State capacity in responding to COVID-19

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Abstract

This study investigates the link between state capacity and deaths from Covid-19. We examine the effects on the Covid-19 case fatality rate of state capacity of countries with an ordered probit estimation controlling for the level of democracy, government policy responses, the share of the elderly population, and health system resource capacity indicators. The study presents strong evidence for the critical role of state capacity in achieving positive policy outcomes. The effect of government effectiveness on the Covid-19 death level is consistently negative and statistically significant, suggesting that increased government effectiveness is significantly associated with decreased Covid-19 fatality rates. The findings show that in the models controlling for government effectiveness and the testing and stay at home requirements policies, non-free countries are more likely to have lower death levels than free countries. The effects of the testing and stay at home requirements policies have expected negative signs. Higher health system capacity represented by higher numbers of hospital beds and doctors is more likely to lower a country's case fatality rate. A higher proportion of the elderly population is associated with higher death levels from Covid-19.

Key words: COVID-19, state capacity, government effectiveness, democracy, policy responses, fatality rate, health system capacity, testing policy

JEL codes: J18, H83, H51, I18

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1 Introduction

As of 2 July 2020, the world has recorded over 10.5 million confirmed cases, and about 512 000 deaths from Covid-19 (World Health Organization (2020). Case fatality ratios reported across countries vary a lot.

Covid-19 is a great challenge and the real test for any government. The crucial role of state capacity in designing and implementing effective policies and, as a result, in determining the outcomes of the government performance in responding to natural disasters, pandemics and other crises is well documented in the literature (Kahn (2005); Raschky (2008); Lin (2015)). This paper addresses how different levels of government effectiveness impact the Covid-19 death levels across countries.

The current experience of countries with Covid-19 highlights several major factors likely to influence countries' success or failure in fighting the disease, including the type of the political regime, the share of the elderly population, health system resource capacity, promptness and stringency of policy measures implemented.

The Covid-19 pandemic has led to massive state interventions both at the social and individual levels. Up to now, the experiences of countries with different political regimes demonstrate differing results. While authoritarian countries such as China and Singapore have managed to reduce the outbreak, many countries, including the European democracies and the US, have been heavily struggling to contain Covid-19. At present, the US, UK, Spain, Italy, France, Germany rank among the countries experiencing the highest numbers of confirmed cases and deaths. Such outcomes will surely provide input to the long-standing debate over the performance of democracy and authoritarianism (M. Dorsch and Branyiczki. (2020); Cronert (2020)).

Countries throughout the world have responded to Covid-19 with various policy measures. The government responses to Covid-19 have differed dramatically in their reach, timing, and severity across countries. Testing policies and stay at home requirements have been widely implemented to control the outbreak. However, healthcare systems in many countries have experienced much pressure because of resource capacity strain (Verelst et al. (2020)). Moreover, Covid-19 seems to be especially challenging to older people who are believed to be at risk of higher mortality and

severe impact from the infection.

The current cross-country study explores the factors explaining the variation in the Covid-19 case fatality rates with the focus on the effect of governance effectiveness controlling for the variations in the level of democracy, government response measures, the share of the elderly population, and health system capacity across countries. To that end, the ordered probit model is developed and estimated.

The key findings of the study are as follows. The effect of democracy on the Covid-19 death level is statistically significant for non-free countries in the models controlling for government effectiveness and the testing and stay at home requirements policies. In non-free countries the likelihood of a higher death rate is lower compared to free countries. The coefficient on government effectiveness exhibits a consistently negative sign and is statistically significant in all model specifications. This suggests that increased government effectiveness is significantly associated with decreased death rates. A higher share of the elderly population is associated with increased death levels from Covid-19. Health system capacity measures represented by the numbers of hospital beds and doctors have statistically significant effects, as well. The higher the number of both doctors (per 10 000 people) and beds (per 10 000 people) is, the more likely the country is to have a lower case fatality rate due to Covid-19.

The article is structured as follows. Section 2 provides the literature review. Section 3 describes the data used in the study. Section 4 provides the results of the estimation. The paper concludes with the discussion of the main findings of the study and their policy implications.

2 Literature review

A critically important factor in handling any pandemics and crisis is state capacity. Capacity, as expansively defined by Wu and Howlett (2015), is determined from the combinations of analytical, operational, and political competencies, on the one hand, and policy capabilities and resources at the individual, organizational, and systematic level, on the other hand, which affect policy success or failure. State capacities are important to all policy areas: economic development, regulation, law and order enforcement, public goods supply, conflict resolution, democratic consolidation,

international relations, etc.

In the literature, a lack of state capacity is often defined as an obstacle to development. Originally referred to the power to raise revenue, with respect to the development process state capacity comprises a wide range of competencies including the power to secure private property rights, enforce contracts, support and augment markets through regulation, public goods provision (Besley and Persson (2014, 2010)). State capacity in its various forms has been found to impact development outcomes positively. Dincecco and Katz (2014) provide evidence for a significant positive impact of extractive capacity improvements achieved through fiscal centralization and limited government on per capita GDP growth. Another cross-national study by Evans and Rauch (1999) finds that "Weberian" characteristics of state bureaucracies, namely meritocratic recruitment and predictable rewarding career ladders, which are likely to increase competence and motivation of officeholders and corporate coherence, are associated with higher growth rates. Referring to the experience of post-communist countries, Hamm et al. (2012) point out that declining fiscal and bureaucratic capacity of the state prompted weak institutions and corruption, which negatively affected economic outcomes. Rajkumar and Swaroop (2008) examine the impact of governance quality represented by the level of corruption and the quality of bureaucracy on the efficacy of public spending and present empirical evidence that good governance increases the effectiveness of public spending in lowering child mortality rates and raising primary education attainment. Schwartz (2003), using three measures of state capacity such as human capital, fiscal strength, and reach/responsiveness, shows that state capacity plays a central role in environmental policy compliance in Chinese provinces. The separate strand of literature on conflict research demonstrates that strong states are associated with lower risks of civil war. Sobek (2010) highlighted that strong states have higher capabilities to address the needs of people, as well as the ability to lower rebel success. Meanwhile, states with lower levels of capacity are less likely to resist contagion of conflict occurring in a neighboring country (Braithwaite (2010)).

The existing literature also highlights the importance of state capacity in effectively designing, adopting and implementing state functions and policies in crises which determines the success or failure of policy responses to natural disasters and pandemics (Kahn (2005); Raschky (2008); Lin

(2015)). A substantial impact of health system resource strain (hospital beds, doctors, equipment, etc.) on mortality is well documented, as well (Rudge et al. (2012); Eriksson et al. (2017)).

Interestingly, previous research has shown that state capacity positively impacts development outcomes across different regime types, and that high state capacity can help non-democratic regimes perform well and bolster their legitimacy (Hanson (2015); Knutsen (2013)). In this respect, state capacity is used by scholars somewhat interchangeably with governance, which is prominently defined by Fukuyama (2013) as "a government's ability to make and enforce rules, and to deliver services, regardless of whether that government is democratic or not". As such, the World Bank indicator for government effectiveness assessing "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" (Kraay et al. (2010)) is often employed to capture the state capacity to implement sound and effective policies (Lee and Whitford (2009); El-Taliawi and Van Der Wal (2019)).

In general, our expectations about the effects of the democratic quality of political institutions on government policy outcomes are ambiguous. On the one hand, many political and social scholars agree that democratic institutions lead to better outcomes due to better-informed decision-making, higher accountability, greater legitimacy, open political institutions, competition, more personal freedoms and opportunities (Maravall (1994); Zweifel and Navia (2000); Besley and Burgess (2002); Bhagwati (2002); Acemoglu et al. (2019)). Thus, governments are more responsive to natural disasters where the spread of news via mass media is freer, and voters' accountability is higher (Besley and Burgess (2002)). On the other hand, democratic processes are not always believed to be efficient due to slow decision-making, the prevalence of short-term considerations in policy-making, diminished public accountability of public agencies ensuing from neoliberal public management reforms, corruption distorting policy choices (Schmitter and Karl (1991); O'Donell (1994); Haque (2000); Pani (2011); Lipscy (2018)). Democracy may limit the ability of authorities to react to a crisis quickly. The availability of information in democratic countries may deter the capability of authorities to respond with sound actions and policies due to increasing public debate and revealing deficient measures taken by the government (Egorov et al. (2009); Gobel (2013); Lorentzen

(2014); Baekkeskov and Rubin (2014)). There is also evidence suggesting that the performance of democracies is not intrinsically better or worse given the role of other factors in determining policy outcomes (Diamond (1990); Przeworski and Limongi (1993)).

Meanwhile, authoritarian regimes may have advantages in natural disaster management that may compensate for the merits of the democratic system. Such factors as centralized decision-making, effective mobilization of public support, and government power over the mass media may be key to an effective response to the crisis in a non-democratic setting (Schwartz (2012)). Flores and Smith (2013), based on the quantitative investigation, argue that the autocracies are more capable of resisting to disaster fatalities. In general, there is no empirical evidence that non-democracies are worse at tackling natural disaster issues than their counterparts (Rubin and Rossing (2012); Pelling and Dill (2006)). The policy approach of the Chinese authorities to stop the spread of Covid-19 acknowledged as being ambitious, aggressive and remarkable has been praised for the uncompromising rigor of the national strategy application promoting universal temperature monitoring, masking, and handwashing, the remarkable speed with which the causative virus was isolated, diagnostic tools and key transmission parameters were established, and cases were detected, isolated and early treated, the extensive use of cutting edge technologies, strong adherence of the Chinese people to the starkest restrictions (WHO (2020)). Likewise, Singapore's early response to the disease, early detection of cases through comprehensive surveillance system, aggressive contact tracing, and Vietnam's experience of a proactive approach in responding to COVID-19 helped them to succeed in the control of the spread of Covid-19 (Lee and Whitford (2009); Bansal et al. (2020)). According to the experts, early and stringent government actions that may be perceived excessive and possibly invasive of individual rights are necessary for controlling the spread of the disease (Bansal et al. (2020)).

We assume that the Covid-19 situation has revealed the inherent trade-offs in a democracy between providing public health safety and ensuring individual freedoms. The trade-off between restricting individual freedoms to contain the virus spread and maintaining civil liberties defining democracy and free societies is more challenging to democratic governments than authoritarian ones, which may have played with a more strong hand in the Covid-19 crisis. However, some

believe the autocratic advantage to be temporary to reverse over time allowing democracies to regain their supremacy through freedom of information and research (Cepaluni et al. (2020)). Given the extraordinary scale of the state interventions democratic societies and individuals have experienced, and many are still exposed to the current study examines the impact of the level of democracy on the Covid-19 death rate.

As reflected in the Oxford COVID-19 Government Response Tracker (OxCGRT), the governments across the world have responded to Covid-19 with various policy measures that have differed in their reach, timing, and severity (Hale et al. (2020)). The experience of the countries that have successfully dealt with the Covid-19 pandemic and the recent studies emphasize the importance of quarantine lockdown measures, contact tracing, social distancing, and testing for controlling the spread of the virus (ECDC (2020); WHO (2020)). The most widely implemented government policy measures to contain the spread of Covid-19 have included closings of schools and workplaces, prohibitions of public gatherings and events, restrictions on internal movement and international travel, testing and contact tracing, augmenting healthcare systems capacity and economic support measures (Hale et al. (2020)). The effectiveness of policy interventions to reduce deaths is also believed to be affected by the speed at which the governments around the world have implemented policy measures to fight the coronavirus.

Covid-19 is heavily impacting people's lives, and, particularly, the most severe risks and challenges are posed to older people. They are more likely to suffer from dire outcomes from the virus due to physiological changes related to aging and increased multimorbidity (Kluge (2020); LaFave (2020)). Older persons are more likely to be affected by the infection than youth; they are at a higher risk of developing severe and fatal disease associated with COVID-19 (Yi et al. (2020); United Nations (2020)).

3 Data

The dataset used in the study is built from several sources. Table 3 provides the summary statistics for the variables used in the study. The dependent variable of interest is the Covid-19 death index determined from the case fatality rate calculated as the ratio of the number of

deaths due to Covid-19 and confirmed cases in a country. We divide countries into three categories depending on the level of the case fatality rate: of high (more than 0.06), medium (between 0.02 and 0.06), and low fatality rate (less than 0.02).

For the primary explanatory variable of state capacity, the study uses a proxy-indicator of government effectiveness. The estimates of government effectiveness across countries are taken from the Worldwide Governance Indicators database.

To measure democracy, we use the Freedom in the World 2020 data (Repucci (2020)) on Free, Partly Free, or Not Free status of countries determined from the combined overall scores for political rights (free and fair elections, political pluralism and participation, a functioning government, open and transparent government, strong and effective safeguards against official corruption) and civil liberties (free media, freedom of expression and belief, freedom of assembly, the rule of law, personal freedoms and rights). Table 1 presents countries rated by the freedom status. According to the Freedom in the World methodology, liberal democracies are Free countries while some Partly Free countries meet minimum standards and qualify as electoral democracies (Repucci (2020)). In the current study, the three categories of Free, Partly Free and Non-Free countries are treated as being democratic, partially democratic, and undemocratic. Thus, the level of democracy is the categorical variable indicating the status of democratic political rights and civil liberties across countries.

Free	Partly Free	Non-Free
Argentina, Australia, Austria, Barbados, Belgium, Brazil, Bulgaria Cabo, Canada, Chile, Costa Rica, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Ghana, Greece, Guyana, Iceland, India, Ireland, Israel, Italy, Jamaica, Japan, South Korea, Latvia, Lithuania, Luxembourg, Malta, Mauritius, Netherlands, New Zealand, Norway, Panama, Peru, Poland, Portugal, Romania, Sao Tome, Slovak Republic, Slovenia, South Africa, Spain, Sweden, Switzerland, Taiwan, Trinidad and Tobago, Tunisia, United Kingdom, United States, Uruguay	Albania, Armenia, Bangladesh, Bolivia, Bosnia and Herz., Burkina Faso, Colombia, Cote d'Ivoire, Dominican Republic, Ecuador, El Salvador, Georgia, Guatemala, Guinea, Guinea-Bissau, Haiti, Honduras, Hungary, Indonesia, Jordan, Kenya, Kosovo, Kuwait, Kyrgyz Republic, Lebanon, Liberia, Malawi, Malaysia, Maldives, Mali, Mauritania, Mexico, Moldova, Montenegro, Morocco, Niger, Nigeria, North Macedonia, Pakistan, Paraguay, Philippines, Senegal, Serbia, Sierra Leone, Singapore, Sri Lanka, Tanzania, Thailand Togo, Ukraine, Zambia, Zimbabwe	Afghanistan, Algeria, Angola, Azerbaijan, Bahrain, Belarus, Cameroon, Chad, China, Cuba, Djibouti, Egypt, Equatorial Guinea, Ethiopia, Gabon, Iran, Iraq, Kazakhstan, Libya, Nicaragua, Oman, Qatar, Russia, Saudi Arabia, Somalia, South Sudan, Sudan, Syria, Turkey, United Arab Emirates, Uzbekistan, Vietnam, Venezuela, Yemen

Table 1: Freedom statuses of countries

The study controls for government policy responses to Covid-19 data on which is derived from the OxCGRT, a database project of the University of Oxford, providing cross-country systematic information on government responses to Covid-19 across time (Hale et al. (2020)). The effects on the Covid-19 death level of two policy measures- the stay at home requirements and testing policy are estimated. We construct a testing policy index by taking into account the speed with which countries responded to the Covid-19 pandemic proxied by the number of days from the first case detected up to the day of the policy adoption. Using Table 2, we construct the index by the following formula:

$$T = \sum_i \omega_i t_i$$

where ω_i stands for weights given to each category of response, and t_i denotes the points representing the speed of the response. The higher weights are assigned to more stringent categories of the testing policies and the higher points account for the speed with which the policy was implemented. For example, let's assume that the date of the first case in country A is February 10th, 2020, and the government of the country responds on March 10th by instituting a policy of testing of anyone showing symptoms. Then, the index for this country is computed as follows: the received point is 2 since 20 days have passed from the day of the first case detected, and since the policy involves testing of anyone showing symptoms a weight of 0.3 is assigned. On March 20th, the government instituting the testing to be open to anyone in the country (open public testing) receives 1 point (40 days since the first case) and the weight of 0.5. So, the index for the country is $T = \sum_i \omega_i t_i = 0.3 \times 2 + 0.5 \times 1 = 1.1$.

	Days from the first case	Points (t)	Weights (ω)
(1) have symptoms and (2) meet the specified criteria (Hale et al. (2020))	<=10 days	3	0.2
	>10 and <=20 days	2	
	>20 days	1	
testing of anyone showing symptoms	<=10 days	3	0.3
	>10 and <=20 days	2	
	>20 days	1	
open public testing	<=10 days	3	0.5
	>10 and <=20 days	2	
	>20 days	1	

Table 2: Testing policy index methodology

The study also makes use of several control variables, which are believed to be important in the outcomes of the policies implemented against Covid-19, including the share of the elderly population and the health system resource capacity represented by the number of hospital beds and the number of medical doctors per 10 000 population. The health system capacity can affect mortality since, as hospitals have fewer resources and become overwhelmed, the death rate may increase.

Variable	Definition	mean	sd	min	max
Death index	Case fatality rate for Covid-19 calculated as the ratio of the number of deaths due to Covid-19 and confirmed cases in a country from the data of Johns Hopkins University as of May 21, 2020	0.04	0.04	0.00	0.17
Government effectiveness	The estimates of government effectiveness for 2018 from the World Governance Indicators database	0.05	1.02	-2.48	2.22
Level of democracy	Free, Partly Free, or Not Free status of countries derived from Freedom in the World 2020	1.84	0.78	1.00	3.00
Testing policy	The testing policy index calculated from the OxCGRT data	0.74	0.47	0.00	2.10
Stay_home	The stay at home requirement policy measure data from the OxCGRT data	0.22	0.42	0.00	1.00
Elders	The share of the elderly population from the World Development Indicators database for the recent period	9.06	6.17	0.90	25.35
Doctors	The number of medical doctors per 10 000 population from the WHO data, latest available	20.84	16.06	0.14	82.95
Beds	The number of hospital beds per 10 000 population from the WHO database, latest available	29.93	24.70	1.00	134.00

Table 3: Data Sources and Descriptive Statistics

Table 4 provides correlation estimates among the variables. As seen, the Covid-19 death level is significantly associated with the level of democracy, the testing policy, and the elderly population. The democracy level has a strong inverse relationship with government effectiveness, meaning that in non-free countries government is less effective relative to free countries. The variables representing the health care system resource capacity are strongly and positively related to government effectiveness. That is, higher levels of government effectiveness are associated with higher levels of health system capacity. The numbers of doctors and hospital beds are significantly and positively related to the share of the elderly population.

	Death rate	Gov. effectiveness	Level of democracy	Testing policy	Stay_home	Elders	Doctors	Bed
Death rate	1							
Gov. effectiveness	0.0792	1						
Level of democracy	-0.1956*	-0.6591*	1					
Testing policy	-0.1563*	0.2670*	-0.1206	1				
Stay_home	-0.0992	-0.1047	0.1774*	0.1914*	1			
Elders	0.3066*	0.7213*	-0.6311*	0.0670	-0.115	1		
Doctors	0.0687	0.6165*	-0.3497*	0.1300	0.05	0.7551*	1	
Beds	0.0546	0.4816*	-0.3246*	0.0352	-0.0498	0.7253*	0.6460*	1

Table 4: Correlations between death rate and its determinants

4 Empirical Results

In this section, we empirically investigate the relationships between the Covid-19 death level and the explanatory variables. We begin with the simplest possible specification, where the death level is estimated on government effectiveness and the level of democracy:

$$P(D_c) = \Phi(\beta_0 + \beta_1 GE_c + \beta_2 PF_c + \beta_3 NF_c) \tag{1}$$

where c indexes a country, Φ is the cumulative standard normal distribution function, D_c defines categories according to the death level, GE means government effectiveness, PF_c denotes partial free countries; NF_c stands non free countries. A free country is a base category.

The full model specification capture additionally the variation across countries in population characteristics, policy measures adopted to fight Covid-19, and health system capacity:

$$P(D_c) = \Phi(\beta_0 + \beta_1 GE_c + \beta_2 PF_c + \beta_3 NF_c + \beta_4 P_c + \beta_5 E_c + \beta_6 H_c) \tag{2}$$

As before, c indexes the country, P_c represents policy measure, E_c denotes the share of the elderly population in a country, and H_c is health care system capacity.

We investigate five specifications. Table 5 provides the details of the specifications used in the ordered probit model. The first is a benchmark specification, where the independent variables include government effectiveness and the categories for the level of democracy; in the second specification, we control for variation in policy measures implemented in responding to Covid-19;

in the thrid specification, the difference in the elderly share of the population across countries is controlled for; in the last one, we add variables indicating the health system capacity. The control variables allow us to explain the differences in the probability of death across different political regimes and countries with varying degrees of governance quality.

1	Model 1	Benchmark model	$P(D_c) = \Phi(\beta_0 + \beta_1 GE_c + \beta_2 PF_c + \beta_3 NF_c)$
2	Model 2	Benchmark model+Police measures	$P(D_c) = \Phi(\beta_0 + \beta_1 GE_c + \beta_2 PF_c + \beta_3 NF_c + \beta_4 P_c)$
3	Model 3	Benchmark model+Police measures+Share of elders	$P(D_c) = \Phi(\beta_0 + \beta_1 GE_c + \beta_2 PF_c + \beta_3 NF_c + \beta_4 P_c + \beta_5 E_c)$
4	Model 4	Benchmark model+Police measures+Share of elders+Health system capacity	$P(D_c) = \Phi(\beta_0 + \beta_1 GE_c + \beta_2 PF_c + \beta_3 NF_c + \beta_4 P_c + \beta_5 E_c + \beta_6 H_c)$

Table 5: Probit estimations of the Covid-19 death index

Table 6 presents the results of the ordered probit estimation models of the Covid-19 death level. Since the dependent variable or the death index increases with a higher case fatality rate, positive coefficients imply the probability of higher death levels. Column (1) shows the estimates of the benchmark model, i.e., a model with government effectiveness and the level of democracy for Free, Partly Free, and Non-Free countries. The base category includes free countries. The estimates are negative, which suggests the likelihood of decreased death levels. The estimated coefficient is statistically significant and negative, meaning that increased government effectiveness is significantly associated with decreased death levels. The coefficient is also statistically significant for non-free countries. In other words, in non-free countries, the likelihood of higher death rates is lower compared to free countries. After controlling for the variation in policy measures taken against Covid-19 in Column (2), the effects of government effectiveness and not-free status relative to free status remain statistically significant. The coefficients on both the testing index and stay at home requirement policy variables are negative, appearing to suggest that countries

implementing these measures succeed in lowering Covid-19 deaths per confirmed cases, but the effects, as expected, are statistically insignificant. In the third specification, the estimated impact of the elderly population ratio on the probability of a higher level of deaths per confirmed cases is significantly positive, which means that a higher proportion of the elderly population is associated with increased death levels from Covid-19. The coefficients on non-free status and government effectiveness are statistically significant. The last column shows that the higher number of both doctors (per 10 000 people) and hospital beds (per 10 000 people) is, the more likely the country is to have a lower case fatality rate. The effects of the testing and stay at home requirements policies have expected negative signs in all models, although being statistically insignificant. It should be noted that the coefficients on government effectiveness and the elderly population share exhibit consistently negative and positive signs, respectively, and are statistically significant.

At the bottom of Table 7, we provide log-likelihoods for each set of the results. The likelihood shows the probability of the data given the parameter values for each model. The statistic is used to measure the ability of variables added in the different specifications to account for the differences in the probability of the country having a particular death level. As seen, the log-likelihood increases from the model (1) to (5), suggesting the improvement in the fit of the model.

	(1)	(2)	(3)	(4)
VARIABLES	Model 1	Model 2	Model 3	Model 4
Government effectiveness	-0.243*	-0.203	-0.452***	-0.471***
	(0.134)	(0.130)	(0.170)	(0.180)
Partly Free	-0.607**	-0.628**	-0.383	-0.317
	(0.280)	(0.290)	(0.304)	(0.309)
Not Free	-1.067***	-1.024***	-0.798**	-0.462
	(0.342)	(0.346)	(0.365)	(0.387)
Testing policy		-0.311	-0.173	-0.126
		(0.216)	(0.223)	(0.227)
Stay at home required		-0.097	-0.134	-0.063
		(0.242)	(0.245)	(0.255)
Elderly share			0.072***	0.176***
			(0.026)	(0.040)
Number of doctors				-0.024**
				(0.010)
Number of beds				-0.015**
				(0.006)
Number of observations	141	141	139	137
Log-likelihood	-144.2	-142.9	-136.9	-128.2
Significance (Prob > chi2)	0.0164	.0239	.0018	.0000

Table 6: Probit estimation of the Covid-19 death index

*Note: The dependent variable in columns is category for death rate. Note. Standard errors in parentheses and *** p<0.01, ** p<0.05, * p<0.10.*

Table 7 presents the estimated odds ratios for the Covid-19 death index. Government effectiveness is found to have a statistically significantly impact on the Covid-19 death level in all model specifications. As government effectiveness increases, the death level decreases. Model 1 shows that all else equal, for a one unit increase in government effectiveness, the odds of the country being in the high death level category versus the medium and low death level categories decreases by about 34%. In the full model the odds of having the high death level is approximately 54% lower, holding the other variables constant.

	Model 1	Model 2	Model 3	Model 4
Government effectiveness	0.66*	0.71*	0.47***	0.46**
Partly Free	0.36**	0.35**	0.52	0.58
Not Free	0.17***	0.19***	0.28**	0.48
Testing policy		0.61	0.76	0.79
Stay at home required		0.85	0.79	0.91
Elderly share			1.13***	1.33***
Number of doctors				0.96**
Number of beds				0.97**

Table 7: Odds ratios for the explanatory variables
*Note. Significance levels: *** p<0.01, ** p<0.05, * p<0.1.*

As presented in Table 7, the non-free status of the country is found to have a significant effect on the Covid-19 death level in all models except the last one. According to Model 1, for example, the odds of the high level of death versus the combined medium and low death level outcomes decreases by around 83% in a non-free country compared to a free country, all else equal. When controlling for government effectiveness, the testing policy, stay at home requirements, the share of the elderly population, and the number of hospital beds and doctors, these odds is 0.48, meaning that the odds of the high death level versus the lower categories decreases by around 52% in a non-free country compared to a free country. Thus, the variations in government effectiveness, the government response policies, the elderly population share, health system resource capacity account for approximately 37% of the difference in the Covid-19 death levels between free and non-free countries. The share of the elderly population, the number of hospital beds and doctors are all statistically significant determinants of the Covid-19 fatality rates across countries.

5 Conclusion

Covid-19 presents a great challenge to every country affected. The current cross-country study explores the factors explaining the variation in the Covid-19 death level with the aim of assessing the effect of governance effectiveness controlling for the level of democracy, government response measures, the share of the elderly population, and health system resource capacity.

One of the study's major findings is that it suggests strong evidence for the importance of higher state capacity in the battle against Covid-19. The effect of government effectiveness on the

Covid-19 case fatality rate is consistently negative and is statistically significant across all model specifications. Increased government effectiveness is significantly associated with decreased death rates.

For the impact of the level of democracy, we find a result consistent with the Covid-19 experiences of many countries having different political regimes. The study shows that according to the results of the models including the government effectiveness indicator and the testing and stay at home requirements policy, non-free countries are more likely to have lower death levels than free countries. Although the effect becomes statistically insignificant when health system resource capacity measures are included, the effect does not lose its negative sign.

The effects of the testing and stay at home requirements policies have expected negative signs in all models, although being statistically insignificant. Higher health system capacity represented by higher numbers of hospital beds and doctors is more likely to lower a country's case fatality rate. As expected, a higher proportion of the elderly population is associated with higher death levels. The differences in the elderly population share, the number of beds and doctors explain around 37% of the difference in the Covid-19 death levels between free and non-free countries.

Overall, the empirical findings of the study emphasize the importance of having a capable state. In this light, it may well be the case that high state capacity may account for success stories of non-democratic countries in fighting against the pandemic. The lesson is to improve government effectiveness, with a focus on enhancing all types and levels of state capacity.

Government effectiveness is not achieved overnight but is the outcome of having a long-term perspective on investing in government institutions' quality and credibility. As noted by Tommasi (2011), while characteristics of the implementation of policies impact their outcomes, it is essential to facilitate the accumulation of institutional capacity. Just as with private sector growth, the development of public physical and human capital is a way to scale up the state's ability to implement policies effectively.

The experience with Covid-19 highlights the need to strengthen the basics, that having an effective public health system requires adequate investments in trained staff and infrastructure. In fact, many countries in the Covid-19 situation have experienced shortages of physicians, hospital

beds, and ventilators (White (2020); Verelst et al. (2020)). Therefore, resource capacity expansion has occurred in many countries to different extents in response to COVID-19, including extra beds, mobilizing retired healthcare workers, etc. (Verelst et al. (2020)).

Overall, policymakers face the need to make important decisions on improving the effectiveness of the health system response to pandemics, like Covid-19. Resource gaps in healthcare infrastructure, human resources, equipment, materials, and surveillance capabilities, and importantly, the distribution of resources across jurisdictions should be evaluated and adjusted appropriately to meet demands during infectious outbreaks. Also, effective mechanisms for leveraging the capacity of the private health sector need to be developed.

Every country needs to be prepared for the case of a new pandemic threat, expand critical care capacity to the adequate level and/or capabilities to implement effectively population-based interventions such as quarantine, social distancing, and testing to lower pressure on the health system resource capacity. To that end, in the first place, there must be designed plans which will enable to act in a timely and effective manner.

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