depend in part on the ability of governments to take action.

General capacity. Patrick (2006) notes that, although research on government action typically focuses on political incentives, the greatest problem in weak states may simply be "a genuine inability to prevent and respond adequately to disease outbreaks." Gizelis (2009) provides evidence, from a large sample of countries over time, of the central role played by government capacity, independent of regime type, in the containment of the AIDS epidemic.

Political science literatures point to multiple dimensions of state capacity. These include the ability of a state to *know* what the situation is within its territory (Lee and Zhang 2017), and its ability to act and implement policy.

As general measures of capacity, we use an index of government effectiveness produced by the World Bank capturing, among other features, "perceptions of the quality of public services,

[9] Political polarization for instance, could matter because of how it shapes the policy-making process in a multi-tier system, and the speed with which policies are implemented on the ground. This would place it in the "political structures" category. Polarization might also operate at the societal level, however, by altering the way citizens process information coming from the government, and influencing the level of compliance with official regulations. This logic situates it closer to other factors from the "social factors" family.

the quality of the civil service and the degree of its independence from political pressures."

As a measure of **sector specific capacity** we include measures specifically of *pandemic* preparedness, which capture domain relevant dimensions of state strength; additional health systems capacity measures are included under the health systems set.

Bureaucratic learning. Accounts of bureaucratic capacity emphasize the role of bureaucratic learning (Reiter 1995). To account for the possibility that bureaucratic learning from prior health crises might improve government responses to Covid-19, we include a measure of recent experience with SARS, Ebola, or MERS, drawing on data from the World Health Organization. Experience with the SARS outbreak of 2002-03 has been associated with the swift response to Covid-19 implemented by South Korea and China. (See, for example, the discussion in Fox (2020)).

Fragility. Extreme instances of state weakness arise in states suffering from civil wars or widespread political instability, in what the literature sometimes refers to as "fragile states." Numerous paths link state fragility and vulnerability to rapid disease spread. These include crippled economies, the destruction of health infrastructure, weakened general health conditions, and large population movements. Conflict, particularly when protracted, devastates institutions and hollows out bureaucracies. It can render populations inaccessible to health and humanitarian workers. It weakens trust in government and, along with it, citizen willingness to comply with government directives. It can weaken intergroup trust and a sense of common fate across communities.[10] Indeed, Ghobarah, Huth, and Russett (2003) show that disease spread following war contributes to significant post-war mortality.[11]

Together, these arguments suggest that Covid-19 should be particularly devastating for countries currently or recently affected by conflict, leading to higher mortality rates in those countries.

To capture these dimensions we include the State Fragility Index generated by the Integrated Network for Societal Conflict Research, which produces scores for each country on "effectiveness" and "legitimacy" on each of four performance dimensions: security, political, economic,

[10] See IGC (2020) for a timely discussion of the risks posed by Covid-19 in contexts of recent and ongoing conflict.

[11] For a historical account of similar processes, and a discussion of the role of conflict in contributing to medical research, see Charters (2014).

and social. This measure captures exposure to civil conflict and political violence.

We note that for the current pandemic that are some reasons why these logics may not play out in this way. On the one hand many traditional accounts of state effectiveness assume that it is known what the optimal policies are. If these are not known then the importance of state strength becomes less clear. Some of the relevant policies in this case—such as implementing distancing provisions—require compliance but not state strength as often defined. Moreover in this case there may also be reasons why state weaknesses might work in unusual ways. If more fragile countries are cut off from external and internal sources of contagion (for example, due to the destruction of transportation infrastructure) this may in fact slow the spread of disease.

Decentralization. A state's strength plausibly also depends on the way authority is dispersed within it, with a substantial literature focusing on the potential benefits of decentralization of power (see Faguet 2014; Mookherjee 2015). Starting from US Supreme Court Justice Louis Brandeis' view of state government as a "laboratory" for policy experiments (Brandeis 1932), one line of argumentation has framed decentralization in a positive light. It facilitates policy experimentation and competition between sub-national units (Weingast 1995, 5), which ought to result in better policies in the long term by disciplining them and incentivizing them to provide services more efficiently (Brennan and Buchanan 1980). In addition, it should also improve accountability by increasing the capacity of voters to monitor the elected representatives that make sub-national decisions (Treisman 2002, 4), as well as allow local governments to react quicker to a rapidly developing crisis than in the case of a centralized system. In the case of a health crisis, this series of arguments would predict that greater decentralization would reduce mortality: electoral incentives would make local authorities act quicker in testing and imposing social distancing measures so as to reduce mortality.

A second set of arguments suggests a more pessimistic view. Decentralized systems confront greater collective action problems (Wibbels 2005, 2), which can be a deadly handicap in the face of a health emergency that, by its very nature, requires coordinated and rapid action. Such systems have multiple veto points (Tsebelis 2002) that tend to lock in the status quo, and are susceptible to waste and duplication (Treisman 2002, 7). Indeed, some evidence exists that such types of systems produce higher levels of corruption (Fan, Lin, and Treisman 2009) and worse educational health outcomes, as proxied by infant mortality, rates of infant vaccination, access to clean water sources, and youth literacy (Treisman 2002).

Overall, though, we note that the weight of arguments point to decentralization having a positive influence on health outcomes (Cavalieri and Ferrante 2016; Kang, Cho, and Jung 2012; Kumar and Prakash 2017; Robalino, Picazo, and Voetberg 2001). The gains from policy experimentation may be particularly important when facing a new threat. We include in our models an index of federalism that we construct from indicators found in the 2017 version of the Database of Political Institutions (Cruz, Keefer, and Scartascini 2018). The indicators refer to (1) whether or not there are autonomous regions; (2) whether municipal governments are locally elected; (3) whether state/province governments are locally elected; (4) whether state/provinces have authority over taxing, spending, or legislating; (5) whether the constituencies of the senators are the states/provinces. Each indicator was centered and standardized. The final mean-based index of federalism was computed only for those countries that had at least 3 valid measurements on these 5 indicators.[12] Higher values on the index denote a greater degree of federalism in the country.

Corruption. Corruption can be thought of as a feature of state strength or of accountability failures (Rose-Ackerman 2013). Multiple accounts highlight the adverse effects of corruption on service provision (Azfar and Gurgur 2008; Davis 2004; Fisman and Golden 2017). Gupta, Davoodi, and Tiongson (2001) in particular describe three channels through which corruption weakens health systems. These include higher prices and poorer service provision, weaker investment in human capital, and reduced government revenue. A smaller literature suggests that corruption can have a beneficial effect ("greasing the wheels"), especially in weaker states (Méon and Weill 2010).[13] This literature mostly relies on observational variation. Serra and Wantchekon (2012) provide an overview of experimental studies, typically implemented at a macro level and often focused on measuring corruption. Olken (2007) is an important

[12] The highest share of missing information was found for the last two indicators (above 60%), meaning that the final index is predominantly computed based on the first three indicators.

[13] For a review see Méon and Sekkat (2005).

exception, and documents how audits to reduce corruption result in better service delivery in Indonesia. Such accounts suggest weaker overall responses to a pandemic. Corruption may also introduce additional inequalities within societies in who is able to access services (see, for instance, Hunt 2010 on corruption-induced price discrimination in the health sector). We include a measure of the extent of political corruption in the country from the V-DEM project.

Figure 6 shows the evolution of deaths for countries broken down by quantiles of these measures.

3.2.2 Political structures

Government reactions to crises may depend not only on their ability to respond, but also on their *incentives* to do so, a feature that likely depends on the nature of political institutions.

Democratic Institutions. Sen (1982) famously argued that democratic institutions and a free press have a major effect on the incidence of famines. Famines may be triggered by natural events, but their scale and impact depends on human responses (Waal 2006). The simplest logic that Sen points to is that of political accountability, whereby politicians in democratic contexts take actions to protect (informed) populations because they are accountable to them. For some, the same logic may account for variation in the impact and spread of diseases, likely transmitted through greater spending on public goods (Boix 2001; Kaufman and Segura-Ubiergo 2001; Ghobarah, Huth, and Russett 2004) and particularly on the health system (Besley and Kudamatsu 2006). Bollyky et al. (2019), for instance, argue that "[d]emocratic experience explains 22–27% of the variance in mortality within a country from cardiovascular diseases, 16–53% for tuberculosis."—a conclusion that is shared by other authors as well (Boone 1996; Halperin, Siegle, and Weinstein 2009). See also evidence on infant mortality provided in Lake and Baum (2001), Kudamatsu (2012) and, on policies, Diaz-Cayeros, Estévez, and Magaloni (2016).[14] For evidence for the basic logic in operation at the local level, see Diaz-Cayeros, Estévez, and Magaloni (2016) who argue in Mexico, municipalities"that experienced an alternation of power between political parties are better

[14]For contrary views, see Rubin (2009) and Ross (2006), the latter of whom argues that while democracies spend more on health, these do not benefit populations widely.

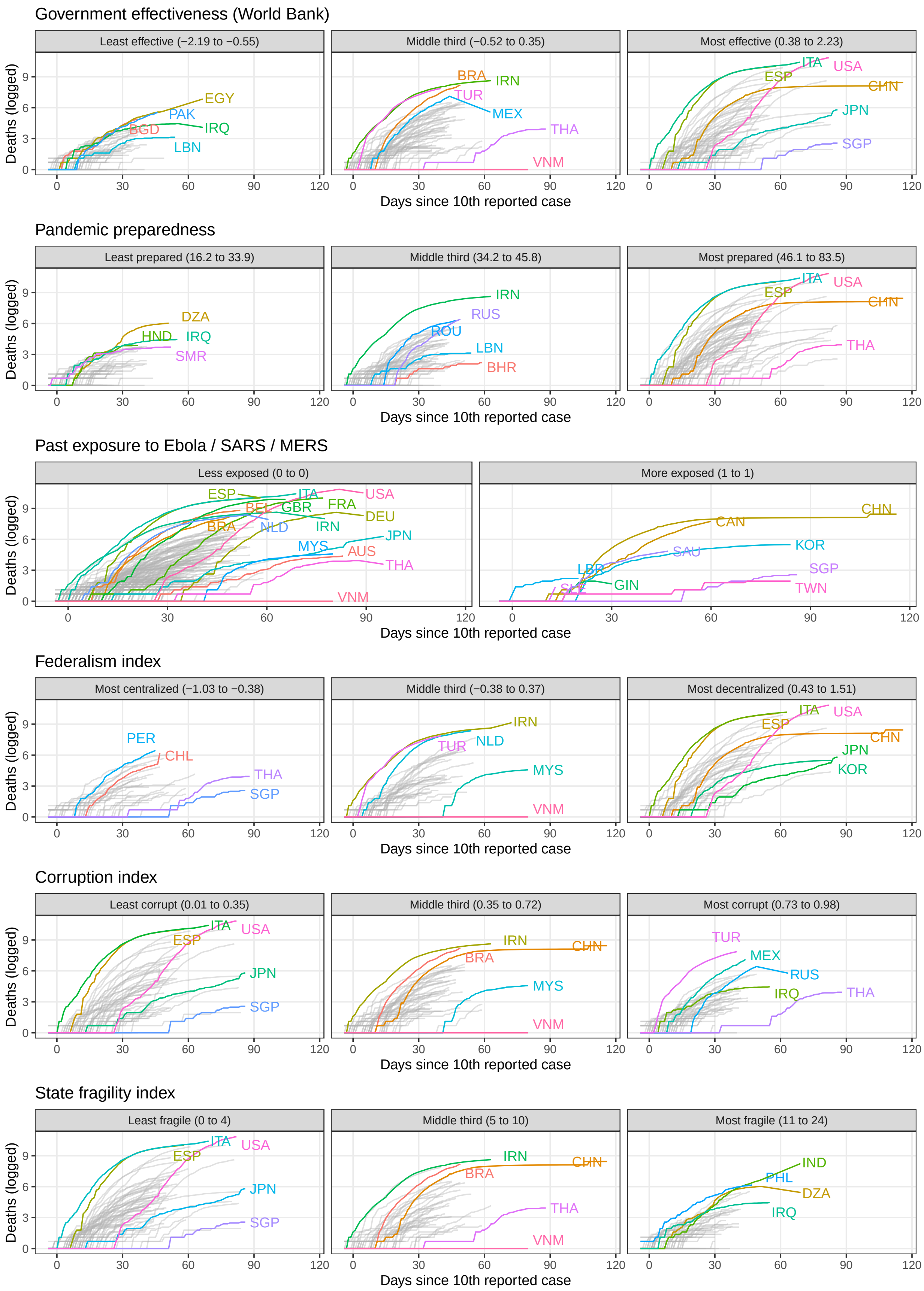

Figure 6: State strength measures; cumulative deaths (logged).

at preserving infants' lives than municipalities that remained under the exclusive hegemonic control of the PRI."

These claims are based on observational data and we know of no experimental studies that link democracy to better health outcomes. See Fujiwara (2015), however, for a natural experiment showing how improvements in democratic institutions (in this specific case, the introduction of electronic voting in Brazilian municipalities) can plausibly lead to better health outcomes.

To capture the potential impact of democratic institutions, we include a measure of liberal democracy, produced by the V-DEM project (Coppedge et al. 2020; Pemstein et al. 2020), as well as the Polity score, originally generated by Robert Gurr (Marshall, Jaggers, and Gurr 2019).

Media. Besley and Burgess (2002) extend Sen's logic and focus on the role of the media. In their account, the media is important for incentivizing governments: if governments get credit from media outlets for responding to crises, they have greater incentives to do so. This mechanism should be stronger for otherwise difficult to observe shocks and depends on the presence of democratic institutions. The media can also take a more confrontational stance, and see its role as "speaking truth to power". This can provide incentives to politicians to capture the media sector (Besley and Prat 2006), and thus sever a crucial link in the government accountability chain—resulting in poorer government performance (Adsera, Boix, and Payne 2003; Snyder Jr. and Strömberg 2010). To examine this relationship, we include an indicator of the extent to which the media is independent of pressures (particularly bribes) to alter their coverage of issues, sourced from the V-DEM project.

Electoral Pressures. Literatures across substantive areas within political science suggest that political action is most intense when electoral pressures are high—when seats are contested, or in the run-up to elections. Nordhaus (1975) provides a classic account of "political business cycles", focusing on ways that economic policies respond to electoral incentives. Meserve (2017) documents plausible effects of electoral cycles on health outcomes in the French Third Republic, arguing that "political importance, not need, plays a prominent role in determining who lives and dies in democracies." A plausible account of how politicians react to the pressures posed by the Covid-19 pandemic starts with the sensitivity of the electorate to economic downturns, and particularly unemployment (Cohen and King 2004; Dassonneville and Lewis-Beck 2013; Markus 1988; Pacek and Radcliff 1995). One of the standard responses to the pandemic has been to impose lockdown measures of varying intensity, that typically include closures of retail outlets and restaurants, and stringent social distancing guidelines for other businesses. These measures will result, in the short term, in a spike in unemployment and an accelerated economic contraction (Stebbins 2020; Strauss 2020). oliticians who are up for reelection in the near future should be more sensitive to the economic damage caused by strict lockdown measures, and correspondingly opt for laxer guidelines. Such choices would then be reflected in mortality rates.

With direct reference to health emergencies, for example, Dionne (2011) argues that upcoming elections and shorter time horizons are related to *less* investment against fighting AIDS in Africa; leaders with shorter horizons implemented policies that were seemingly more comprehensive but cheaper and more visible than effective. A critical part of her argument, however, relies on the slow-moving nature of AIDS—a feature not shared with Covid-19—which gives myopic politicians incentives to ignore the spread.[15]

A counter-argument is that voters undoubtedly care about their own health as well, and feel strongly about governments' responsibility to protect citizens during public health emergencies. Moreover, governments are not entirely powerless in how they frame any economic downturn, and voters do seem to care about responsibility (D'Elia and Norpoth 2014; Peffley and Williams 1985).[16] The ability to claim that Covid 19 was a "black swan"[17], and that strict measures were essential to guarantee population health might spare a government electoral punishment. Finally, the fact that attributions of responsibility might themselves be shaped by partisanship (Tilley and Hobolt 2011) might make a government willing to impose strict measures even if within sight of an election.

[15]Electoral pressures arguments are relevant not only for overall policy responses but may have important distributive consequences within countries. For example, although pressures to respond in a certain way to a public health crisis may increase in general across a country, there may be particularly intense pressures in politically competitive areas.

[16]However, see Arceneaux and Stein (2006) for an instance when voters did punish the incumbent when they believed that preparation for a natural disaster was the authorities' responsibility.

[17]The book that popularized the term refers to global epidemics as "white swans": rare events, but that are certain to happen (Taleb 2007).

We assess which line of argumentation finds support in the data by including in our specifications the time (relative to 2020) until the next general election.

Natural resource dependency. Natural resource endowment also plausibly matters for political responsiveness. Karl (1997), documenting the "paradox of plenty", highlights ways in which the availability of rents from natural resources can weaken state–society linkages. Paler (2013) provides micro-level evidence suggesting that citizens monitor governments more closely when governments are funded by taxes rather than by windfalls. Natural resource dependency—oil in particular—has been linked to a broader class of adverse effects—notably, weaker institutions, corruption, and conflict—that may, in turn, determine response to crises (Ross 2015). To investigate this possibility, we include a World Bank measure of oil rents as a share of GDP. A complication with Covid-19 is that it coincided with a dramatic drop in oil prices at an early stage, producing a government income shock that accompanies possible political channels.

Populism. In a definition given and operationalized by Kyle and Meyer (2020), populist political leaders are united by two claims: "(1) that a country's 'true people' are locked into a moral conflict with 'outsiders' and (2) that nothing should constrain the will of the 'true people.'" Under this account, populist politicians can exacerbate cultural divisions, take a skeptical position towards science and expertise, and can be erratic in decision-making, eschewing the policy moderation that can result from between-party compromise. Insofar as populist leaders take anti-establishment positions, they can also weaken state services, such as health services, that rely on institutionalized bureaucratic structures and expertise. Skepticism about the severity of Covid-19 risks has been voiced by leaders such as Donald Trump in the US and Jair Bolsonaro in Brazil, creating conflicts between messaging by executives and health authorities. Recent cross-national studies offer evidence that populist leaders contribute to a deterioration of both government accountability and state capacity (Rode and Revuelta 2015; Cachanosky and Padilla 2018; Murphy 2019), suggesting multiple paths through which populist politics could result in less effective government responses to the Covid-19 crisis.[18]

[18] Though see Rodrik (2018) for a limited defense of economic populism in times of national emergency.

The measure we use from Kyle and Meyer (2020) focuses specifically on electoral populism and classifies 17 states currently as having governments led by electoral populist parties, including a number of cases with significant early deaths from Covid-19, including Italy, the US, Brazil, Turkey.

The **ideological orientation** of a government may also shape its responses. A simple logic suggests that governments led by right wing parties may implement policies more focused on protecting property while more left wing governments would put more weight on health and welfare outcomes. Kushner Gadarian, Goodman, and Pepinsky (2020) describe polarization between divergent party responses in the US, reporting that "political differences are the single most consistent factor that differentiates' Americans health behaviors and policy preferences;" while Merkley et al. (2020) describe a "rare moment" of partisan consensus in Canada on the importance of responding to Covid-19. We include a measure of ideological position for only a small set of governments given by a weighting of ideological placements of all the parties that form the government (larger numbers denoting more right leaning governments).[Sources]

Political polarization. A considerable part of managing a public health emergency is conveying a clear message concerning spread, state actions, and mitigation techniques (Vaughan and Tinker 2009). High levels of political polarization can potentially disrupt the effectiveness of official communication, particularly when considering its strong affective dimension (Iyengar, Sood, and Lelkes 2012). Under such conditions, a sizable part of the population may attribute a partisan bias to all official messages, leading to lower compliance with government health advisories. Such a partisan lens extends to trust in the source of the message: with growing polarization, the governing apparatus is seen as less trustworthy by supporters of the other side (Citrin and Stoker 2018; Hetherington 2015). In combination, this partisan discounting of the trustworthiness of the source, and of the message itself, can result in lower compliance rates with official guidelines (Blair, Morse, and Tsai 2017; Vinck et al. 2019) and, therefore, in higher mortality. Though we lack cross-national evidence regarding this phenomenon, preliminary analyses link compliance with mobility restrictions instituted during the Covid-19 pandemic with partisanship (Allcott et al. 2020).

In addition to its potential effects on citizen compliance with government policies, an extensive literature on American politics documents the link between party polarization and stalemate in the policymaking process (Layman, Carsey, and Horowitz 2006), to the extent that ideological polarization between parties reduces legislative productivity in the US Congress even more than divided government (Binder 2004; Jones 2001). Such legislative gridlock can plausibly impede swift, effective policy responses in times of crisis.

Further evidence from the American context suggests that, for political systems with multi-tier governance, hyper-partisanism can lead to implementation of policy recommendations at varying speeds, depending on the partisanship of state government (Adolph et al. 2020). And polarization too, following the logic described in Kushner Gadarian, Goodman, and Pepinsky (2020) can lead to variation in citizen responses as a function of divergent positions taken by parties. Taken together, various strands of the literature suggest that highly polarized political contexts will suffer more Covid-19-related fatalities.

We include in our analyses an indicator of party polarization computed based on MARPOR data (Volkens et al. 2019). Using the existing RILE index of Left-Right placement of parties found in the data source, we compute party polarization based on the Taylor and Herman (1971) method: the sum of weighted deviations of party positions from the average party system placement, with party vote shares used as weights.

We note, however, that while these arguments focusing on accountability, broadly understood, are plausible, it is possible that the urgency of Covid-19 is so great, and the effects so widely distributed, that capacity constraints will be more important than incentives in explaining variation in outcomes.

Figure 7 shows the evolution of deaths for countries broken down by quantiles of these measures.

3.2.3 Social structures

Existing literature points to the role of social structures, such as the division of societies into ethnic, religious, or economic groups, in accounting for variations in welfare. In the context of a pandemic, social structures could plausibly condition both the spread of the disease and the ability of governments to respond to it.

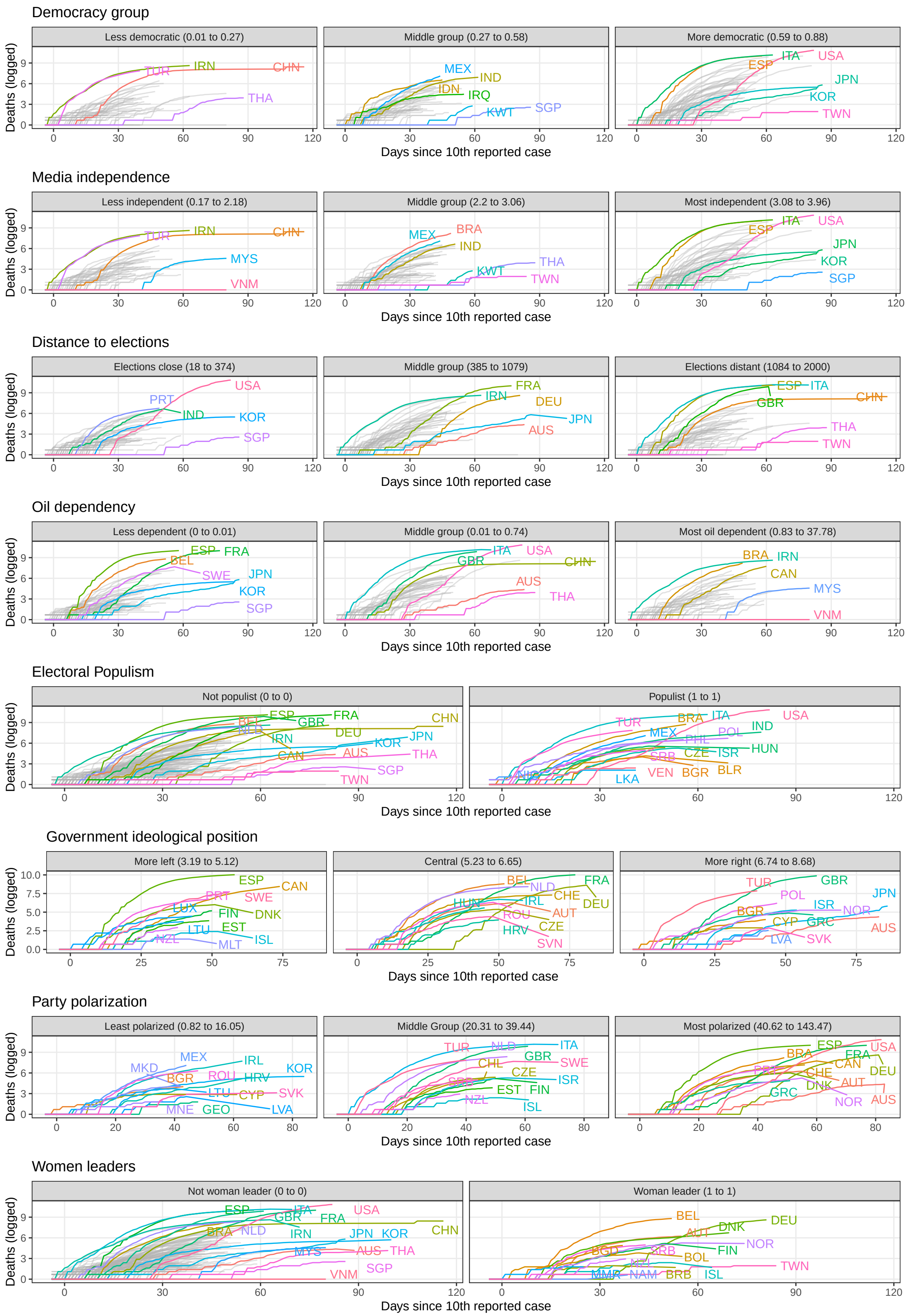

Figure 7: Political structures measures: cumulative deaths (logged).

Ethnic diversity. Two large, well-supported literatures in economics and political science suggest opposite predictions for the relationship between ethnic heterogeneity and the spread of disease.

First, an extensive body of work documents obstacles posed by ethnic diversity for collective action, coordination, informal sanctioning of bad behavior, empathy, and trust.[19] Lieberman (2009) directly applies an argument about ethnic divisions to disease outcomes, using both within- and cross-country variation to make the case that societies with deeper divisions produce poor public policies in the face of a health crisis. He describes multiple channels, but a key insight is that understanding of epidemics can take on an ethnic dimension, resulting in inappropriate scapegoating and false beliefs regarding risks and immunities associated with different groups. Even media coverage can depend on ethnicization of disease (Armstrong, Carpenter, and Hojnacki 2006). Taken together, these studies suggest that more diverse societies should be less able (or willing) to contain an epidemic.[20]

Another well-established literature on the political economy of ethnic diversity focuses on the relative density of intraethnic (as opposed to interethnic) networks, and suggests that fragmentation should actually slow the spread of disease. Early work in this vein begins with the assumption that between-group interactions are typically far less frequent than within-group interactions, with possible consequences for the spread of information and the ability to sanction bad behavior within ethnic networks (Fearon and Laitin 1996; Chandra 2007; Miguel and Gugerty 2005), while later work offers empirical evidence in support (Habyarimana et al. 2007; Gubler and Selway 2012; Larson and Lewis 2016; Larson 2017). Given fewer interactions across groups, the spread of the disease should plausibly be lower within ethnically diverse societies.

Further insights can be drawn from work on ethnic marginalization in diverse societies. Pervasive discrimination and political exclusion may leave marginalized ethnic communities especially vulnerable in the face of a health crisis, and a large literature highlights conditions,

[19] See Alesina and Ferrara (2005) for a review of empirical studies linking ethnic diversity and poor economic outcomes, and Habyarimana et al. (2007) for a discussion of mechanisms linking group diversity to collective action problems. Baldwin and Huber (2010) provide evidence of an intergroup "empathy gap" that contributes to low levels of public goods provision in diverse contexts.

[20] This view is not uncontested, however. For example, see Page (2019) on the enhanced ability of diverse societies to innovate.

such as widespread economic and political discrimination, associated with low levels of intergroup trust and cooperation (Gurr 2015, 2000; Cederman, Wimmer, and Min 2009). Members of marginalized groups are likely to exhibit low levels of trust in government and empirical studies in developed (Cohen and others 1999; Alsan and Wanamaker 2018) and developing country contexts (Obadare 2005; Dionne and Poulin 2013; Blair, Morse, and Tsai 2017; Arriola and Grossman 2020) suggest they are less likely to comply with public health advisories.

We capture ethnic diversity and ethnic politics using several measures. We first include measures of *ethnolinguistic* and *religious fractionalization*, using data from Alesina et al. (2003). To address arguments about ethnic marginalization, we use a measure from the Ethnic Power Relations (EPR) dataset (Vogt et al. 2015) of the share of a country's population that is made up of ethnic groups defined as *excluded from government* in the data.

Economic inequality. Adapting the framework of Leigh, Jencks, and Smeeding (2009), we can identify three different channels through which a higher level of income inequality might increase a country's rate of mortality attributed to Covid-19.

To begin with, there is an *absolute income* effect: a mean-preserving increase in income inequality implies that incomes have decreased for part of the population, making them less able to afford medical treatment for illnesses (Leigh, Jencks, and Smeeding 2009, 387), particularly in systems with a developed private healthcare market. Given that the marginal impact of income changes on health outcomes should be greater at lower incomes than at higher ones, we should observe an aggregate decrease in health outcomes from an increase in income inequality. As the presence of comorbidities has been shown to be associated with an increased mortality rate attributed to Covid-19 (Zhou et al. 2020), such a development would lead to a higher mortality rate in more unequal countries. To the effect just described, we also add a *relative income* pathway: growing income disparities lead to social comparisons and status anxiety (Marmot 2005), which makes the organism susceptible to a wider array of illnesses (Durevall and Lindskog 2012; Sawers and Stillwaggon 2010; Zhuo and Gotway Crawford 2012; Selye 1976; Steptoe and Kivimäki 2012; Wilkinson and Pickett 2006, 2009). As in the previous pathway, these illnesses increase the Covid-19 mortality rate.

The third pathway encapsulates the *society-wide* effects of inequality, which plausibly impact the efficiency with which a country can respond to the challenge posed by the pandemic. By decreasing aggregate levels of trust (Elgar 2010), income inequality can impact the provision of public goods (Leigh, Jencks, and Smeeding 2009), and particularly a well-funded and efficient health system (Ghobarah, Huth, and Russett 2004). By damaging social cohesion (Barnett and Whiteside 2002), inequality can undermine the very type of coordinated, society-wide action that is needed to prevent contagious diseases from spreading faster. We use in our specifications the Gini index of net income inequality, sourced from the Standardized World Income Inequality Database (SWIID), version 8.2 (Solt 2016).

Interpersonal and institutional trust. In addition to serving as a mechanism for the impact of economic inequality, trust can exert an independent effect on mortality rates. As was briefly mentioned above, lower levels of interpersonal trust can hinder cooperation between individuals and groups (Gächter, Herrmann, and Thöni 2004; Fukuyama 1996; Parks, Henager, and Scamahorn 1996; Putnam 1995). Responding to a major epidemic requires such large-scale cooperation, particularly with respect to following health and social distancing guidelines. In its absence we expect higher infection rates, which directly translates into higher mortality. The guidelines mentioned above are disseminated by state authorities; the extent to which such messages are acted upon also depends on the degree of trust in the state authorities (Blair, Morse, and Tsai 2017; Vinck et al. 2019). Where such trust is fragile, we expect a lower degree of compliance with such messages and a greater degree of misinformation about Covid-19 transmission pathways and its mortality. Both of these are likely to result in a larger number of fatalities. As an indicator of interpersonal trust we include here the share of the population that agrees with the statement "most people can be trusted", computed based on waves 5 and 6 of the World Values Surveys (WVS), and obtained from Our World in Data (Ortiz-Ospina and Roser 2020). For institutional trust, we include the share of the population that self-reports "a great deal" or "quite a lot" of confidence in the central government, also obtained from waves 5 and 6 of the WVS (WVS 2018).[21]

[21] In the case of both indicators, only surveys fielded in or after 2009 were selected for inclusion.

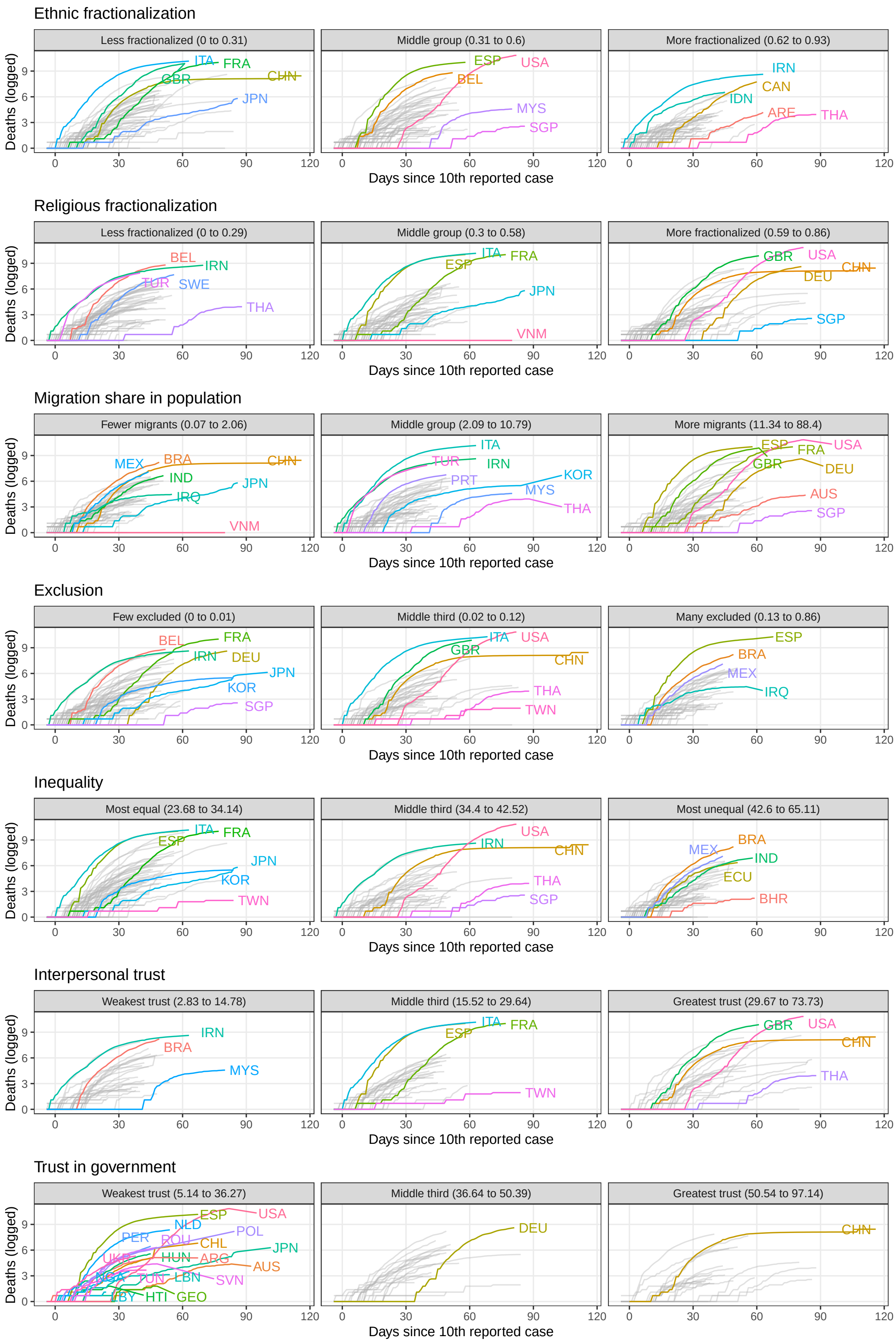

Figure 8: Social structure measures: cumulative deaths (logged).

In addition to these core political and social measures, we include for comparison a set of economic and demographic indicators suggested by Figure 5 that can plausibly explain variations in outcomes.

3.2.4 Global linkages

Research in the field of international political economy suggests that the global growth of interconnectivity can amplify systemic risks. Goldin and Mariathasan (2015), for instance, highlight the spatial risks of globalization, including "vector risk" for the transmission of disease. Following this logic, higher levels of global integration—as measured, for example, by trade dependencies, foreign investment, migration and air travel—should generally increase the risk of disease outbreaks and are likely to be associated with more deaths. Some accounts focus on the risks to countries that are more globalized, while others focus on the *systemic* risks arising from globalization (see Centeno et al. 2015 for a review).

Epidemiologists have paid particular attention to global linkages in estimating short-term risks of diffusion. For example, Craig, Heywood, and Hall (2020) and Gilbert et al. (2020) provide tools for assessing risks of importation of cases of Covid-19, using data on origin–destination air travel flows in combination with assessments of domestic health system preparedness.

Studies in the political economy of global systemic risks have largely focused on globalization's role in increasing economic risks, but some identify mechanisms through which globalization may actually *reduce* risks. The simplest argument is that wider connections can, in some instances, diversify risk. Another possibility is that globalization can spur demands for welfare policies that can cushion shocks—a logic that could, in principle, apply to global health crises (Cameron 1978; Katzenstein 1985; Rodrik 1998).[22].

To assess these arguments, we measure global interconnectivity in air travel, migration, trade, and foreign investment, using data from the World Bank.

3.2.5 Environmental risks

Beyond the risks of spread arising from global linkages, demographic and climatic features can also increase vulnerabilities, conditional on behaviors. Although not a central focus of our

[22] See, however, counter-arguments from Iversen and Cusack (2000)

analysis, we include for comparison purposes some several demographic measures including measures of population density and the percentage of the population living in urban areas, as well as climatic measures of temperatures and precipitation.

3.2.6 Health risks

Even conditional on infections, measures of age structures — the share of a country's population aged 65 and above and prevalence of respiratory diseases. For age structure in particular, a growing epidemiological literature suggests that the older population is at a higher risk of dying from Covid-19 (Hauser et al. 2020; Onder, Rezza, and Brusaferro 2020a).

Though not included in our measures, we note that air quality too has been associated with higher mortality, other things equal (Xiao Wu 2020).

3.2.7 Health systems

Countries vary not only in their political structures but in the policy outputs of political processes. Critically, there is substantial variation across societies in the role of the state in regulating and managing health care systems, as well as the degree of protection available to social groups. We are not aware of a substantial literature in political science linking social protection to national-level resilience to shocks (although see Rodrik 1998). Health scientists have done more to address this question. See, for example, Siroka, Ponce, and Lönnroth (2016), who documents a relationship between social protection and tuberculosis (see also Reeves et al. 2014). We include a set of measures of social protection since these capture important political variation across states and because there are intuitive, plausible mechanisms, such as better access to authoritative health information, better management, and a greater ability of individuals to respond to infection, that should help explain variation in Covid-19 fatalities.

Reporting. Health systems also matter for what is reported. There are broad concerns around underreporting of both cases and fatalities. A particular concern for cross sectional analysis is that countries with weaker health systems systematically underreport and thus might appear to have fewer deaths than they have. This concern can partly be addressed by using information specifically on reporting capacity. Hollyer, Rosendorff, and Vreeland

(2014) provide a discussion and measurements of reporting from political science research. We incorporate information from GHSI that captures early capacity for "detection and reporting epidemics of potential international concern."

4 Estimation

The core analyses report coefficients on explanatory measures of interest from linear regressions of outcomes (primarily cumulative Covid-19 deaths on a given day). We include a small set of simple controls selected using a Lasso ("least absolute shrinkage and selection operator"). The top four variables selected by this procedure, currently, are total population (logged), share 65+, respiratory disease prev (IMHE), and access to sanitation (GHSI) (see data appendix for more details on measures). Notably, a direct measure of health quality reporting generally does not get selected as a control variable, and nor does per capita GDP.

Thus our estimating equation for day t for each measure of interest X is:

$$y^t = \beta_0^t + \beta_1^t X + \gamma^t Z + \epsilon$$

where Z is a vector of controls. As of 25 April, 2020, the four control variables account for 71% of the cross national variation in deaths. See Figure 9 for relations between these controls and outcomes on different days (for unconditional relations see Figure 14 in supplementary material). Data missingness among these control variables results in dropping data for Cote d'Ivoire, Cuba, Cyprus, Iran, Morocco, Palestine, Russia, Sudan, Somalia, South Sudan, Syria, the United Republic of Tanzania, Ukraine, and Kosovo (among countries with populations of 1 million or more). In addition China is excluded from all analyses to allow for a focus on internal reactions to an external shock. We emphasize that these controls can be considered "post treatment" with respect to the political and social measures we include: for instance plausibly the gains from better government are captured by higher GDP. For this reason the absence of a conditional correlation does not imply causal irrelevance of a variable.

We calculate confidence intervals using robust standard errors.[23]. In addition to reporting coefficients and confidence intervals, our output reports the partial adjusted R^2 and the

[23] Calculated using `lm_robust` from the `estimatr` package for `R`

number of observations used in each analysis (Ives 2019). In additional analyses, we also report the estimated coefficients from a model with no controls.

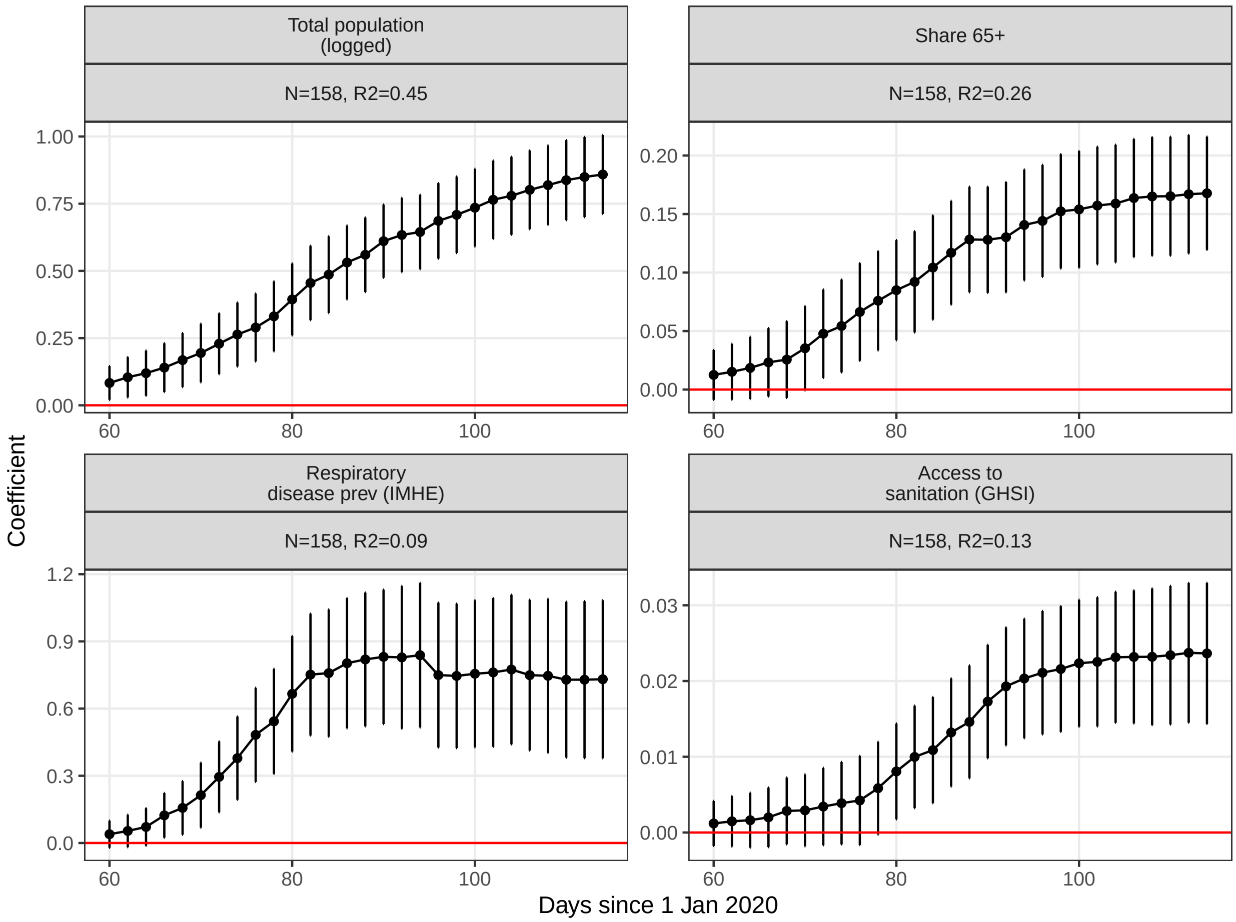

Figure 9: Relation between controls and logged deaths at different points in time (each conditional on the others; partial adjusted R^2 reported.)

Figure 10 shows how these controls perform in predicting out of sample; each point in the figure shows the actual and predicted values for a given country where predicted values are generated from models that do not include the model in question. We see currently that the controls perform relatively well but do not pick up on particular features that give rise to the large numbers for Italy, Spain, France, the UK and US. These have high rates even taking account of reporting, income, age profiles, and population; Japan especially stands out as a case with fewer deaths than might be expected given these controls.

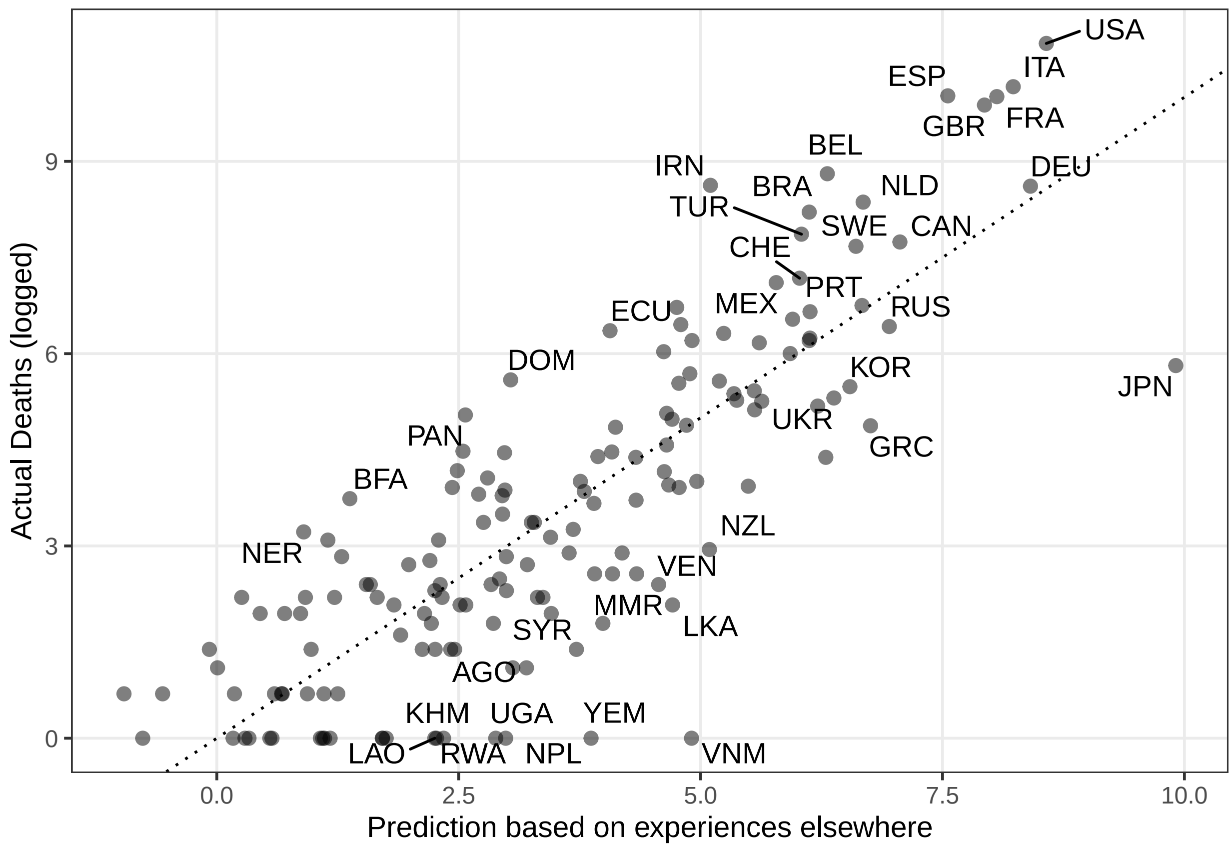

Figure 10: Out of sample predictions from controls. Points aboce (below) the 45 degree line do worse (better) than predicted.

5 Patterns

We report results in Table 1 and graphically in Figure 11. We show estimates using the most recent available data for each relationship (with and without basic controls). Coefficients are normalized and can be interpreted as differences in outcomes associated with a standard deviation shift in the variable of interest.

In the supplementary material, we show the coefficients as estimated from daily data as well as (a) correlations x days since onset (b) correlations with policy outcomes (c) correlations within subgroups.

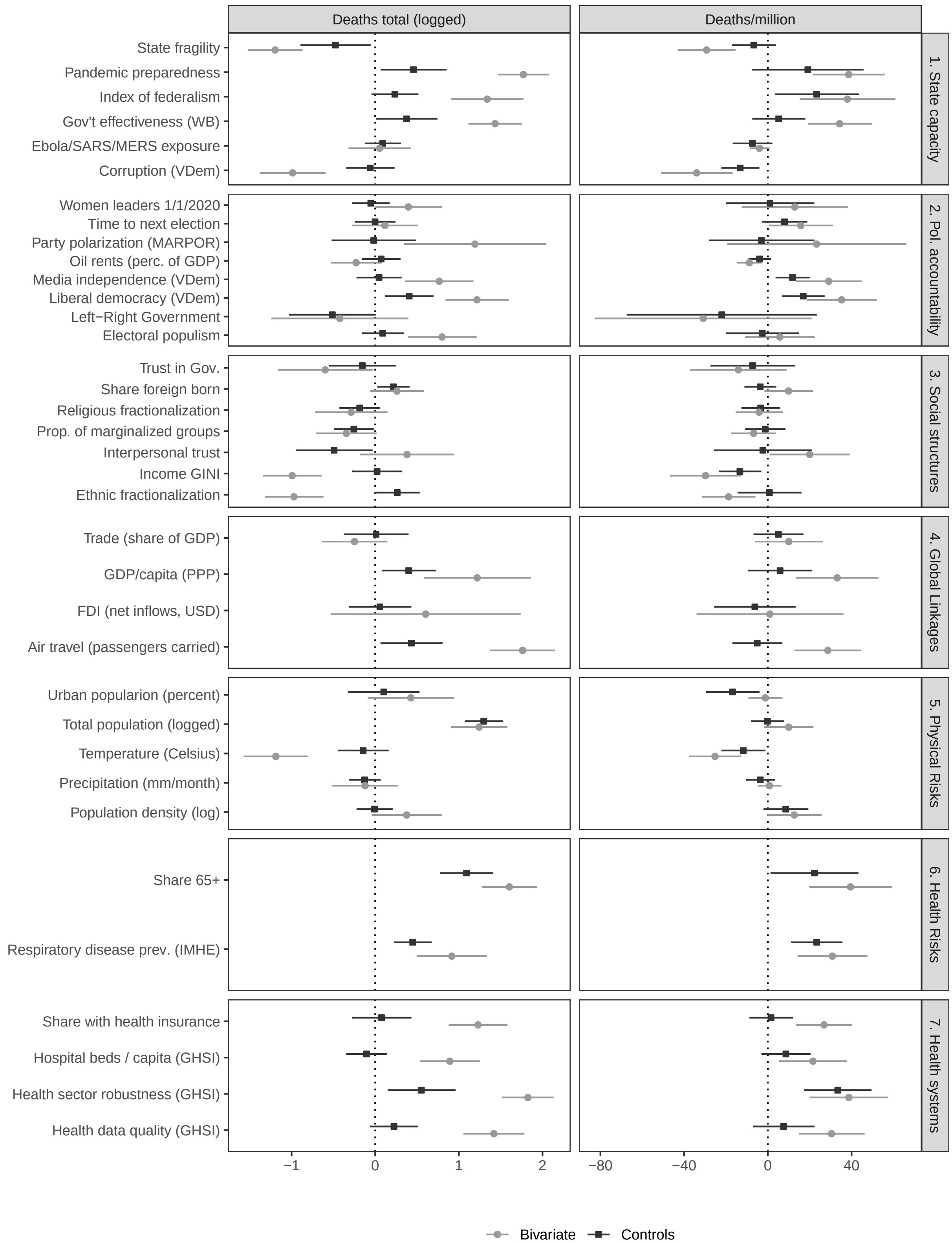

Figure 11: Correlates of Corona outcomes. Points represent normalized coefficients from either a bivariate model (circles) or a model with controls (squares).

Table 1: Estimates and p-values: log total deaths

Variable	Relation	Estimate	P	P (adj.)	N
1. State capacity					
Gov't effectiveness (WB)		0.37	0.05	0.07	158
Pandemic preparedness		0.46	0.02	0.04	158
Ebola/SARS/MERS exposure	States learn from past experience to similar crises.	0.09	0.41	0.49	158
Index of federalism	Decentralization of government power allows local authorities to mobilize quickly to save lives.	0.23	0.10	0.13	117
Corruption (VDem)	Higher level of corruption results in weaker institutions, including health systems, suggesting more deaths in more corrupt countries.	-0.06	0.69	0.75	158
State fragility	States in conflict or with political instability are more vulnerable to rapid disease spread and have weaker capacities to respond effectively to curb deaths.	-0.47	0.03	0.04	157
2. Pol. accountability					
Liberal democracy (VDem)		0.41	0.01	0.02	158
Media independence (VDem)	Independent media can hold governments accountable for their actions thereby incentivizing them to effectively respond to public health emergencies.	0.05	0.74	0.84	158
Time to next election	Political action is most intense when seats are contested or in the run-up to elections.	0.00	0.99	0.99	158
Oil rents (perc. of GDP)	Citizens monitor governments more closely when governments are funded by taxes than by windfalls, resulting in weaker institutions, which in turn determines response to crises.	0.07	0.54	0.74	155
Electoral populism		0.09	0.47	0.74	158
Party polarization (MARPOR)		-0.02	0.94	0.99	38
Left-Right Government		-0.51	0.05	0.12	34
Women leaders 1/1/2020		-0.05	0.64	0.79	158
3. Social structures					
Share foreign born	Higher levels of global integration increase disease spread and are likely to be associated with more deaths.	0.22	0.03	0.09	158
Ethnic fractionalization		0.26	0.06	0.11	151
Religious fractionalization		-0.19	0.13	0.18	152
Prop. of marginalized groups	Marginalized groups due to political exclusion, and lower levels of trust in political authorities are more vulnerable in crises.	-0.26	0.03	0.09	158
Income GINI	Due to differential morbidities, access to health care, ability to comply with government directives, and trust in government disease mortalities are higher in more unequal countries.	0.02	0.88	0.88	139
Interpersonal trust	Lower levels of interpersonal trust hinder cooperation in complying with social distancing guidelines, leading to higher infections.	-0.49	0.04	0.09	75

Table 1: Estimates and p-values: log total deaths *(continued)*

Variable	Relation	Estimate	P	P (adj.)	N
Trust in Gov.	Lower levels of trust in government can lead to resistance to outbreak mitigation measures.	-0.15	0.44	0.47	57

Note:
The table shows estimates, raw p-values and p-values adjusted for multiple comparisons (Benjamini-Hochberg procedure). All variables are standardized. The outcome is the logarithm of the total number of deaths, as of the date of this paper.

Table 2: Estimates and p-values: log total deaths

Variable	Relation	Estimate	p	p (adj.)	N
4. Global Linkages					
GDP/capita (PPP)		0.40	0.02	0.04	151
Trade (share of GDP)	Higher levels of global integration increase disease spread and are likely to be associated with more deaths.	0.01	0.96	0.96	141
FDI (net inflows, USD)	Higher levels of global integration increase disease spread and are likely to be associated with more deaths.	0.06	0.77	0.88	155
Air travel (passengers carried)	Higher levels of global integration increase disease spread and are likely to be associated with more deaths.	0.43	0.02	0.04	132
5. Physical Risks					
Population density (log)	Aid rapid virus diffusion, leading to more deaths.	-0.01	0.93	0.93	156
Total population (logged)		1.30	0.00	0.00	158
Precipitation (mm/month)	Higher humidity aid virus diffusion, leading to more deaths.	-0.13	0.19	0.31	158
Temperature (Celsius)	Higher temperatures aid virus diffusion, leading to more deaths.	-0.14	0.35	0.50	158
Urban popularion (percent)	Aid rapid virus diffusion, leading to more deaths.	0.10	0.63	0.70	117
6. Health Risks					
Share 65+	Increase disease fatalities.	1.09	0.00	0.00	158
Respiratory disease prev. (IMHE)	Increase disease fatalities.	0.45	0.00	0.00	158
7. Health systems					
Share with health insurance	Higher access to health care is associated with lower mortality.	0.08	0.67	0.67	138
Hospital beds / capita (GHSI)	More robust health systems mean fewer fatalities from infections.	-0.10	0.40	0.46	155
Health data quality (GHSI)	More robust health systems mean fewer fatalities from infections.	0.22	0.12	0.16	158
Health sector robustness (GHSI)	More robust health systems mean fewer fatalities from infections.	0.55	0.01	0.01	158

Note:
The table shows estimates, raw p-values and p-values adjusted for multiple comparisons (Benjamini-Hochberg procedure). All variables are standardized. The outcome is the logarithm of the total number of deaths, as of the date of this paper.

Currently, across almost all measures included here, the bivariate relationship between **state capacity** and deaths is strong, reflecting the current concentration of the disease in Western Europe and the United States. With controls included, these relationships are currently substantially weaker.

Correlations with political structures measures broadly track those of the state capacity measures at this time, with the greatest concentrations of Covid-19 deaths in states with more responsive political structures. Democracy and populism are weakly associated with more deaths but relationships in this set are in general not strong at this time. There are not many governments classified in the data as electoral populist (just 17), though they include many high death locations, including Italy, the US, Turkey, and Brazil. Currently, on average, the bivariate relationship between populism and deaths is strong, though it is substantially weaker once basic controls are introduced.

Currently, although the unconditional relation between social fragmentation measures and deaths is negative (particularly for ethic fragmentation and economic inequality), there is no strong relationship between between these measures and deaths once other factors are taken into account (Figures 17).[24] For these social diversity measures, less fractionalized countries with many deaths include France and Italy; more fractionalized countries with few or no deaths include Uganda and Liberia. There is a suggestive correlation between interpersonal trust and fewer deaths, though the data for this measure is currently sparse and limited largely to wealthier countries.

5.1 Other covariates

Global connections as measured by FDI and trade dependence are not strongly related to deaths, though air passengers carried is. "Environmental risks"—such as temperature and humidity are not strong predictors, nor are population density and urbanization. Health risks — as captured by respiratory diseases and share of the population over 65 are, at this stage, clearly the strongest predictors. A country's population share above age 65 accounting currently for about 38.37% of the variation in (log) deaths across states (Figures

[24]This could partly be an artifact of the progression of the pandemic. After China and Iran, it has gone on to strongly impact the democratic and wealthy countries of Western Europe, which are less economically unequal and less fractionalized than the rest of the world.

20). Prevalence of respiratory diseases currently accounts for about 11.66% of the variation in (log) deaths across states.

6 Predictive power of political and social correlates

The analysis above focused on variables that existing literature suggested could be important for explaining variation in Covid-19 outcomes. In a second, complementary approach we use a Lasso analysis to gauge whether political and social correlates have predictive power above and beyond a set of controls from the remaining families of correlates. This approach simply asks whether *any* of these variables singly or in combination enhances predictive power. We proceed in two steps.

We run Lasso models to predict our two Covid-19 burden outcomes, once excluding variables in families 1–3 and again including them. In each case we employ 5-fold cross validation to obtain the tuning parameter λ that maximizes out-of-sample accuracy. We then run a lasso model using the optimal λ. In figure **??**, we show prediction accuracies for models that do and do not include the political and social correlates. To calculate out-of-sample prediction accuracy, we split the data into separate training and test sets. To ensure that our results are not driven by a specific test-train split, we show results for 100 different splits. The confidence intervals in figure **??** show sensitivity of the prediction accuracy to the particular units selected in the test-train splits. We elaborate on the individual steps of the procedure, as well as the exact definition of the RMSEs in section 9.7 in the appendix.

In figure 12, we show which political and social variables were selected in an unconstrained model and indicate the importance they play in the optimal model (for comparison Figure 13 in supplementary materials show the variables selected from among families 4 - 7 only).

Overall, the results from this analysis suggest that, to date, these political and social variables have little explanatory power over and above simple demographic and health indicators.

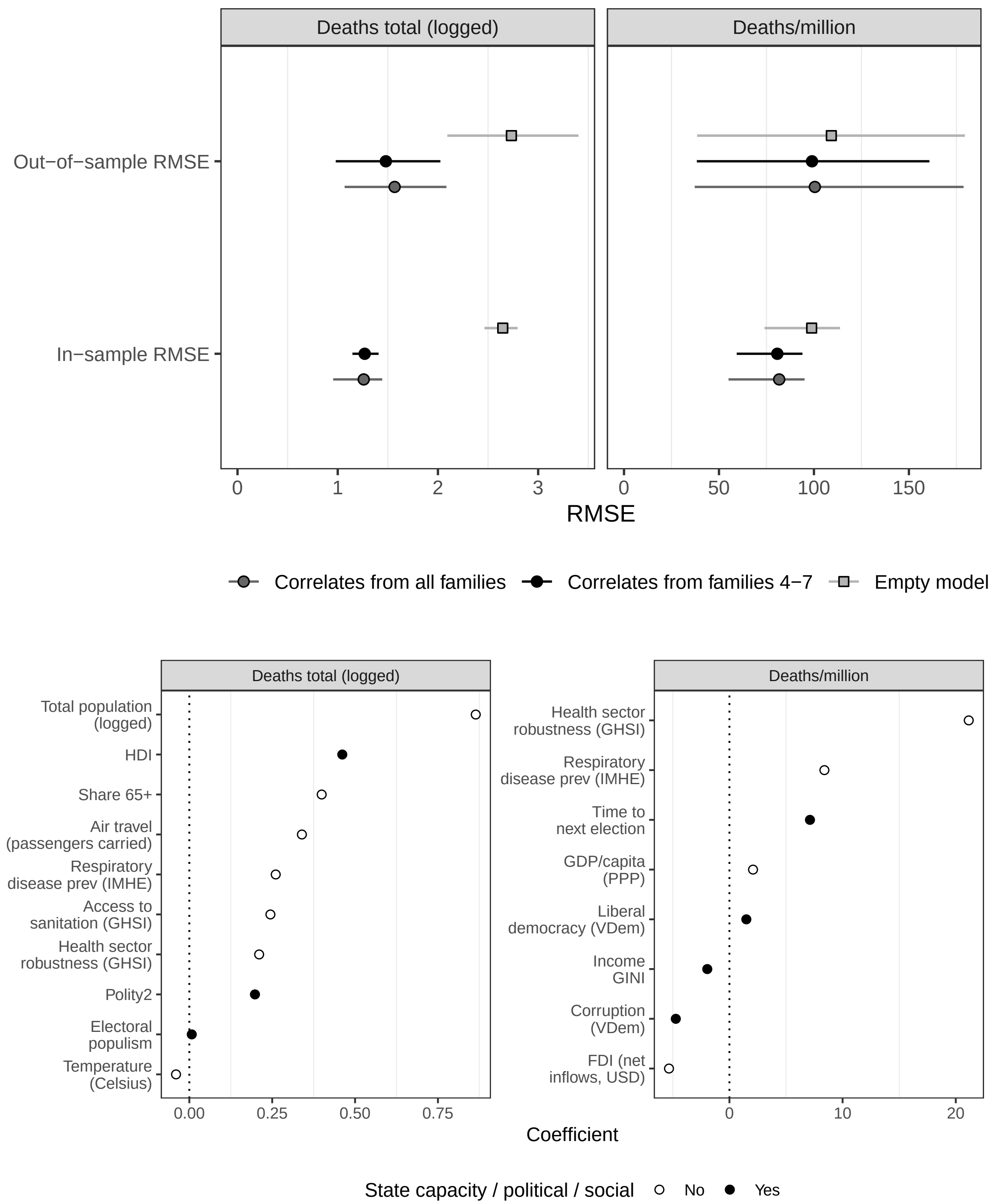

Figure 12: Variables chosen by Lasso and corresponding coefficients, all variable families. All variables are standardized.

7 Future work

The results presented in the last sections show emerging correlations at what is likely an early stage of the Covid-19 pandemic. These patterns are likely to change for at least four reasons. First, current patterns reflect in part randomness in the onset of outbreaks in different countries. Second, government responses are liable to change as the disease progresses, perhaps with different strategies being employed at different times by different countries. Third, different strategies may vary in their short term and longer term effects. Fourth, data is likely to be corrected and improved over time.

In the longer run too, variation in the broader social costs of the disease will become clearer, including deaths that arise indirectly due to the disease arising from economic costs and pressures on health systems.

To assess these longer-term relations we intend to re-run the analyses of the last two sections using the same code and specifications as used here. The primary outcomes for future analyses will be (a) cumulative reported Covid-19 deaths on 1 Jan 2021 and (b) once 10 day growth rates fall below 10% in at least 50% of countries, if this comes later than 1 Jan 2021 and (c) 2020 excess deaths.

8 Conclusion

We have provided a snapshot of political and social correlates of the Covid-19 burden up until 25 April, 2020. We lay no claim to the estimation of causal effects, but seek, more simply, to assess the extent to which measures that political science research suggests might help us understand states' responses to adverse shocks and, in turn, national-level variation in the Covid-19 deaths burden.

Currently, on many counts, simple correlations appear opposite to those we might expect from these literatures. In particular, we see more deaths in states that score highly on common measures of government capacity and political accountability. On most political and social measures however there is currently no clear discernible relationship conditional on other factors.

We are still at an early stage of this crisis, however, and some of these correlations may change— some may strengthen, some may change direction, and some may disappear. We accompany this article with a real time tracker[25] that provides continuous updates of key figures and which can be used to assess whether distributions fall in line with theoretical expectations over time.

We envision, and invite, at least three natural extensions of this work. The first is to assess the extent to which these correlations, changing through time, have predictive value above and beyond what can be gained from existing forecasting approaches. The second is to shift the focus from the national level to the sub-national level. Our focus on the national level has some justification: although the disease does not have boundaries, many government responses do. However, a focus on the national level prevents examination of patterns in the within-country distribution of Covid-19 which may turn out to be critical for understanding the welfare impacts of the disease.[26] The third is to go in the opposite direction and take account of the global nature of the disease, to understand how relations between countries worsen or strengthen responses to the crisis.

[25] https://wzb-ipi.github.io/corona/

[26] For a historical study of inequality in health outcomes within human societies see Boix and Rosenbluth (2014).

Table 3: Estimates and p-values: Deaths per million

Variable	Relation	Estimate	p	p (adj.)	N
1. State capacity					
Gov't effectiveness (WB)		5.17	0.42	0.42	153
Pandemic preparedness		19.11	0.16	0.19	153
Ebola/SARS/MERS exposure	States learn from past experience to similar crises.	-7.39	0.12	0.16	153
Index of federalism	Decentralization of government power allows local authorities to mobilize quickly to save lives.	23.34	0.02	0.04	114
Corruption (VDem)	Higher level of corruption results in weaker institutions, including health systems, suggesting more deaths in more corrupt countries.	-13.21	0.00	0.01	153
State fragility	States in conflict or with political instability are more vulnerable to rapid disease spread and have weaker capacities to respond effectively to curb deaths.	-6.73	0.21	0.22	152
2. Pol. accountability					
Liberal democracy (VDem)		16.93	0.00	0.01	153
Media independence (VDem)	Independent media can hold governments accountable for their actions thereby incentivizing them to effectively respond to public health emergencies.	11.77	0.00	0.01	153
Time to next election	Political action is most intense when seats are contested or in the run-up to elections.	7.97	0.14	0.29	153
Oil rents (perc. of GDP)	Citizens monitor governments more closely when governments are funded by taxes than by windfalls, resulting in weaker institutions, which in turn determines response to crises.	-3.97	0.14	0.29	152
Electoral populism		-2.64	0.77	0.86	153
Party polarization (MARPOR)		-3.06	0.81	0.86	38
Left-Right Government		-22.02	0.33	0.44	34
Women leaders 1/1/2020		1.03	0.92	0.92	153
3. Social structures					
Share foreign born	Higher levels of global integration increase disease spread and are likely to be associated with more deaths.	-3.65	0.34	0.59	153
Ethnic fractionalization		0.74	0.92	0.92	148
Religious fractionalization		-3.46	0.46	0.60	149
Prop. of marginalized groups	Marginalized groups due to political exclusion, and lower levels of trust in political authorities are more vulnerable in crises.	-1.26	0.79	0.90	153
Income GINI	Due to differential morbidities, access to health care, ability to comply with government directives, and trust in government disease mortalities are higher in more unequal countries.	-13.37	0.01	0.05	139
Interpersonal trust	Lower levels of interpersonal trust hinder cooperation in complying with social distancing guidelines, leading to higher infections.	-2.39	0.84	0.90	74

Table 3: Estimates and p-values: Deaths per million *(continued)*

Variable	Relation	Estimate	p	p (adj.)	N
Trust in Gov.	Lower levels of trust in government can lead to resistance to outbreak mitigation measures.	-7.30	0.47	0.60	56

Note:
The table shows estimates, raw p-values and p-values adjusted for multiple comparisons (Benjamini-Hochberg procedure). All variables are standardized. The outcome is the number of deaths per million population, as of the date of this paper.

Table 4: Estimates and p-values: Deaths per million

Variable	Relation	Estimate	P	P (adj.)	N
4. Global Linkages					
GDP/capita (PPP)		5.84	0.45	0.60	149
Trade (share of GDP)	Higher levels of global integration increase disease spread and are likely to be associated with more deaths.	5.05	0.40	0.60	138
FDI (net inflows, USD)	Higher levels of global integration increase disease spread and are likely to be associated with more deaths.	-6.20	0.53	0.60	153
Air travel (passengers carried)	Higher levels of global integration increase disease spread and are likely to be associated with more deaths.	-5.07	0.40	0.60	128
5. Physical Risks					
Population density (log)	Aid rapid virus diffusion, leading to more deaths.	8.55	0.11	0.19	153
Total population (logged)		-0.19	0.96	0.96	153
Precipitation (mm/month)	Higher humidity aid virus diffusion, leading to more deaths.	-3.60	0.30	0.42	153
Temperature (Celsius)	Higher temperatures aid virus diffusion, leading to more deaths.	-11.73	0.03	0.09	153
Urban popularion (percent)	Aid rapid virus diffusion, leading to more deaths.	-16.86	0.01	0.05	113
6. Health Risks					
Share 65+	Increase disease fatalities.	22.22	0.04	0.04	153
Respiratory disease prev. (IMHE)	Increase disease fatalities.	23.34	0.00	0.00	153
7. Health systems					
Share with health insurance	Higher access to health care is associated with lower mortality.	1.52	0.77	0.77	135
Hospital beds / capita (GHSI)	More robust health systems mean fewer fatalities from infections.	8.63	0.15	0.20	150
Health data quality (GHSI)	More robust health systems mean fewer fatalities from infections.	7.53	0.31	0.35	153
Health sector robustness (GHSI)	More robust health systems mean fewer fatalities from infections.	33.39	0.00	0.00	153

Note:
The table shows estimates, raw p-values and p-values adjusted for multiple comparisons (Benjamini-Hochberg procedure). All variables are standardized. The outcome is the number of deaths per million population, as of the date of this paper.

9 Appendix

9.1 Lasso controls selection

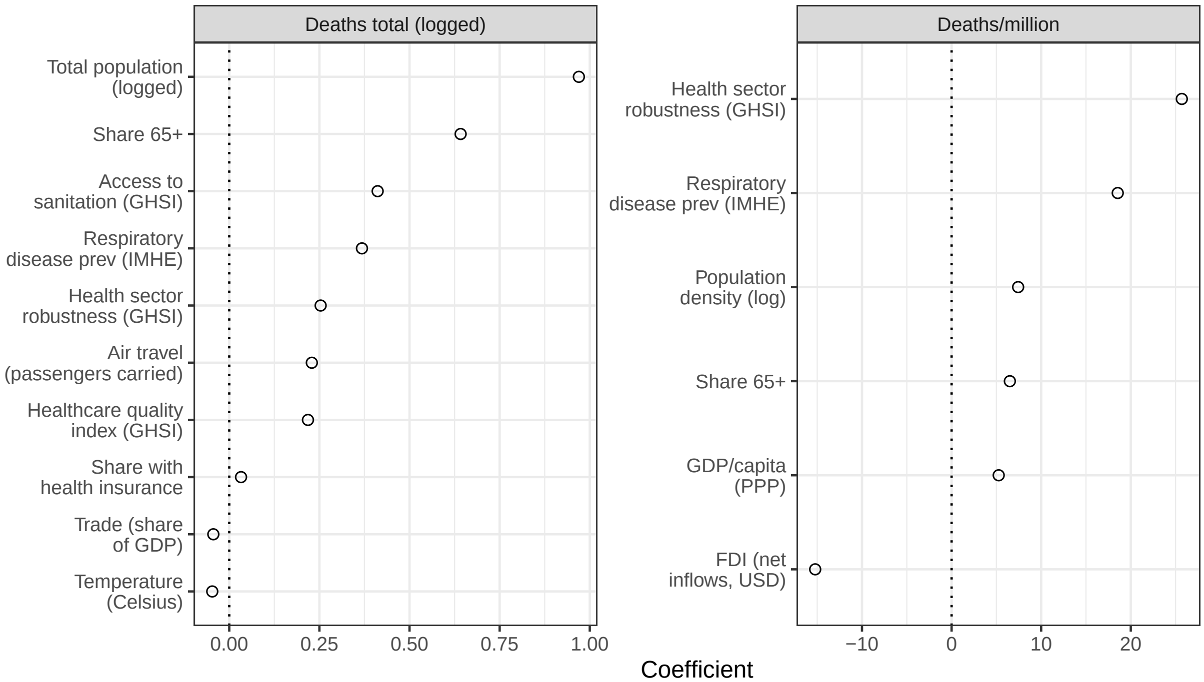

Figure 13: Control variables chosen by Lasso and corresponding coefficients, families 4–7. All variables are standardized.

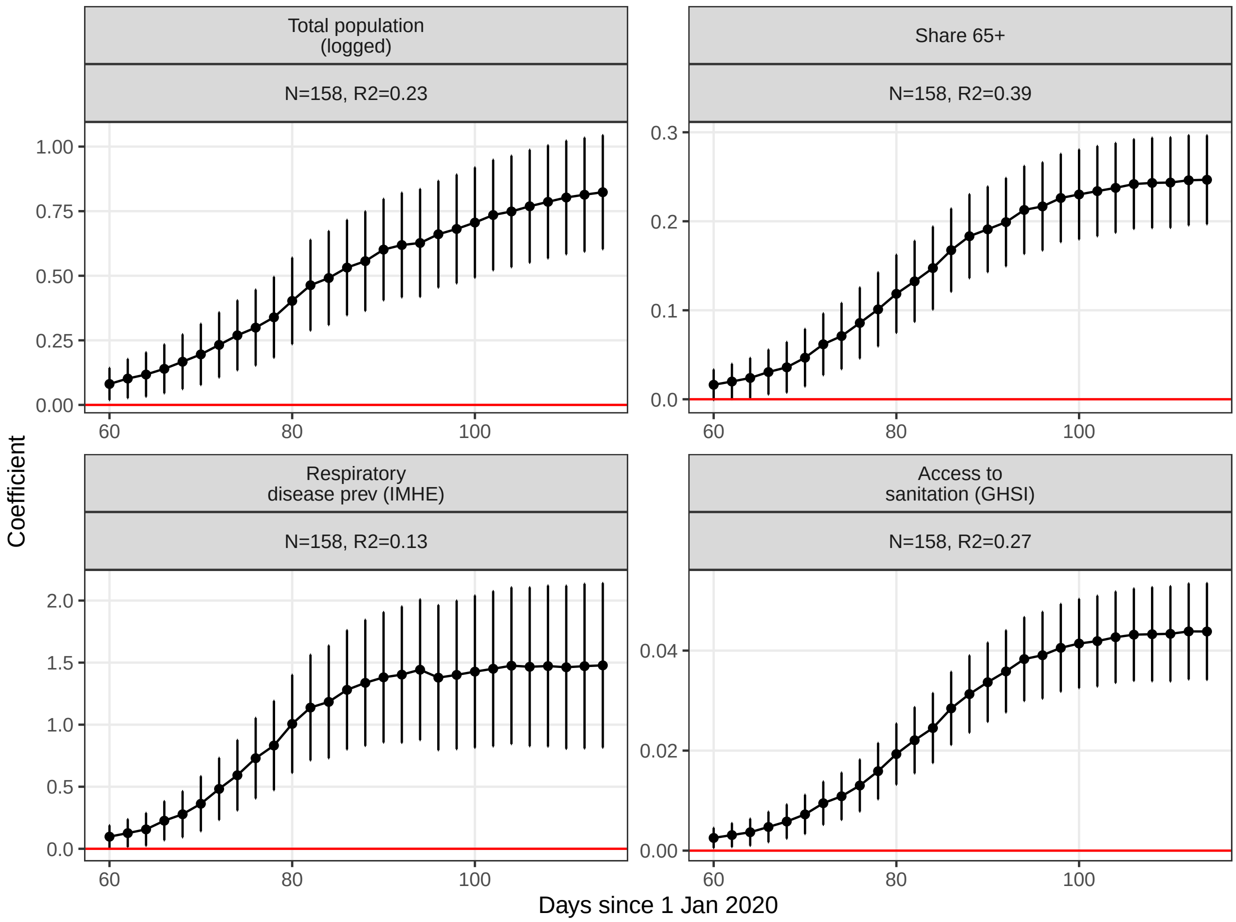

Figure 14: Bivariate relations between selected controls and logged deaths at different points in time. Points represent coefficients calculated for a given day's data in a linear model with no controls.

9.2 Changing estimates over time

9.2.1 State capacity

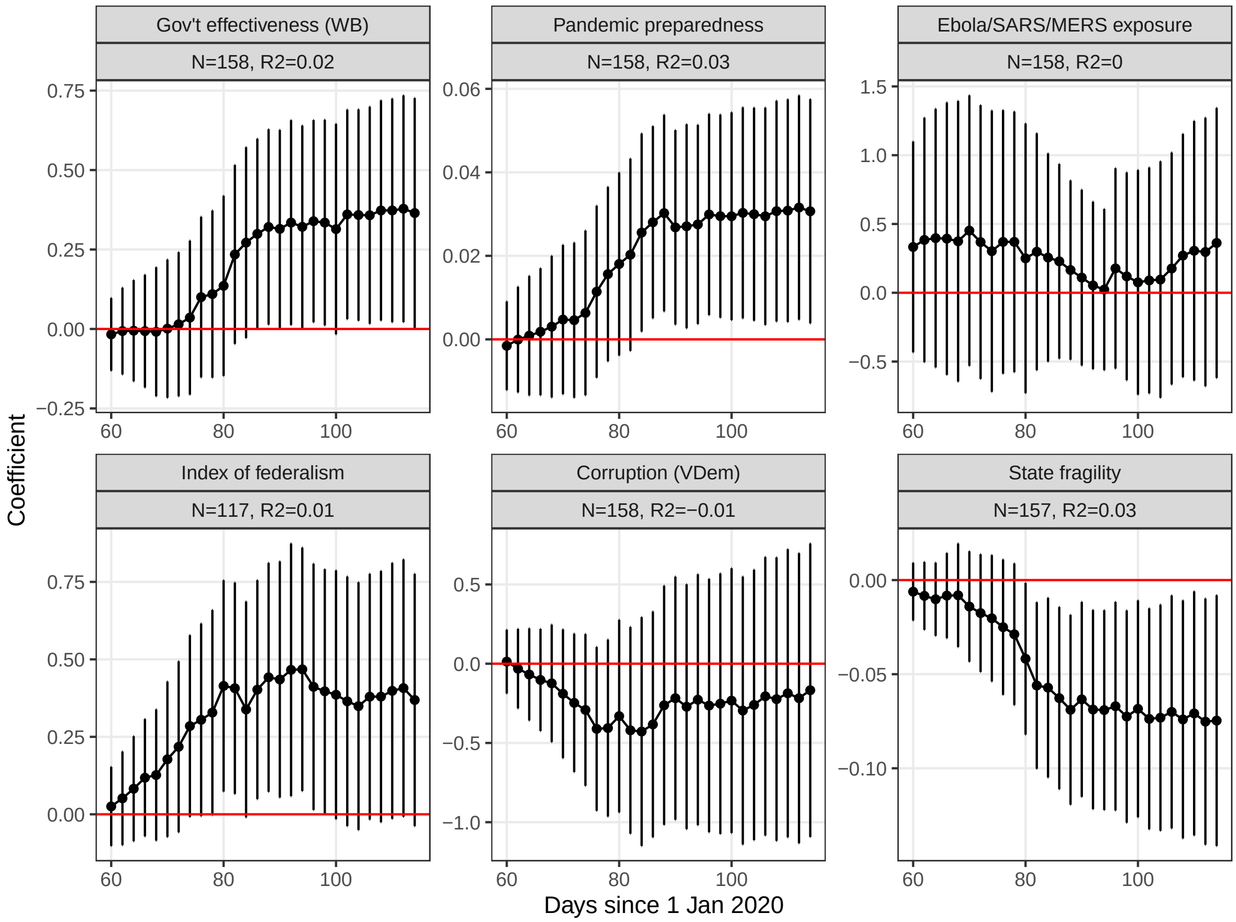

Figure 15: State capacity measures: Correlates over time

9.2.2 Political structures

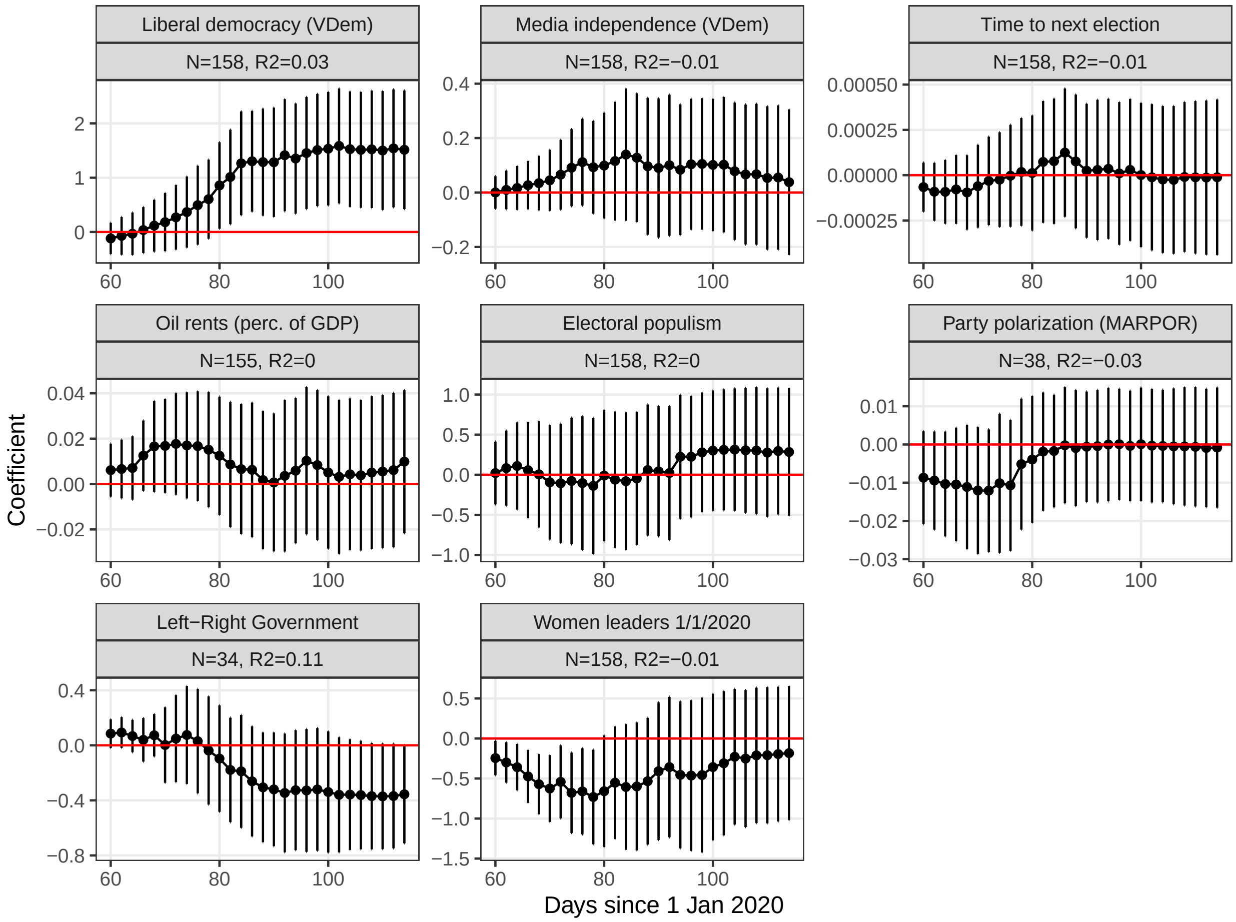

Figure 16: Government accountability measures: Correlates over time

9.2.3 Social structures

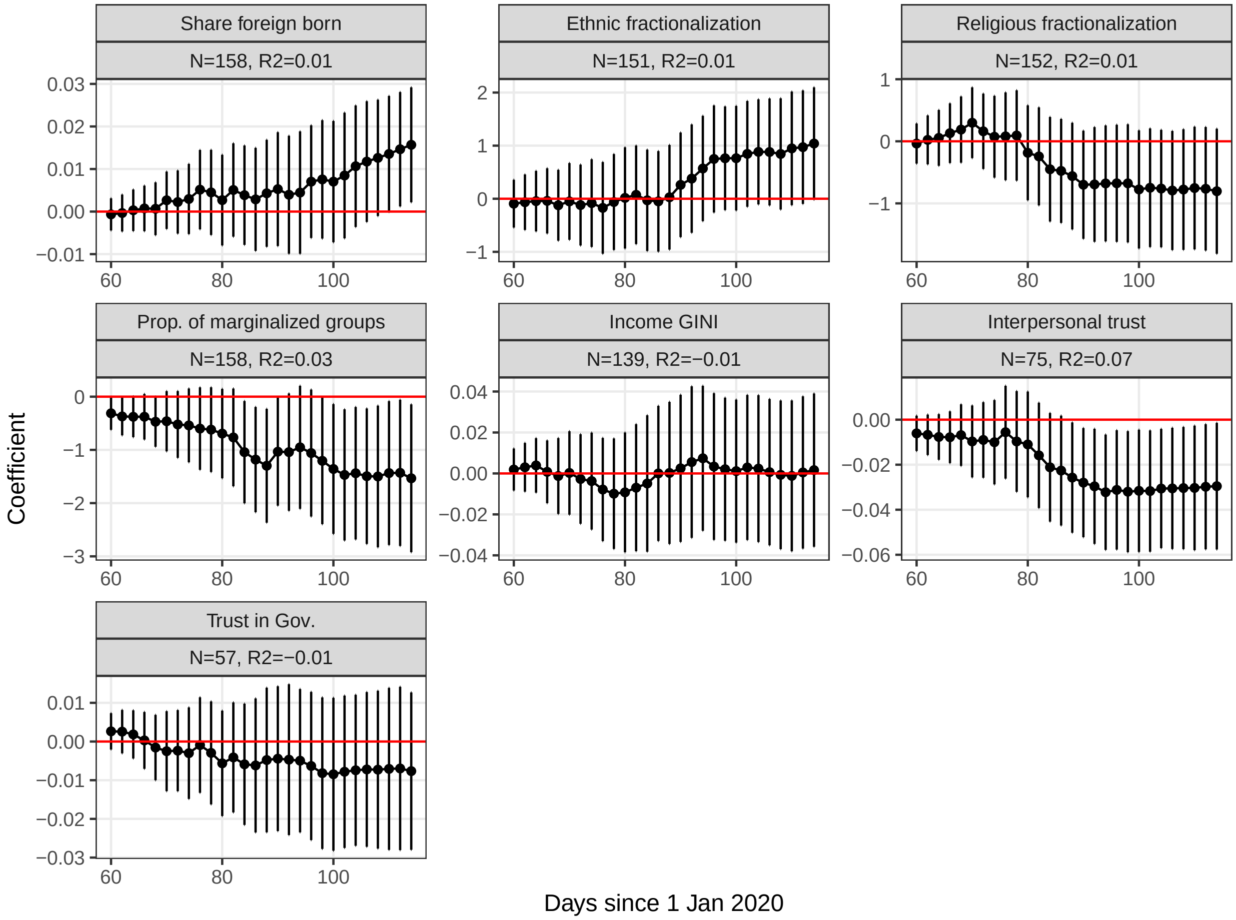

Figure 17: Social structure measures: Correlates over time

9.2.4 Global linkages

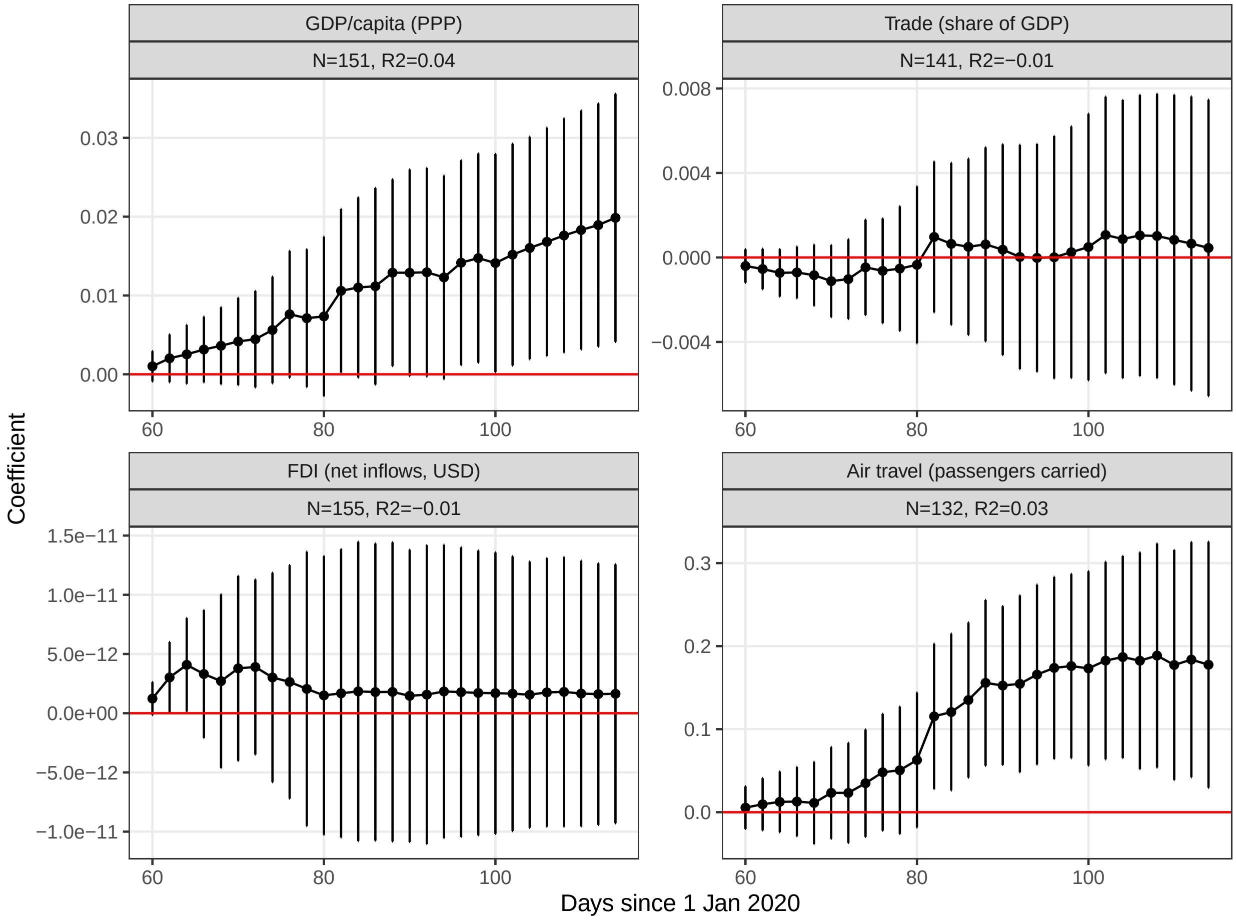

Figure 18: Global integration measures: Correlates over time

9.2.5 Physical risks

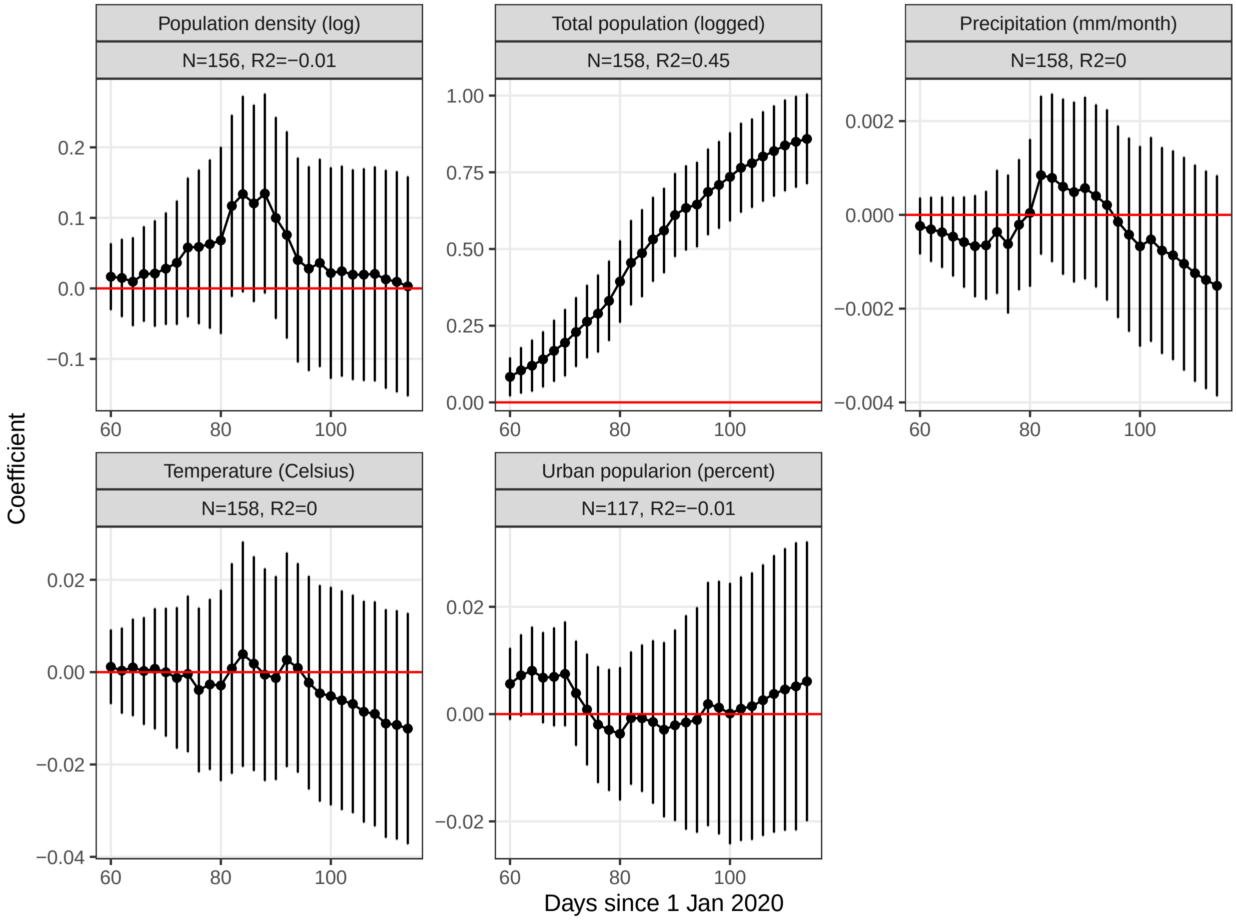

Figure 19: Physical risks measures: Correlates over time

9.2.6 Health risks

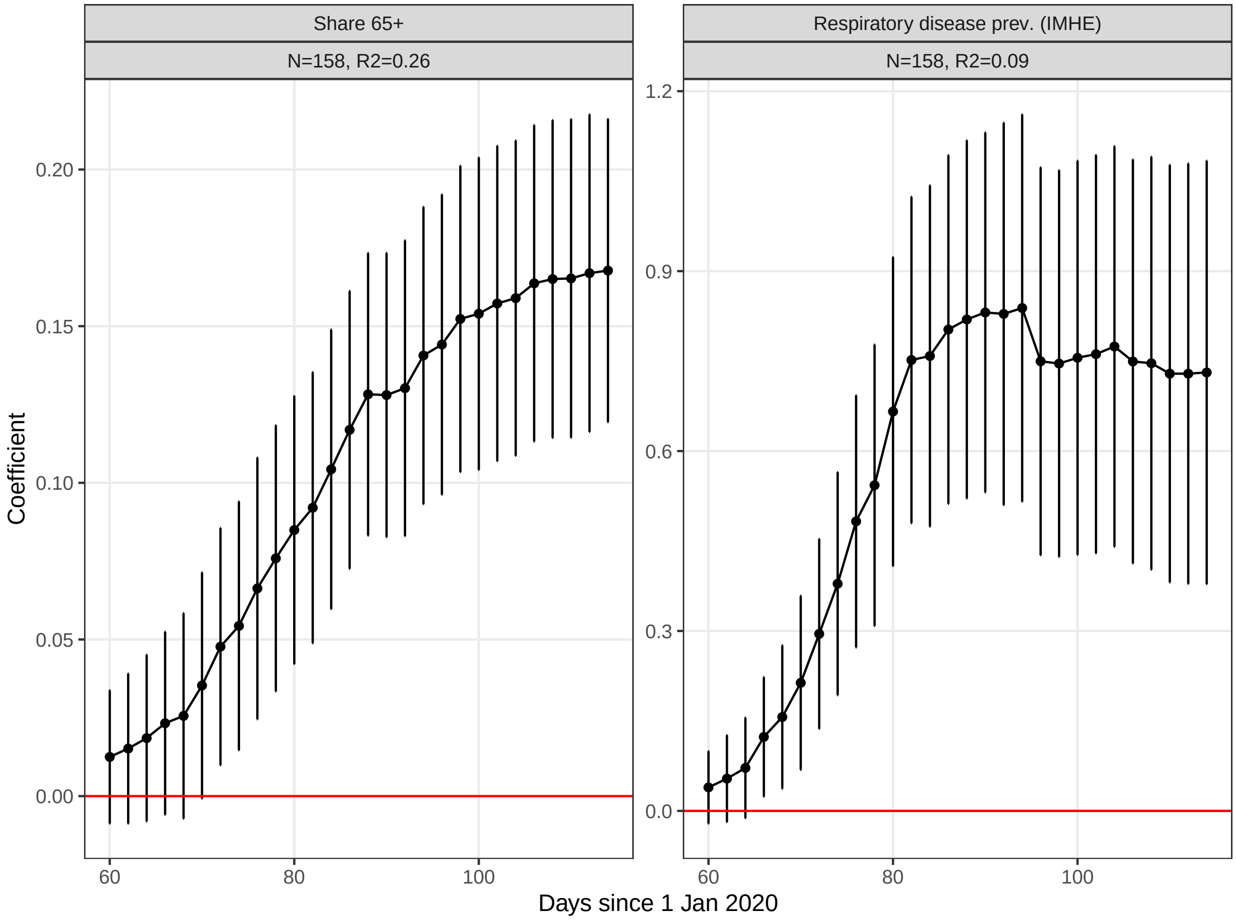

Figure 20: Physical / epidemiological measures: Correlates over time

9.2.7 Health systems

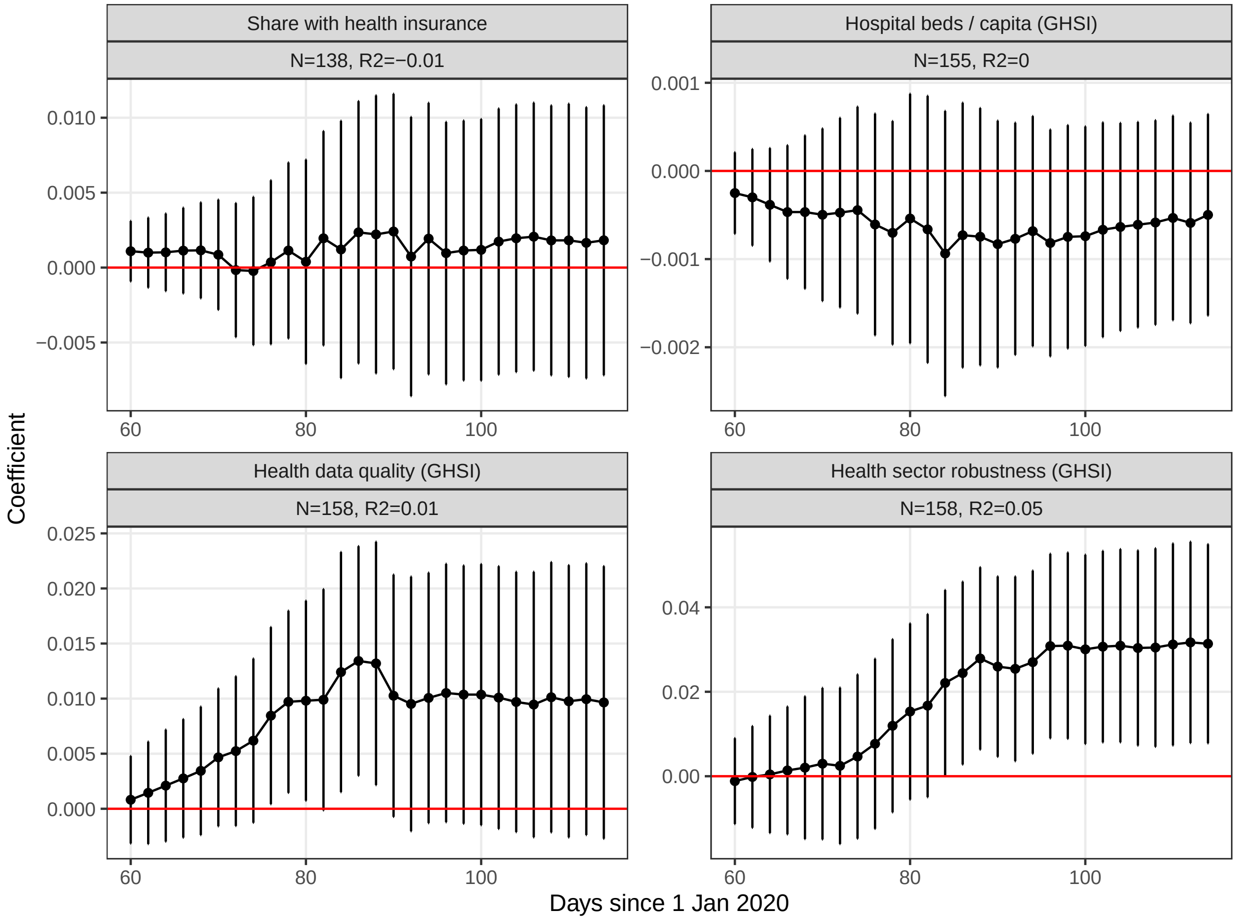

Figure 21: Health systems measures: Correlates over time

9.3 Details on measures used

Table 5: Sources

Variable	Sources	Variable definition
Gov't effectiveness (WB)	World Bank	Government Effectiveness captures perceptions of the quality of public services, the quality of the civil service and the degree of its independence from political pressures, the quality of policy formulation and implementation, and the credibility of the government's commitment to such policies. Estimate gives the country's score on the aggregate indicator, in units of a standard normal distribution, i.e. ranging from approximately -2.5 to 2.5.
Pandemic preparedness	GHSI	
Ebola/SARS/MERS exposure	Constructed from WHO data	At least 100 cases for either MERS, Sars, or Ebola
Index of federalism	Database of Political Institutions, 2017	Index of federalism, computed based on 5 indicators from the DPI: (1) whether or not there are autonomous regions; (2) whether municipal governments are locally elected; (3) whether state/province governments are locally elected; (4) whether state/provinces have authority over taxing, spending, or legislating; (5) whether the constituencies of the senators are the states/provinces. Each indicator was centered and standardized. The final mean-based index of federalism was computed only for those countries that had at least 3 valid measurements on these 5 indicators. Higher values on the index denote a greater degree of federalism in the country.
Corruption (VDem)	QoG data	Question: How pervasive is political corruption? "The corruption index includes measures of six distinct types of corruption that cover both different areas and levels of the polity realm, distinguishing between executive, legislative and judicial corruption. Within the executive realm, the measures also distinguish between corruption mostly pertaining to bribery and corruption due to embezzlement. Finally, they differentiate between corruption in the highest echelons of the executive at the level of the rulers/cabinet on the one hand, and in the public sector at large on the other. The measures thus tap into several distinguished types of corruption: both "petty" and "grand"; both bribery and theft; both corruption aimed and influencing law making and that affecting implementation." Scale: Interval, 0 to 1, with higher values denoting higher levels of political corruption.
State fragility	Integrated Network for Societal Conflict Research	0 "no fragility" to 25 "extreme fragility"; closely associated with its state capacity to manage conflict, make and implement public policy, and deliver essential services, and its systemic resilience in maintainingsystem coherence, cohesion, and quality of life, responding effectively to challenges and crises, and sustaining progressive development.

Table 5: Sources *(continued)*

Variable	Sources	Variable definition
Liberal democracy (VDem)	QoG data	To what extent is the ideal of liberal democracy achieved? Clarifications: The liberal principle of democracy emphasizes the importance of protecting individual and minority rights against the tyranny of the state and the tyranny of the majority. The liberal model takes a "negative" view of political power insofar as it judges the quality of democracy by the limits placed on government. This is achieved by constitutionally protected civil liberties, strong rule of law, an independent judiciary, and effective checks and balances that, together, limit the exercise of executive power. To make this a measure of liberal democracy, the index also takes the level of electoral democracy into account.
Media independence (VDem)	QoG data	Do journalists, publishers, or broadcasters accept payments in exchange for altering news coverage? Responses: 0: The media are so closely directed by the government that any such payments would be either unnecessary to ensure pro-government coverage or ineffective in producing anti-government coverage. 1: Journalists, publishers, and broadcasters routinely alter news coverage in exchange for payments. 2: It is common, but not routine, for journalists, publishers, and broadcasters to alter news coverage in exchange for payments. 3: It is not normal for journalists, publishers, and broadcasters to alter news coverage in exchange for payments, but it happens occasionally, without anyone being punished. 4: Journalists, publishers, and broadcasters rarely alter news coverage in exchange for payments, and if it becomes known, someone is punished for it.
Time to next election		
Oil rents (perc. of GDP)	World Bank	Estimates based on sources and methods described in "The Changing Wealth of Nations: Measuring Sustainable Development in the New Millennium" (World Bank, 2011). "NY.GDP.PETR.RT.ZS"

Table 5: Sources *(continued)*

Variable	Sources	Variable definition
Share foreign born	United Nations Population Division, Trends in Total Migrant Stock: 2008 Revision via World Bank	International migrant stock is the number of people born in a country other than that in which they live. It also includes refugees. The data used to estimate the international migrant stock at a particular time are obtained mainly from population censuses. The estimates are derived from the data on foreign-born population–people who have residence in one country but were born in another country. When data on the foreign-born population are not available, data on foreign population–that is, people who are citizens of a country other than the country in which they reside–are used as estimates. After the breakup of the Soviet Union in 1991 people living in one of the newly independent countries who were born in another were classified as international migrants. Estimates of migrant stock in the newly independent states from 1990 on are based on the 1989 census of the Soviet Union. For countries with information on the international migrant stock for at least two points in time, interpolation or extrapolation was used to estimate the international migrant stock on July 1 of the reference years. For countries with only one observation, estimates for the reference years were derived using rates of change in the migrant stock in the years preceding or following the single observation available. A model was used to estimate migrants for countries that had no data. 2015 data.
Electoral populism	Populism in Power (Kyle, Meyer, Tony Blair Instititure for Global Change)	"populist" countries (=1) are those in which a leader is elected within a democratic setting (PolityIV>=6 in year of election) running a populist campaign. So, I try not to include leaders that only become populist while in office (eg I would consider Putin a populist, but only starting in around 2012). So, any analysis of the databaseï¿½ï¿½ï¿½ï¿½ï¿½ï¿½ï¿½ï¿½ï"the effect of electing a populist leader". Autocrats that deploy populism to hold onto power are not included (eg Mugabe). All others coded 0, including NAs in original data.
Party polarization (MARPOR)	MARPOR, version 2019b	Polarization on a Right-Left dimension, computed as the sum of the weighted squared deviations from the mean position on the Right-Left dimension in the party system, using the party vote shares in the election as weights (Taylor and Herman, 1971). Higher values denote a greater degree of political polarization in the party system. Measure includes only manifestos for elections that took place since 2015.
Left-Right Government	ParlGov	The Left-Right position of the governing coalition (or party). Computed from the ideological placements of all the parties that form the government. The final score represents the weighted average of the governing parties' Left-Right position, using their legislative seats as weights. Higher values denote a more Right-leaning governing coalition.

Table 5: Sources *(continued)*

Variable	Sources	Variable definition
Women leaders 1/1/2020	Wikpedia list	Woman head of government on 1 Jan 2020. Does not include heads of state or joint heads.
Ethnic fractionalization	QoG data	The variables reflect the probability that two randomly selected people from a given country will not be from the same ethnic group; the higher the number, the greater the degree of fractionalization. The indicator comes originally from Alesina et al. (2003)
Religious fractionalization	QoG data	Same as directly above, but this is based on the Alesina et al. (2003) data, and refers to the probability that two randomly drawn individuals are from different religious groups
Prop. of marginalized groups	EPR data	Share of the population that is defined as "powerless" in the EPR. This refers to groups with political representatives that are excluded from national-level decision making, without being explicitly discriminated. It's important to highlight that groups that hold power at the subnational level, but not at the national level, are still defined as "powerless".
Income GINI	SWIID data	Index of net income inequality, based on SWIID 8.2 data. Ranges from 0 to 1, with higher values denoting more income inequality.
Interpersonal trust	Our World in Data (computed based on World Values Surveys)	% of respondents who believe that "most people can be trusted", when given the option between this and "you can't be too careful". Measure includes only countries sampled since 2009.
Trust in Gov.	World Values Surveys	Computed based on item E069_11, which asks respondents to self-rate their degree of confidence in the central government: 1=a great deal; 2=quite a lot; 3=not very much; 4=none at all. The variable we use in the models represents the % of respondents who reported trusting the government "a great deal" or "quite a lot". Measure includes only countries sampled since 2009.
GDP/capita (PPP)	World Bank	GDP per capita, PPP (constant 2011 international $)
Trade (share of GDP)	World Bank	Trade is the sum of exports and imports of goods and services measured as a share of gross domestic product. (NE.TRD.GNFS.ZS)
FDI (net inflows, USD)	World Bank	Foreign direct investment, net inflows (BoP, current US$). BX.KLT.DINV.CD.WD
Air travel (passengers carried)	World Bank	Air passengers carried include both domestic and international aircraft passengers of air carriers registered in the country. (IS.AIR.PSGR) (logged)

Table 5: Sources *(continued)*

Variable	Sources	Variable definition
Population density (log)	FAO and World Bank	Population density (people per sq. km of land area)
Total population (logged)	World Bank	Total population is based on the de facto definition of population, which counts all residents regardless of legal status or citizenship. The values shown are midyear estimates. (In '000,000)
Precipitation (mm/month)	Climatic Research Unit, University of East Anglia	Average precipitation for Jan-Mar 2018, in mm per month
Temperature (Celsius)	Climatic Research Unit, University of East Anglia	Average temperature for Jan-Mar 2018, in Celsius degrees
Urban popularion (percent)	UB via World Bank	Population in urban agglomerations of more than 1 million (% of total population) (EN.URB.MCTY.TL.ZS)
Share 65+	World Bank	World Bank staff estimates using the World Bank's total population and age/sex distributions of the United Nations Population Division's World Population Prospects: 2019 Revision. Based on measures SP.POP.65UP.MA.IN and SP.POP.65UP.FE.IN
Respiratory disease prev. (IMHE)	Institute for Health Metrics and Evaluation (IHME)	Combined prevalance of upper and lower respiratory disease as a % of the total population in 2017.
Share with health insurance	ILO via Our World in Data	Insurance coverage here includes affiliated members of health insurance, as well as the population having free access to healthcare services provided by the government.
Hospital beds / capita (GHSI)	GHSI	
Health data quality (GHSI)	GHSI	early detection and reporting epidemics of potential international concern

Table 5: Sources *(continued)*

Variable	Sources	Variable definition
Health sector robustness (GHSI)	GHSI	sufficient and robust health sector to treat the sick and protect health workers
COVID-19 deaths	ECDC	Deaths per day: transformed to generate cumulative counts and logged counts
COVID-19 cases	ECDC	Cases per day: transformed to generate cumulative counts and logged counts

9.4 Subsets

9.4.1 Excluding low quality data countries

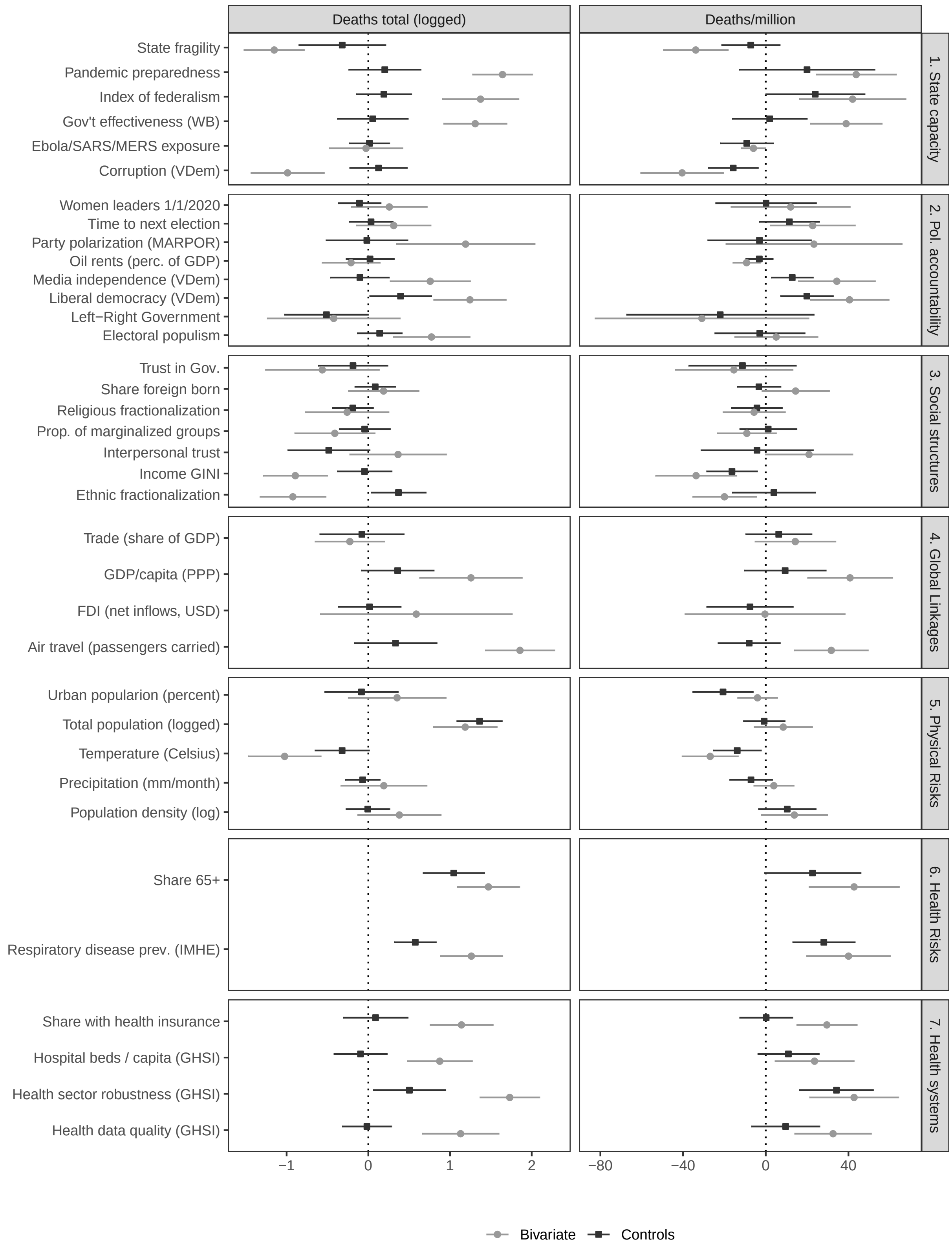

Figure 22: Correlates of Corona outcomes. Countries in top 2/3 of health data quality distribution. Points represent normalized coefficients from either a bivariate model (circles) or a model with controls (see text) (squares).

9.4.2 Excluding wealthy countries

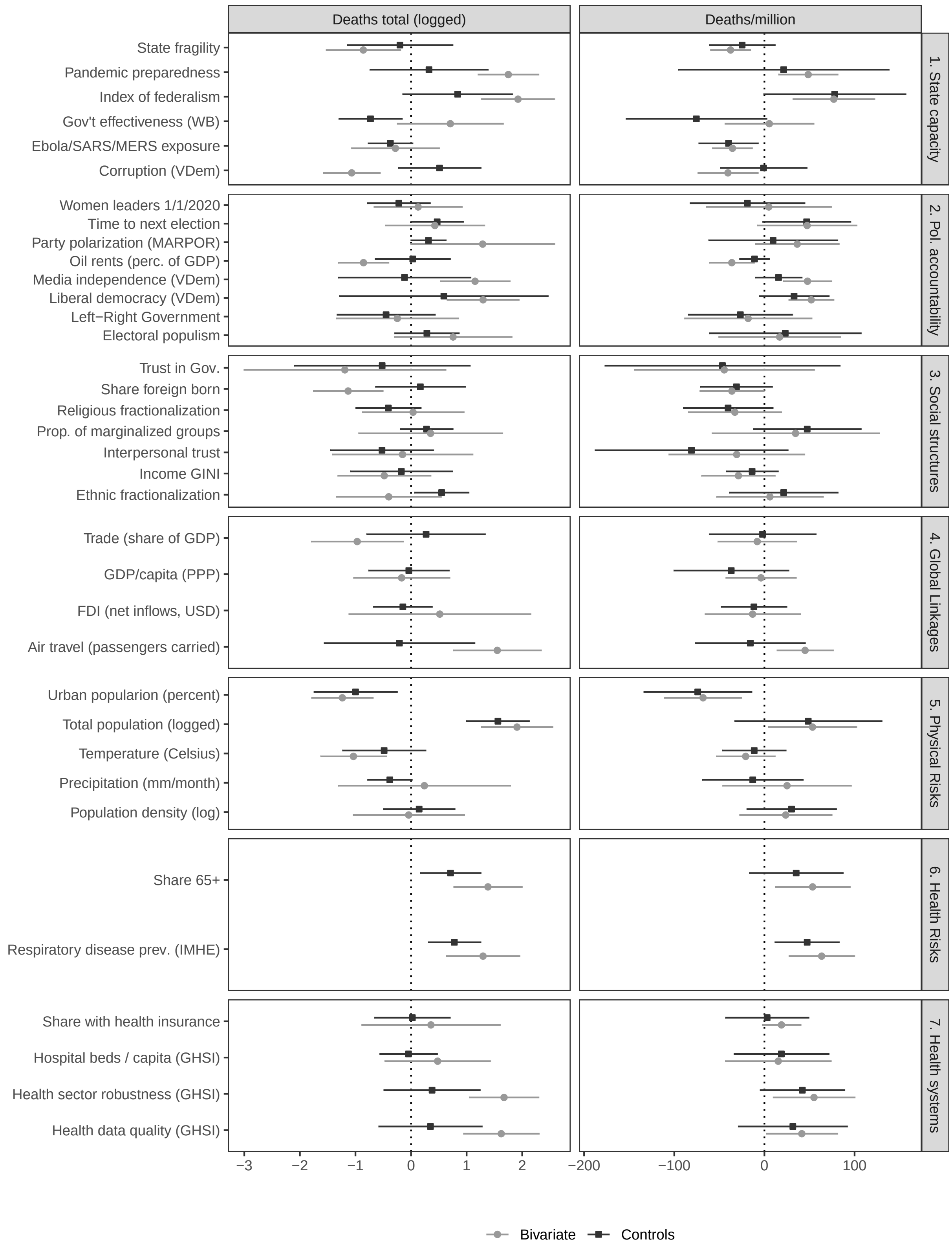

Figure 23: Correlates of Corona outcomes. Restricted to countries in lower 75% of per capita income distribution. Points represent normalized coefficients from either a bivariate model (circles) or a model with controls (see text) (squares).

9.5 Alternative outcomes: Policy responses

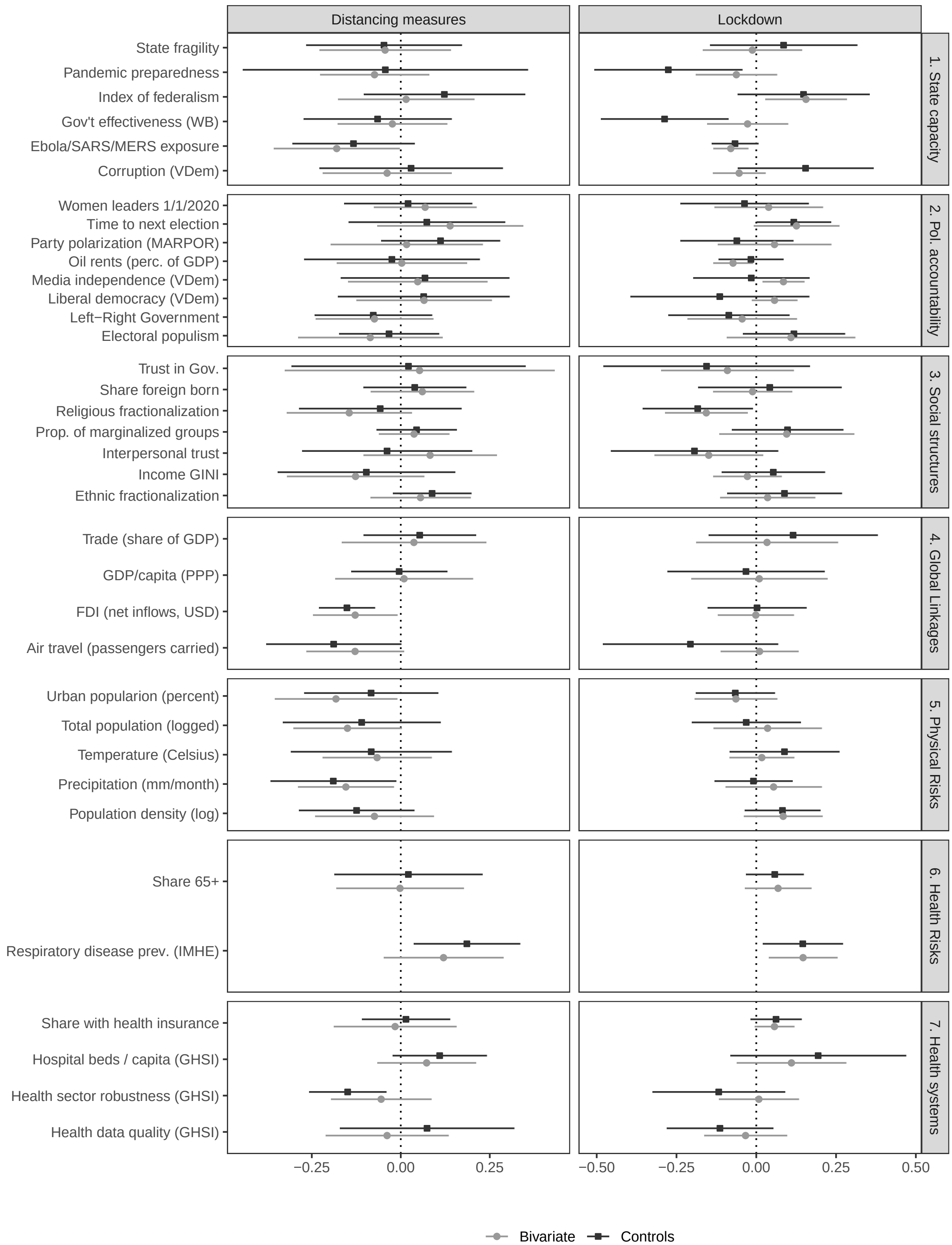

Figure 24: Correlates of Corona outcomes. Policy responses. Points represent normalized coefficients from either a bivariate model (circles) or a model with controls (see text) (squares).

9.6 Alternative outcome coding: Relative dates

Analysis from 30 days after the 10th reported case. 119 cases with data on controls.

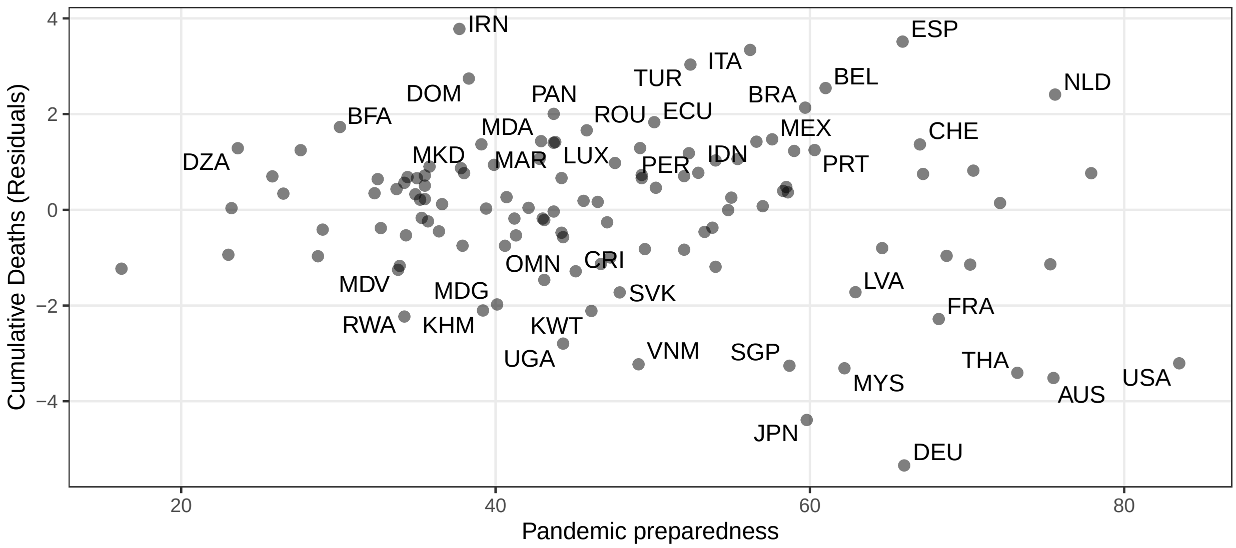

Figure 25: Residuals, 30 days after 10th reported case

9.7 Lasso details

Our Lasso procedure is as follows:

1. We split the sample into train and test sets, such that we obtain two outcome vectors Y^{test} and Y^{train}, as well as corresponding input matrices X^{test} and X^{train}. The predictors that enter the model are either all predictors, or predictors from families 4–7.The original data set is split such that 20% of all observations are in the test set, and 80% of all observations in the train set.

2. We use the training set to determine the optimal shrinkage parameter λ. This is done using 5-fold cross validation. We then choose the parameter λ^{Opt} that minimizes the average out-of-sample RMSE across the five folds. This step is done without using the test set at all.

3. We then estimate a Lasso model using Y^{train} and X^{train}, based on the previously determined shrinkage parameter λ^{Opt}. This gives us the predicted values $\hat{Y}^{\text{train}}$. We can then calculate the in-sample RMSE based on the difference between the fitted values

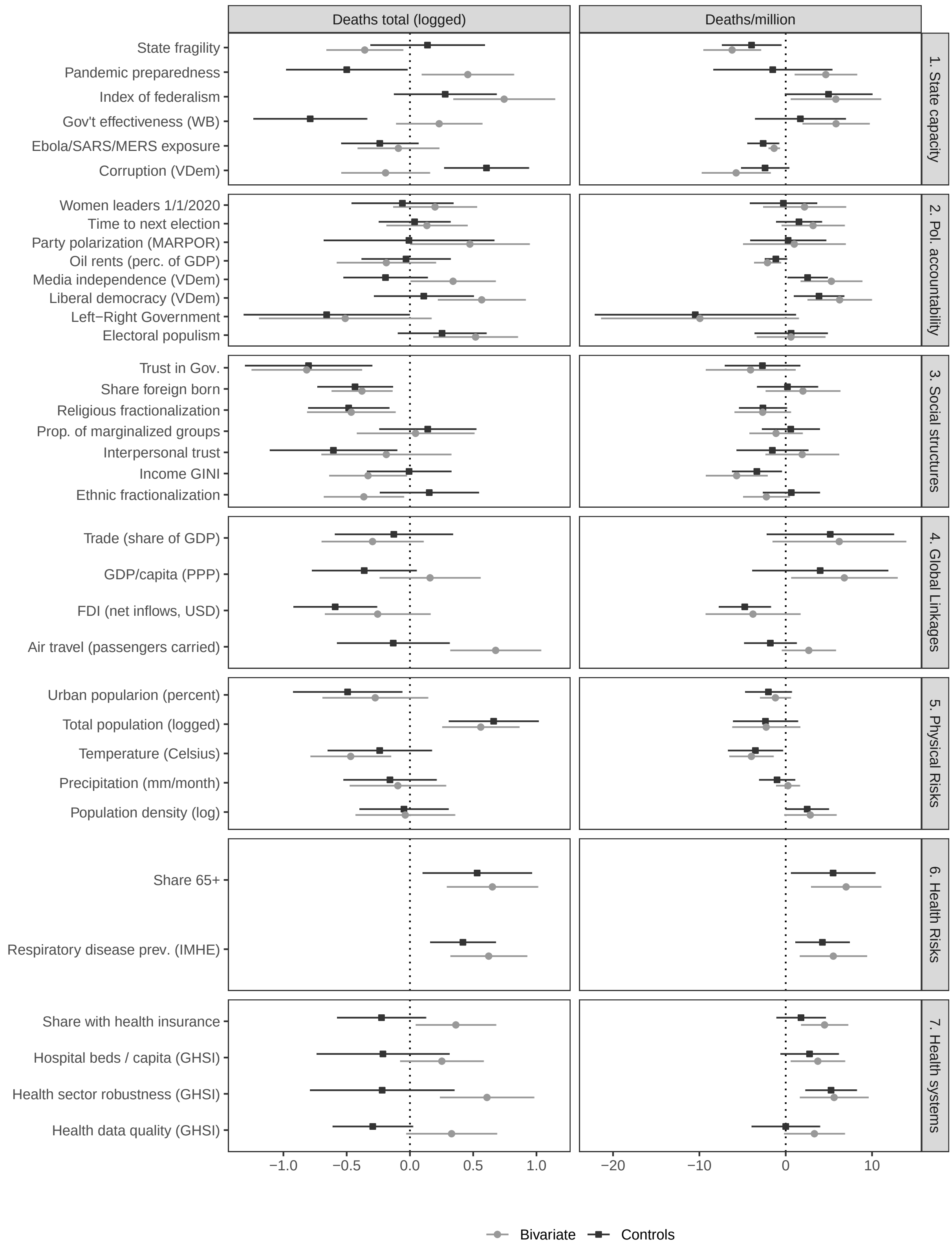

Figure 26: Correlates of Corona outcomes (30 days since 10th case). Points represent normalized coefficients from either a bivariate model (circles) or a model with controls (squares).

$\hat{Y}^{\text{train}}$ and the true values Y^{train}.

4. Since we now have the model from step 3, we can predict the outcome for the test set using the input matrix X^{test}. This gives us the predicted values $\hat{Y}^{\text{test}}$. We then calculate $\text{RMSE}(Y^{\text{test}}, \hat{Y}^{\text{test}})$

5. In addition to the two quantities described above, we also estimate RMSEs from 'empty' models, i.e. models that do not include any covariates. For these models, the predicted values are simply the in-sample mean of the outcomes.

The exact definitions for all RMSE quantities are as follows

- In-sample RMSE: $\sqrt{\frac{1}{n_{\text{train}}}\sum_{i=1}^{n_{\text{train}}}(\hat{Y}_i^{\text{train}} - Y_i^{\text{train}})^2}$
- Out-of-sample RMSE: $\sqrt{\frac{1}{n_{\text{test}}}\sum_{i=1}^{n_{\text{test}}}(\hat{Y}_i^{\text{test}} - Y_i^{\text{test}})^2}$
- In-sample empty model RMSE $\sqrt{\frac{1}{n_{\text{train}}}\sum_{i=1}^{n_{\text{train}}}(\hat{Y}_i^{\text{train}} - \bar{Y}^{\text{train}})^2}$
- Out-of-sample empty model RMSE $\sqrt{\frac{1}{n_{\text{test}}}\sum_{i=1}^{n_{\text{test}}}(\hat{Y}_i^{\text{test}} - \bar{Y}^{\text{train}})^2}$

We conduct the above steps for two different sets of explanatory variables. First, we use all covariates from families 4, 5, 6 and 7. This set excludes variables which fall under the social, political or state capacity categories. Second, we go through the above steps with the full set of predictors, which includes predictors from all seven variable families.

Since we split the sample into training and test sets, our Lasso procedure has a stochastic component. To make sure the results are not driven by one specific split between test and training sets, we instead execute the procedure for 100 randomly chosen test-train splits. For all RMSEs, we therefore end up with 100 different values based on the 100 train-test splits. When presenting RMSE results in figure **??**, we show the mean RMSE, as well as intervals that include all values from the 0.025 to the 0.975 quantiles.

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