Online Appendix for
Democracy and COVID-19 Outcomes*
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Gokhan Karabulut
Klaus F. Zimmermann
Mehmet Huseyin Bilgin
Asli Cansin Doker

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Abstract

More democratic countries are often expected to fail at providing a fast, strong, and effective response when facing a crisis such as COVID-19. This could result in higher infections and more negative health effects, but hard evidence to prove this claim is missing for the new disease. Studying the association with five different democracy measures, this study shows that while the infection rates of the disease do indeed appear to be higher for more democratic countries so far, their observed case fatality rates are lower. There is also a negative association between case fatality rates and government attempts to censor media. However, such censorship relates positively to the infection rate.

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*Corresponding author: **Klaus F. Zimmermann** (klaus.f.zimmermann@gmail.com), UNU-MERIT & Maastricht University, Global Labor Organization (GLO), and Centre for Economic Policy Research (CEPR). **Gokhan Karabulut** (gbulut@istanbul.edu.tr), Istanbul University and GLO; **Mehmet Huseyin Bilgin** (mehmet.bilgin@medeniyet.edu.tr), Istanbul Medeniyet University and GLO; and **Asli Cansin Doker** (acdoker@erzincan.edu.tr), Erzincan Binali Yildirim University and GLO

Description of the Data

The used measures of democracy are: The Freedom House's Political Rights Index (FH Political Rights), the Freedom House's Civil Rights Index (FH Civil Liberties), the Freedom House Total Democracy Score (FH Total), the Polity's Democracy Index (Polity's Democracy Index), and Electoral Democracy Index of the V-Dem Institute. The Freedom House Political Rights Index is calculated by awarding a country a score from 0 to 4 in 10 political rights indicators under 3 categories, which are electoral processes, political pluralism, and the functioning of government. Freedom House Civil Rights Index scores are calculated by using questions under 4 categories: freedom of expression and belief, associational and organizational rights, rule of law, and personal autonomy and individual rights. Freedom House Total Democracy Index scores are calculated by simply adding Political Rights and Civil Liberties indices.

FH total generally changes due to significant developments in political rights and civil liberties. FH political rights index concentrates on political corruption, interests of minority groups, and rights of the opposition groups. FH Civil Liberties focus on media independence, the presence of a fair legal system, education, freedom of assembly, expression and religion, and trade union activities (Freedom House, 2020). Polity's Democracy Index is calculated by considering many factors such as institutional constraints of power, the competitiveness of political participation, and electoral processes (Marshall and Gurr, 2020). The Electoral Democracy Index has values with a range from 0 to 1. It measures the responsiveness of the rulers to citizens, achieved through electoral competition for the electorate's approval. It explicitly captures Dahl's (1971) concept of polyarchy that beyond electoral competition includes freedom of expression/media as well as associational freedom. It is thus much broader conceptually and more demanding empirically than e.g. Polity. (Coppedge et al., 2019 and 2020; Teorell et al., 2019; Lindberg et al., 2014).

Control variables are the Gini coefficient, tourism revenue per capita, Gross Domestic Product (GDP) per capita, the population of people aged 65 and above as a percentage of the total population, the share of health expenditures per capita, number of medical doctors per 1000 population, and hospital beds per 1000 population. We also use a Government Censorship Effort Index, which was developed by the V-Dem Institute, and a measure for the country's "testing policy" (Hale et al., 2020) to check for misreporting (under-reporting of confirmed cases and the number of deaths). The Government Censorship Effort variable measures the

degree of government censorship of media and press with positive numbers in a continuous way where a rising value indicates lower censorship. Testing policy is a sub-index of the Government Response Stringency Index (GRSI) developed by the Oxford COVID-19 government response tracker (Hale et al., 2020). GRSI is a measure based on nineteen response indicators such as school and workplace closures and travel bans. The Testing Policy variable takes values between 0-3 where 0 means no response and 3 means maximum stringent response of daily data collected over the COVID-19 period averaged to obtain a non-zero continuous measure rising with stronger testing activity.

All available countries had values larger than 0 for the pandemic variables. We checked the relationships between the non-logarithmic variables. Joint test results and significance of the coefficients of the quadratic versions of the four democracy indices explaining the pandemic variables show that there are non-linear relationships in most equations. We, therefore, used the logarithmic specifications in the paper. The logarithmic transformation of the democracy indices requires values larger than 0; index values of 0 did not appear in our data set except for Polity's Democracy Index where we added 1 to all observations. The variance inflation factors (VIF) presented in Table A3 suggest no collinearity between the independent variables.

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Robustness Checks Continent Dummies and Age Distribution

Appendix Table A5 adds continent dummies and controls for the age distribution of the populations to the models used in the Table of the paper as a robustness check. For the age distribution, we used 'Population Share 15-64' and alternatively 'Median Age'. The continent dummies are Europe, Asia, Australasia (Australia and New Zealand), North America and South America with Africa as the reference category.

The findings are indeed very robust. This is particularly true for the core issue under study, the role of democracy; parameters and standard errors hardly change. The parameter estimates for 'Population Share 65 and older' became a bit smaller in absolute terms, and the significance weaker for the Case Fatality Rate only. Temperature, which was positive and significant for the Infection Rate and non-significant for the Case Fatality rate becomes non-significant with values close to zero for the former rate, while the results for the latter remained unchanged. All other controls remain robust.

The added 'Population Share 15-64' turned out to be never significant; the same when replaced by the 'Median Age' (results not presented, but mentioned in the footnote of Table A5). The continent dummies show some significant results. In comparison to Africa, Europe has higher infection rates and Australasia (Australia and New Zealand) has lower. North America and to a lower degree South America have higher Case Fatality Rates than the other continents.

3

Table A1. Descriptive Statistics

Variable	Mean	Standard Deviation	Minimum	Maximum
Infection Rate	-5.01	1.836	-11.614	-2.75
	(-5.38)	(2.052)	(-11.614)	(-2.75)
Case Fatality Rate	-4.128	0.836	-7.606	-2.379
	(-4.055)	(0.824)	(-7.606)	(-1.233)
FH Total	4.022	0.638	0	4.615
	(3.883)	(0.786)	(0)	(4.615)
FH Political Rights	3.067	0.844	0	3.713
	(2.9)	(0.974)	(0)	(3.713)
FH Civil Liberties	3.512	0.573	1.791	4.094
	(3.405)	(0.642)	(1.098)	(4.094)
Polity Democracy Index	1.819	0.83	0	2.397
	(1.713)	(0.87)	(0)	(2.397)
Electoral Democracy Index	-0.689	0.657	-3.772	-0.105
	(-0.771)	(0.651)	(-3.772)	(-0.105)
Gini Coefficient	3.608	0.191	3.218	4.079
	(3.62)	(0.187)	(3.218)	(4.079)
Tourism Revenue per capita	0.838	0.051	0.656	0.936
	(0.833)	(0.053)	(0.656)	(0.936)
GDP per capita	9.076	1.468	5.604	11.666
	(8.82)	(1.503)	(5.604)	(11.666)
Temperature	2.524	0.945	-2.302	3.471
	(2.649)	(0.882)	(-2.302)	(3.471)
Government Censorship Effort	0.32	0.321	-0.774	0.586
	(0.255)	(0.399)	(-1.102)	(0.586)
Population Share 65 and older	2.12	0.786	0.145	3.332
	(1.992)	(0.778)	(0.145)	(3.332)
Doctors per 1,000 population	2.581	1.313	-1.966	4.003
	(2.362)	(1.435)	(-1.966)	(4.265)
Beds per 1,000 population	0.792	0.94	-2.302	2.595
	(0.739)	(0.917)	(-2.302)	(2.595)
Health Expenditure per capita	1.853	0.382	1.029	2.839
	(1.853)	(0.389)	(0.875)	(2.839)
Testing Policy	0.388	0.379	-1.446	0.956
	(0.326)	(0.436)	(-1.922)	(0.956)

Note: All variables after logarithmic transformation. Numbers are from the reduced sample due to missing variables (N=99); the numbers in parentheses are the respective numbers for the full sample of 128.

Table A2. Countries and Codes

Countries	Codes	Countries	Codes	Countries	Codes
Afghanistan	AFG	Greece	GRC	Philippines	PHL
Albania	ALB	Guatemala	GTM	Poland	POL
Algeria	DZA	Guinea	GIN	Portugal	PRT
Argentina	ARG	Guyana*	GUY	Qatar	QAT
Australia	AUS	Haiti*	HTI	Romania	ROU
Austria	AUT	Honduras*	HND	Russia*	RUS
Azerbaijan	AZE	Hungary	HUN	Saudi Arabia	SAU
Bahrain	BHR	Iceland	ISL	Senegal	SEN
Bangladesh*	BGD	India	IND	Serbia	SRB
Barbados	BRB	Indonesia	IDN	Sierra Leone*	SLE
Belgium	BEL	Iran	IRN	Singapore	SGP
Benin	BEN	Iraq	IRQ	Slovakia	SVK
Bolivia	BOL	Ireland	IRL	Slovenia	SVN
Bosnia and Herzegovina	BIH	Israel	ISR	Somalia*	SOM
Botswana	BWA	Italy	ITA	South Africa*	ZAF
Brazil	BRA	Jamaica	JAM	South Sudan*	SSD
Bulgaria	BGR	Japan	JPN	Spain	ESP
Burkina Faso	BFA	Kazakhstan	KAZ	Sri Lanka	LKA
Burundi	BDI	Kenya	KEN	Sudan	SDN
Cameroon	CMR	Kuwait	KWT	Suriname	SUR
Cape Verde	CPV	Kyrgyzstan	KGZ	Sweden	SWE
Chad*	TCD	Latvia	LVA	Switzerland	CHE
Chile*	CHL	Lebanon*	LBN	Syria*	SYR
China	CHN	Luxembourg	LUX	Tajikistan	TJK
Colombia*	COL	Madagascar	MDG	Tanzania	TZA
Costa Rica*	CRI	Malawi	MWI	Thailand	THA
Croatia	HRV	Malaysia	MYS	Togo*	TGO
Cyprus	CYP	Mali	MLI	Trinidad and Tobago	TTO
Czech Republic	CZE	Mauritius	MUS	Tunisia	TUN
Denmark	DNK	Mexico	MEX	Turkey	TUR
Djibouti	DJI	Moldova	MDA	Uganda*	UGA
Dominican Republic	DOM	Nepal	NPL	Ukraine	UKR
Ecuador	ECU	Netherlands	NLD	United Arab Emirates	ARE
Egypt	EGY	New Zealand	NZL	United Kingdom	GBR
El Salvador	SLV	Niger*	NER	United States of America	USA
Eswatini*	SWZ	Nigeria*	NGA	Uruguay	URY
Ethiopia	ETH	Norway	NOR	Uzbekistan*	UZB
Fiji*	FJI	Oman	OMN	Venezuela*	VEN
Finland	FIN	Pakistan	PAK	Vietnam*	VNM
France	FRA	Panama	PAN	Yemen*	YEM
Georgia*	GEO	Papua New Guinea*	PNG	Zambia*	ZMB
Germany	DEU	Paraguay	PRY	Zimbabwe*	ZWE
Ghana	GHA	Peru	PER		

Note: Full sample of 128 countries is used in Panel A of the paper Table. Due to missing variables, the sample used in the statistical analysis of Panel B of the paper Table reduces to 99 countries excluding those marked here with a "*".

Table A3. Data and Sources

Variables	Description	Sources
Infection Rate	Total number of Corona cases/Population	Johns Hopkins University Center for Systems Science and Engineering (2020)
Case Fatality Rate	Total number of Deaths/Total number of Corona cases	Johns Hopkins University Center for Systems Science and Engineering (2020)
FH Total	The total Political Rights and Civil Liberties scores are equally weighted with calculation.	Freedom House (2020). 'Freedom in the World 2020'
FH Political Rights	A country or territory's Freedom in the World status depends on its aggregate Political Rights score, on a scale of 0–40.	Freedom House (2020). 'Freedom in the World 2020'
FH Civil Liberties	A country or territory's Freedom in the World status depends on its aggregate Civil Liberties score, on a scale of 0–60.	Freedom House (2020). 'Freedom in the World 2020'
Polity Democracy Index	The Democracy index is an additive eleven-point scale (0-10). The operational indicator of democracy is derived from codings of the competitiveness of political participation, the openness and competitiveness of executive recruitment, and constraints on the chief executive.	Polity V project: Political regime characteristics and transitions, 1800–2018. Marshall et al. (2020)
Electoral democracy index	V-Dem's electoral democracy index includes several indicators capturing equal access to power, political resources, liberties, and political inclusion, plus the degree of electoral democracy, or polyarchy, indicated by free and fair elections without coercion or violence in a competitive process. The index is coded on a 0–1 scale where a higher value denotes higher electoral democratic processes.	Coppedge et al. (2020); V-Dem
Gini Coefficient	Measure of the deviation of the distribution of income among individuals or households within a country from a perfectly equal distribution. A value of 0 represents absolute equality, a value of 100 absolute inequality.	Human Development Index, UNDP, (2019)
Tourism Revenue per capita	Tourism Revenue per capita (share in %GDP)	World Bank, WDI (2018)
GDP per capita	Gross domestic product per capita	World Bank, WDI (2018)
Temperature	Average (January-November) temperature for each country	World Bank, API (2020)
Government Censorship Effort	This variable has been linearly translated the measurement model point estimates back to the original ordinal scale of each variable (0-4) as an interval measure. Therefore, Government Censorship Effort variable measures in a continuous way the degree of government censorship of media and press with positive numbers whereas a rising value indicates lower censorship.	Coppedge et al. (2020); V-Dem
Population Share 65 and older	Population ages 65 and above as a percentage of the total population	World Bank, WDI (2018)
Doctors per 1,000 population	The population share of the number of medical doctors (per 1000)	World Health Organization, World Health Statistics (2020)
Beds per 1,000 population	The population share of the number of hospital beds (per 1000)	World Health Organization, World Health Statistics (2020)
Health Expenditures per capita	Current health expenditure (HDI) (Share in %GDP)	Human Development Index, UNDP, (2019)
Testing Policy	Testing policy is a sub-index of the Government Response Stringency Index developed by the Oxford COVID-19 government response tracker (Hale et al., 2020). The Testing Policy variable takes values between 0-3 where 0 means no response and 3 means maximum stringent response of daily data collected over the COVID-19 period averaged to obtain a non-zero continuous measure rising with stronger testing activity. Policies about testing for having an infection (PCR tests) not for policies about testing for immunity (antibody tests).	Hale, T. et al. 2020

Table A4. VIF Results

VIF Results for lnCP and lnCFR

	(I)	(II)	(III)	(IV)	(V)
FH Total	5.91	-	-	-	-
FH Political Rights	-	4.82	-	-	-
FH Civil Liberties	-	-	5.54	-	-
Polity Democracy Index	-	-	-	3.51	-
Electoral Democracy Index	-	-	-	-	4.9
Gini coefficient	1.13	1.13	1.13	1.12	1.16
Tourism Revenue per capita	2	1.99	2	1.99	1.99
GDP per capita	3.88	3.81	3.95	3.81	3.75
Temperature	1.49	1.48	1.5	1.48	1.48
Government censorship effort	4.08	3.94	3.54	3.08	3.61
Population Share 65 and older	5.24	4.93	5.21	4.76	5.4
Doctors per 1,000 population	4.32	4.31	4.35	4.31	4.32
Beds per 1,000 population	2.96	3.04	2.95	2.95	2.98
Health Expenditures per capita	1.63	1.63	1.63	1.63	1.63
Testing Policy	1.42	1.41	1.4	1.43	1.39
Mean	3.1	2.95	3.02	2.73	2.97

Table A5. Democracy and Infection Rate (columns I-V); Democracy and Case Fatality Rate (columns VI-X); Robustness Checks Continent Dummies and Age Distribution

	(I)	(II)	(III)	(IV)	(V)	(VI)	(VII)	(VIII)	(IX)	(X)
FH Total	1.127**					-0.939***				
	(0.477)					(0.225)				
FH Political Rights		1.179***					-0.510***			
		(0.366)					(0.189)			
FH Civil Liberties			0.592					-1.090***		
			(0.447)					(0.246)		
Polity Democracy Index				0.567**					-0.562***	
				(0.279)					(0.149)	
Electoral Democracy Index					1.288**					-0.645***
					(0.602)					(0.209)
Gini Coefficient	-0.258	-0.115	-0.33	-0.441	-0.113	0.29	0.274	0.307	0.453	0.255
	(0.439)	(0.414)	(0.453)	(0.475)	(0.484)	(0.332)	(0.347)	(0.322)	(0.334)	(0.338)
Tourism Revenue per capita	-1.361	-1.215	-0.929	-0.794	-1.086	0.875	0.443	1.008	0.459	0.432
	(3.588)	(3.409)	(3.752)	(3.825)	(3.456)	(2.879)	(2.85)	(2.888)	(2.812)	(2.833)
GDP per capita	-0.033	-0.028	-0.005	0.073	0.029	-0.163	-0.195*	-0.14	-0.256**	-0.219**
	(0.135)	(0.129)	(0.141)	(0.131)	(0.137)	(0.102)	(0.106)	(0.099)	(0.108)	(0.107)
Temperature	-0.084	-0.09	-0.069	-0.088	-0.067	-0.041	-0.053	-0.031	-0.031	-0.062
	(0.128)	(0.110)	(0.136)	(0.138)	(0.127)	(0.086)	(0.089)	(0.085)	(0.09)	(0.091)
Government Censorship Effort	-0.632	-1.429*	0.183	-0.097	-0.823	1.280**	1.070*	1.175**	0.968*	0.916*
	(0.752)	(0.737)	(0.82)	(0.789)	(0.817)	(0.498)	(0.558)	(0.5)	(0.54)	(0.516)
Population Share 65 and older	-1.503***	-1.597***	-1.338**	-1.298**	-1.625***	0.597*	0.517*	0.600*	0.443	0.558*
	(0.567)	(0.489)	(0.566)	(0.529)	(0.552)	(0.307)	(0.301)	(0.308)	(0.317)	(0.302)
Doctors per 1,000 population	0.987***	0.982***	0.972***	0.941***	0.968***	0.108	0.123	0.101	0.148	0.128
	(0.261)	(0.235)	(0.273)	(0.252)	(0.248)	(0.143)	(0.151)	(0.14)	(0.145)	(0.148)
Beds per 1,000 population	-0.085	0.035	-0.117	-0.143	-0.075	-0.22	-0.265*	-0.176	-0.165	-0.219
	(0.188)	(0.167)	(0.193)	(0.196)	(0.174)	(0.136)	(0.147)	(0.124)	(0.125)	(0.141)
Health Expenditures per capita	0.502	0.546*	0.462	0.458	0.453	0.096	0.103	0.104	0.129	0.142
	(0.344)	(0.306)	(0.355)	(0.346)	(0.328)	(0.234)	(0.247)	(0.222)	(0.207)	(0.232)
Testing Policy	0.596	0.732**	0.489	0.587	0.588	-0.465**	-0.457*	-0.437*	-0.482**	-0.406
	(0.387)	(0.343)	(0.42)	(0.418)	(0.379)	(0.23)	(0.243)	(0.229)	(0.24)	(0.247)
Population Share 15-64	2.714	2.25	2.595	3.229	3.53	-0.827	-0.479	-0.979	-1.396	-1.114
	(2.356)	(2.119)	(2.518)	(2.443)	(2.431)	(1.378)	(1.471)	(1.321)	(1.365)	(1.419)
Europe	1.738**	1.643**	1.838**	1.630*	1.820**	0.186	0.165	0.159	0.319	0.093
	(0.84)	(0.808)	(0.842)	(0.885)	(0.845)	(0.406)	(0.419)	(0.399)	(0.412)	(0.408)
Asia	0.142	0.029	0.208	0.118	0.156	-0.063	-0.027	-0.153	-0.034	-0.081
	(0.597)	(0.594)	(0.584)	(0.594)	(0.587)	(0.328)	(0.35)	(0.315)	(0.319)	(0.332)
Australasia	-2.215***	-2.249***	-2.140**	-2.351***	-2.217**	0.51	0.481	0.482	0.662	0.475
	(0.837)	(0.811)	(0.838)	(0.875)	(0.847)	(0.639)	(0.653)	(0.622)	(0.642)	(0.632)
North America	0.894	0.856	0.982	0.752	0.781	0.752**	0.715**	0.724**	0.914**	0.765**
	(0.727)	(0.719)	(0.719)	(0.766)	(0.738)	(0.339)	(0.356)	(0.325)	(0.35)	(0.35)
South America	0.276	0.283	0.409	0.32	0.293	0.645*	0.537	0.666**	0.643*	0.549
	(0.71)	(0.673)	(0.696)	(0.714)	(0.699)	(0.342)	(0.356)	(0.331)	(0.358)	(0.342)
R^2	0.700	0.735	0.681	0.692	0.716	0.400	0.371	0.411	0.397	0.366

Notes: Robust standard errors in parentheses. Number of countries: 99. Gini Coefficient: Measure of the deviation of the distribution of income among individuals or households within a country. The coefficient ranges from 0 to 100, with 0 representing perfect equality and 100 representing perfect inequality. Government Censorship Effort: The Government Censorship Effort variable measures in a continuous way the degree of government censorship of media and press with positive numbers whereas a rising value indicates lower censorship. Testing Policy: The Testing Policy variable takes values between 0-3 where 0 means no response and 3 means maximum stringent response of daily data collected over the COVID-19 period averaged to obtain a non-zero continuous measure rising with stronger testing activity. Australasia is Australia and New Zealand. * Statistical significance at level 10% (*), 5% (**), and 1% (***). For all variables natural logarithmic transformations are used in the regressions. Replacing Population Share 15-64 by Median Age also leads to only non-significant estimates.