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## The Effect of Public Corruption on Covid-19 Fatality Rate: A Cross-Country Examination

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# The Effect of Public Corruption on Covid-19 Fatality Rate: A Cross-Country Examination

## Abstract

This paper evaluates whether the level of public corruption influences COVID-19 case fatality rates. Using cross-section data, including 64 countries and multiple regression techniques, we find that the level of corruption is positively and significantly associated with COVID-19 human costs. These results are robust to control of other possible explanatory factors.

JEL-Codes: I150, I180, D730, E020, H510.

Keywords: Covid-19, case fatality rates, pandemic, corruption, trust, cross-country regression.

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# **The effect of public corruption on COVID-19 fatality rate: A cross-country examination**

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## **1. Introduction**

How can administrative corruption explain part of cross-country variation in COVID-19 fatalities worldwide? There are lessons from literature which can help establish the link between COVID-19 fatalities across countries and their different levels of public corruption. Sommer (2020) shows that cross-country variation of corruption explains the effectiveness of health expenditure at improving infant and child health. According to Transparency International estimations, approximately 140,000 children die every year as a result of corruption in health systems. In monetary terms, Transparency International estimates that of the total amount of \$7.5 trillion spent globally on health each year, \$500 billion is lost to corruption. At the individual level, the corruption perception surveys by Transparency International shows that 1 in 5 people worldwide (17%) report they were forced to pay a bribe when dealing with the medical sector.<sup>2</sup> Distorting effects of corruption on government spending may also help us establish the link to COVID-19 fatalities. Gupta et al (2001) show that corruption is associated with higher military spending as a share of GDP, leaving fewer resources for non-military fields such as health and education. Mauro (1998) and Gupta, et al (2002) show the negative effect of corruption on healthcare and education services. Dincer and Teoman (2019) ask “Does Corruption Kill?” in their case study of Turkey. Using corruption index based on the stories covered in a major Turkish newspaper between the years 1960 and 2010, they show that corruption increases infant mortality in the long-run. A recent detailed report by the World Health Organization (2020) on “Potential corruption risks in health financing arrangements” suggests that “corruption in health systems represents a significant drain on

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<sup>2</sup> For more details see <https://www.transparency.org/en/our-priorities/health-and-corruption#>

national health resources and development assistance for health”. Based on estimations of Gee and Button (2015), fraud in the healthcare sector leads to a global average loss rate of approximately 6% in total healthcare spending, or \$ 455 billion per year. Public corruption also undermines the degree of trust by people in government and formal institutions. Decreasing public trust has a negative impact on effective management of global pandemics, such as COVID-19, which needs the highest levels of cooperation from its citizens. Corruption can increase the price and reduce the level of government output and services (Shleifer and Vishny 1993), which can have implications for costs of health services and goods. Furthermore, corruption has a negative impact on education and cognitive ability of population (Ehrlich and Lui 1999, Farzanegan and Thum, 2020), which may also restrict the possibility of containing global pandemics. Governments are better able to deal with negative shocks of COVID-19 pandemic if they have the necessary financial reserves. Corruption is shown to reduce the income capacity of the state (Shleifer and Vishny 1993; Hindriks et al. 1999) as tax evasion and smuggling is more likely in corrupt countries (Buehn and Farzanegan, 2012 and Farzanegan, 2009). Gupta et al (2001) show empirically that a high level of corruption has adverse consequences for a country’s child and infant mortality rates, percent of low-birthweight babies in total births, and dropout rates in primary schools. Corruption can also affect the COVID-19 fatalities through the channel of trust to the government. Countries with higher levels of corruption are shown to have lower levels of social capital and trust (e.g., Anderson and Tverdova, 2003) and social capital is suggested to be an important determinant of health outcomes across countries (for a survey see Kawachi, Takao, and Subramanian, 2013).

Based on this body of literature, we argue that public corruption and its cross-country variation matters for understanding the global experience of COVID-19 fatalities, controlling for other competing hypotheses. The results add to the literature on consequences of corruption on the health status of people, reminding us the costs of delays in controlling corruption.

## 2. Data and methodology

Our main hypothesis is that higher levels of corruption can explain a higher levels of COVID-19 case fatality rates. Our main specification to test this hypothesis is as follows:

$$cfr_i = cons + \beta_1.corruption_i + \beta_2.controls_i + u_i \quad (1)$$

We use cross-country regression analysis by ordinary least squares (OLS) and robust standard errors in our estimation.

*Dependent variable: case fatality rate (cfr)*

The dependent variable is case fatality rate. It is calculated as the ratio of total COVID-19 deaths per million and total COVID-19 cases per million of population (multiplied by 100). It is based on

cumulative numbers on 14 December 2020. The source of data is European Centre for Disease Prevention and Control Data.<sup>3</sup> Fatality rate varies from a minimum of 0.05% (Singapore) to a maximum of 9.11 % (Mexico) in our estimation sample.

#### *Independent variables*

##### *Corruption*

Our main explanatory variable is the level of corruption in 2019 (the year before COVID-19 pandemic). In the main analysis, the ICRG corruption index is used (ICRG, 2020). It is based on assessments by country experts. It is shown that different subjective indicators of corruption are highly correlated (Treisman, 2000) and often explain the real experience of corruption well (Fisman and Miguel, 2007 and Fisman and Wei, 2009). For robustness checks, we also use corruption indexes from World Governance Indicators and Transparency International<sup>4</sup>.

The main focus of the ICRG index is corruption in the public sector by recording the “actual corruption in the form of excessive patronage, nepotism, job reservations or quid pro quo deals, secret party funding, and suspiciously close ties between politics and business.” The ICRG corruption index in our sample ranges from 0.5 in Somalia and Sudan (most corrupt) to 5.5 in Denmark, Finland, New Zealand, and Sweden (least corrupt). We have reversed the index from 0.5 (least corrupt) to 5.5 (most corrupt).

##### *Control variables*

In addition to our main variables of interest (i.e. corruption) and to reduce the risk of omitted variable bias, we also control for a set of other drivers of COVID-19 fatality rate in our estimations. The source for the control variables is the World Bank (2020) and to increase the sample, the average of explanatory variables from 2017 to 2019 is used. In the following, we briefly explain their association with case fatality rate:

Demographic factors: the role of age structure in cross country differences of COVID-19 fatality has been examined in earlier studies. For example, Farzanegan (2020) shows that countries with higher share of population beyond 65 in total population have experienced a higher number of deaths as a result of the outbreak of SARS-CoV-2. He also shows that the final effect of old age structure on COVID-19 fatality depends on the health absorptive capacity of countries. Old-age demographic structures show a weaker positive association with COVID-19 deaths in countries with higher healthcare absorptive capacity. Dowd et al. (2020) also show that COVID-19 mortality rates would vary across countries due to age structure. Palloni and Walter (2020) argue that both demography and biology are important in

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<sup>3</sup> <https://www.ecdc.europa.eu/en/publications-data/download-todays-data-geographic-distribution-covid-19-cases-worldwide>

<sup>4</sup> For comparability, we use the corruption index in 2019 from <https://www.transparency.org/en/cpi/2019/index/nzl> and <https://databank.worldbank.org/source/worldwide-governance-indicators#>

explaining the patterns of deaths caused by the outbreak of SARS-CoV-2. The association between age and mortality rate of COVID-19 also is mentioned by Blagosklonny (2020). To control for this factor, we use the share of population ages 65 and more in total population.

We also control for population density, which is population divided by land area in square kilometers. The association between population density and COVID-19 fatality is not straightforward. On one side, the outbreak of SARS-CoV-2 may be higher and faster in densely populated countries. On the other side, some studies have identified a reverse (or insignificant) association between population density and COVID-19 fatality. For example, Hamidi et al. (2020) use structural equation modeling and examine the impact of density on the COVID-19 infection and mortality rates for 913 U.S. metropolitan counties. They find that county density is not significantly related to the infection rate after controlling for metropolitan population. They link this finding to more adherence to social distancing guidelines in such areas. They also find that counties with higher densities have lower mortality rates than areas with lower density, possibly because of better healthcare systems. They conclude that connectivity among people matters more than density in the expansion of the COVID-19 pandemic.

In another study, Carozzi et al (2020) also use regional data from the United States and examine the causal effect of population density on COVID-19 cases and death rates, using instrumental variable strategies. While they show that density has affected the timing of the outbreak in each county, there is no empirical evidence on the effect of density on COVID-19 cases and deaths. They also explain the possible mechanisms: there is a positive association between population density and proxies of social distancing and a negative association with the age of the population. We use logarithm of population density (people per sq. km of land area).

Health factors: Countries with better healthcare capacity and more affordable health systems, *ceteris paribus*, are more able to manage the COVID-19 crisis. Farzanegan (2020) shows that early investments in healthcare systems matter in lowering the number of COVID-19 death rates. The importance of health system capacity is also mentioned by Khan et al. (2020), who used a binomial regression model to study the association between COVID-19 case fatality and healthcare capacity index across countries. They suggest “building effective multidimensional healthcare capacity is the most promising means to mitigate future case fatalities”. Golinelli et al. (2017) also highlight the importance of earlier spending on health systems for controlling the COVID-19 fatality in the case study of Italy. Following earlier studies, we use the logarithm of hospital beds (per 1,000 people) to control for healthcare absorptive capacity. In addition, the affordability of healthcare for the average population is an important factor for increasing immunity against the coronavirus. We use per capita out-of-pocket expenditure. Out-of-pocket payments are spending on health directly by households. Higher values of this variable show a higher burden of healthcare costs on the individuals, which may hinder regular checkups and medical controls, increasing the vulnerability of the population in confrontation with deadly viruses such as SARS-CoV-2.



Global connections and mobility: the expansion of SARS-CoV-2 is more likely in countries with higher levels of interaction with the rest of the world and more openness to international tourism. Farzanegan et al. (2020a) provide empirical evidence on the positive association between international tourism and the cumulated level of COVID-19 confirmed cases and deaths in a sample of 90 countries. The risk of international tourism for global public health during a pandemic is also examined by Richter (2003). Mallapaty (2020) refers to role of cruise tourism in the outbreak of COVID-19. In general, a higher degree of globalization by countries is shown to be associated with higher outbreaks of COVID-19 (Farzanegan et al 2020b). We use the logarithm of number of arrivals and departures of international tourism from the World Bank (2020).

Socio-economic development: we use two measures to control for socio-economic development of countries: the logarithm of GDP per capita and the share of population who use internet. It is expected that countries with higher income per capita are more prepared and equipped to control the pandemic and reduce the human costs of COVID-19, recording lower fatality rates. Also, a higher share of internet users in total population may capture the degree of internet penetration and thus easier implementation of social distancing and work-at-home policies, which can reduce the risk of infection. Data on GDP per capita and share of internet users in the population are from the World Bank (2020).

Table 1 provides summary statistics on the COVID-19 fatality rate on 14 December 2020 (as the dependent variable) and ICRG corruption indicators (as the main independent variable) for the included sample of countries in our estimation. There is considerable variation across countries.

For example, in 2019, the corruption index ranges from the lowest levels of 0.5 in Denmark, Finland, New Zealand and Sweden to the highest level of 4.5 in Iran, Mexico, Nicaragua and Russia Federation. COVID-19 fatality rates by the end of 2020 also exhibit considerable cross-country variation. For instance, Bahrain, Cyprus, Denmark, Estonia, Iceland, Israel, Lithuania, Luxembourg, Norway, Singapore, Slovak Republic, Sri Lanka, United Arab Emirates, and Uruguay all experienced fatality rates less than 1% on 14 December 2020, while Bolivia, Bulgaria, China, Guatemala, Indonesia, Iran, Italy, Mexico, Peru, Tunisia, United Kingdom all suffered fatality rates of more than 3% (the average fatality rate in our sample of 64 countries is 2%). Thus, the dataset presents rich cross-country variation for examining the link between COVID-19 fatality rate and corruption.

Figure 1 illustrates that by the end of 2020, countries with higher levels of corruption tend to suffer more COVID-19 fatality rates than countries with lower levels of corruption level in 2019. There is a positive and significant correlation of 0.41 between corruption and fatality rates. Certainly, other factors may account for cross-country variation of COVID-19 fatalities besides corruption. Thus, we now turn to the regression analyses where we control for an array of factors associated with COVID-19 fatalities and also confront potential biases induced by omitted variables.

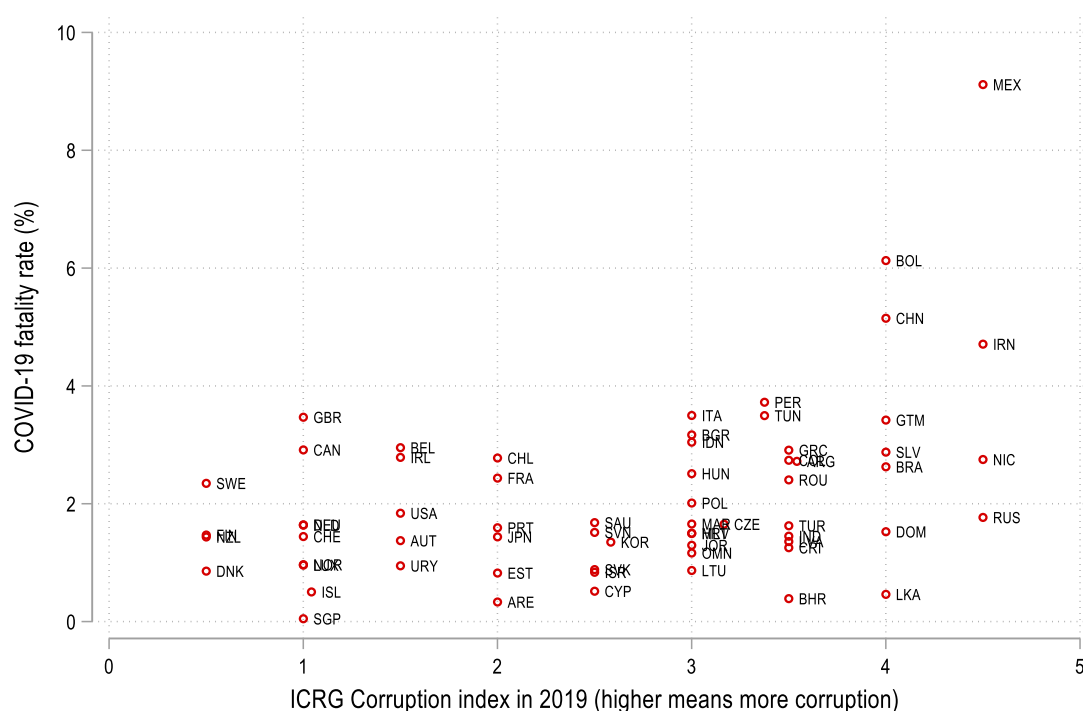
**Table 1.** Summary statistics of variables

Variable	Countries	Mean	Std. Dev.	Min	Max
COVID-19 case fatality rate (%)	64	2.10	1.48	0.05	9.12
ICRG corruption (re-scaled)*	64	2.60	1.18	0.50	4.50
WGI corruption (re-scaled)**	64	-0.59	0.98	-2.17	1.12
TI Corruption (re-scaled)***	64	43.5	18.85	13	78
Internet users in total population (Ave. 2017-19) %	64	76.45	17.19	27.86	98.76
Log of GDP per capita (PPP) (Ave. 2017-19)	64	10.28	0.70	8.65	11.64
Log of number of arrivals of international tourism (Ave. 2017-19)	64	15.96	1.11	13.85	18.29
Log of number of departures of international tourism (Ave. 2017-19)	64	15.66	1.34	13.16	18.80
Log of population density (Ave. 2017-19)	64	4.47	1.41	1.24	8.98
Log of hospital beds (per 1,000 people) (Ave. 2017-19)	64	1.09	0.72	-0.82	2.57
Log of population aged 65 and more in total population (Ave 2017-19) %	64	13.84	6.35	1.09	27.56
Log of per capita out-of-pocket expenditure (Ave. 2017-19)	64	5.70	0.98	3.67	7.88

\*rescaled by subtracting the original index from 6. Higher scores show higher levels of political corruption.

\*\*re-scaled by multiplying the original index by -1. Higher scores show higher levels of petty and grand corruption.

\*\*\*rescaled by subtracting the original index from 100. Higher scores show higher levels of public corruption.

**Figure 1.** Association between corruption and COVID-19 fatality rate

### 3. Regression results

The results indicate a strong connection between the public corruption in 2019 and the level of COVID-19 case fatality rates by the end of 2020. Table 2 summarizes the cross-sectional results for nine regressions, where the key explanatory variable is the level of corruption. Models differ from each other based on inclusion or exclusion of other determinants of COVID-19 fatality rates and continental dummies. The included countries in all models are the same as in the most general specification (Model 8), which controls for all other variables besides corruption.

Model 1 does not control for any other determinants of COVID-19 fatalities except for the level of corruption. It shows a positive correlation between the level of corruption in 2019 and the level of fatalities in 2020. An increase of corruption by one unit (which ranges from 0.5 to 5.5) is associated with an increase of COVID-19 case fatality rates by the end of 2020 by 0.5 percentage point (which varies from 0.5% to 9% and a standard deviation of 1.1 percent). Thus, the effect of corruption is almost half a standard deviation increase in COVID-19 fatality rate. The effect is statistically significant at 99% confidence intervals. Model 2 acknowledges that COVID-19 fatalities may not only be explained by corruption, and thus controls for other factors such as socio-economic and demographic determinants as well as continental dummies. The adjusted R-squared increases from 15% in Model 1 to 41% in Model 2, showing a much higher predictive power of Model 2. More important is the robustness of estimated coefficient of corruption in Model 2. The effect is even higher in this model, adjusting for other drivers of COVID-19 fatality rates. It shows that a unit increase in corruption level is associated with 0.7 percentage point increase in case fatality rate, *ceteris paribus*. This is close to 60% of a standard deviation in case fatality rate. Among control variables, only two drivers show statistically significant effects which are also in line with our theoretical expectations. Countries with higher openness for international tourism over the years of 2017-2019 are associated with higher levels of case fatality rates. This finding is also shown by Farzanegan et al. (2020a). In addition, countries with larger numbers of hospital beds (normalized by population) over the last couple of years show lower records of case fatality rates in 2020. This is also seen in other studies such as Farzanegan (2020). Models 3 to 7 replace corruption with other institutional dimensions. For example, in Model 3, we control for risk of internal conflict (higher values mean lower risk of internal conflict). It shows no statistically significant association with case fatality rate. Model 4 checks government stability while Models 5, 6 and 7 examine the association between law and order, democracy, bureaucratic quality. None of these aspects of governance, which are taken from ICRG (2020), show a significant effect on case fatality rate. In Model 8, we include all these other dimensions besides corruption, holding other variables constant. Model 8 shows the only institutional dimensions which survive this horse competition is corruption, with estimated effect of 0.7, which is statistically significant at 95% confidence interval. In Model 9, we exclude insignificant variables in Model 8, keeping only two robust control variables, such as outbound tourism, hospital beds and continental dummies. Model 9 also shows higher explanatory power as the adjusted R-squared in

Model 9 is 43% which is higher than in Model 8 (37%). Model 9 shows that a one unit increase in corruption level is associated with an increase in case fatality rates by 0.6 percentage points, controlling for tourism, hospital beds and continental dummies.

To put the estimated effect of corruption in perspective, if Iran reduced its corruption levels from 4.5 in 2019 to the level of Saudi Arabia's (2.5), then based on Model 9, its expected level of COVID-19 fatality rates would be 1.2 percentage points lower in 2020 ( $0.6 \times 2$ ). This is a significant reduction, as the standard deviation of case fatality rate in our sample is 1.4 percent.

To what extent are our results sensitive to alternative measures of corruption?

We examine this issue by using two other indicators of corruption: Control of Corruption from the World Governance Indicators (WGI) and the Corruption Perception Index from Transparency International (TI). We used 2019 data for both indexes in our analysis. WGI's Control of Corruption, which ranges from -2.17 (New Zealand) to 1.12 (Nicaragua) in our sample consider both petty and grand corruption and "capture" of the state by private interests. We have re-scaled this index by multiplying it by -1. Higher scores show higher degrees of corruption. The Transparency International index is an aggregate reading of perceived public corruption (i.e. administrative and political) according to businesspeople and country experts. It ranges from 0 (the highest level of perceived corruption) to 100 (the lowest level of perceived corruption). We have also re-scaled this index by subtracting it from 100. In our sample of 64 countries, the re-scaled index of TI corruption ranges from 13 (Denmark & New Zealand) to 78 (Nicaragua). The correlation between the ICRG corruption index and the WGI and TI indexes is more than 0.95. Tables A1 and A2 in the Appendix show the results using the WGI and TI indexes of corruption, respectively.

Model 4 in Table A1, which has the highest explanatory power, shows that countries one unit higher in the WGI corruption index (which ranges from -2.17 to 1.2 in our sample and a standard deviation of 0.98), are associated with 0.75 percentage point increase in COVID-19 case fatality rates. This is a significant association, considering the average case fatality rate of 2% and standard deviation of 1.5% in our sample. The estimated effect of corruption is also highly statistically significant.

Using the TI Corruption Perceptions Index, which focuses more on public corruption, Model 4 in Table A2 shows that countries 10 units higher in the index (ranging 13 to 78 in our sample and a standard deviation of 18.8) are associated with approximately 0.4 percentage point higher case fatality rates in 2020. A shift from low to high corruption levels based on the interquartile range for TI corruption (33 in our sample) is associated with an increase of COVID-19 case fatality rates of 1.3 percentage points, which is a substantial effect. The estimated effect is statistically significant at 99% confidence interval.

**Table 2. COVID-19 fatality rate and ICRG corruption: cross-section regressions**

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
<b>Dependent variable: cumulative COVID-19 case fatality rate % (14 December 2020)</b>									
ICRG Corruption 2019	0.521*** (2.85)	0.734** (2.04)						0.781** (2.25)	0.609*** (3.41)
ICRG Internal conflict 2019			0.016 (0.08)					0.055 (0.21)	
ICRG government stability 2019				0.291 (0.83)				0.016 (0.04)	
ICRG rule of law 2019					-0.336 (-0.92)			-0.207 (-0.70)	
ICRG democracy 2019						-0.255 (-1.20)		-0.175 (-0.67)	
ICRG bureaucratic quality 2019							-0.029 (-0.10)	0.539 (1.43)	
ICRG military in politics 2019								-0.017 (-0.07)	
Internet users (% of population) 2017-19		-0.023 (-1.32)	-0.023 (-1.29)	-0.021 (-1.17)	-0.024 (-1.37)	-0.023 (-1.27)	-0.024 (-1.38)	-0.019 (-1.09)	
Log GDP per capita 2017-19		0.305 (0.43)	-0.684 (-1.07)	-0.813 (-1.29)	-0.355 (-0.50)	-0.695 (-1.11)	-0.654 (-1.13)	0.151 (0.20)	
Log inbound tourism 2017-19		-0.061 (-0.34)	0.150 (0.58)	0.095 (0.46)	0.093 (0.44)	0.073 (0.29)	0.139 (0.55)	-0.023 (-0.12)	
Log outbound tourism 2017-19		0.571*** (3.56)	0.435*** (2.73)	0.443*** (2.96)	0.434*** (2.94)	0.465*** (3.30)	0.439*** (3.02)	0.505*** (2.94)	0.570*** (3.55)
Log population density 2017-19		-0.154 (-1.49)	-0.095 (-1.00)	-0.119 (-1.22)	-0.145 (-1.29)	-0.068 (-0.73)	-0.095 (-1.00)	-0.177 (-1.33)	
Log hospital beds 2017-19		-0.868* (-1.73)	-0.208 (-0.56)	-0.244 (-0.66)	-0.430 (-1.00)	-0.355 (-1.14)	-0.225 (-0.66)	-0.859* (-1.77)	-0.537* (-1.84)
Population 65 plus (% total population) 2017-19		0.057 (1.35)	-0.026 (-0.56)	-0.002 (-0.06)	0.001 (0.02)	0.014 (0.33)	-0.023 (-0.51)	0.067 (1.18)	
Log out of pocket per capital health spending 2017-19		0.282 (1.31)	0.229 (1.04)	0.213 (0.86)	0.343 (1.19)	0.308 (1.27)	0.243 (0.85)	0.207 (0.78)	
Africa		-0.025 (-0.03)	-0.236 (-0.20)	-0.264 (-0.26)	0.268 (0.22)	-0.269 (-0.24)	-0.269 (-0.25)	0.410 (0.31)	-0.637 (-0.72)
America		-0.425 (-0.72)	0.391 (0.73)	0.353 (0.67)	0.009 (0.02)	0.250 (0.50)	0.364 (0.63)	-0.448 (-0.65)	-0.375 (-0.69)
Asia		-1.451** (-2.34)	-0.916 (-1.39)	-1.146 (-1.62)	-0.737 (-1.46)	-1.251* (-1.91)	-0.945* (-1.68)	-1.342 (-1.42)	-2.007*** (-3.45)
Europe		-0.901* (-1.79)	0.021 (0.06)	-0.084 (-0.28)	-0.065 (-0.24)	-0.131 (-0.51)	-0.015 (-0.05)	-0.699 (-1.15)	-0.886** (-2.62)
Countries	64	64	64	64	64	64	64	64	64
adj. R-sq.	0.159	0.414	0.313	0.330	0.337	0.338	0.313	0.376	0.429

Robust t-statistics are included in (), Constant is included but not reported. \*\*\*, \*\*, \* refer to statistical significance at 99%, 95% and 90% confidence intervals.

#### 4. Conclusion

This paper examines the association between COVID-19 case fatality rates and the level of public corruption, controlling for other relevant determinants of fatality rates. We used a pure cross-sectional data and ordinary least squares. The cross-sectional results tell a robust story:

The levels of public corruption in 2019 is positively associated with COVID-19 case fatality rates by the end of 2020; specifically the large, positive link between corruption and COVID-19 fatality rates is not due to potential biases generated by omitted variables, or reverse causation. We also show that among different dimensions of governance, corruption which imposes the most significant human costs across the countries. The paper's findings are consistent with the view that anticorruption reforms that strengthen efficient allocation of government budgets in public goods and services, such as health and education, and promoting transparency and the flow of information can boost the level of resistance against pandemics such as COVID-19, significantly reducing the human costs. Future research may also investigate how COVID-19 outbreak has provided new opportunities for rent-seeking and corruption across countries.

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**Table A1.** COVID-19 fatality rate and corruption (WGI): cross-section regressions

	(1)	(2)	(3)	(4)
<b>Dependent variable:</b> cumulative COVID-19 case fatality rate % (14 December 2020)				
WGI corruption	0.686*** (3.39)	1.045** (2.46)	1.129*** (2.76)	0.758*** (3.79)
ICRG internal conflict			0.022 (0.08)	
ICRG military in politics			0.019 (0.09)	
ICRG government stability			0.037 (0.09)	
ICRG law and order			-0.189 (-0.64)	
ICRG democratic accountability			-0.198 (-0.79)	
ICRG bureaucratic quality			0.551 (1.53)	
Internet users in population		-0.017 (-1.06)	-0.014 (-0.83)	
Log GDP per capita		0.459 (0.62)	0.307 (0.41)	
Log inbound tourism		-0.157 (-0.81)	-0.135 (-0.65)	
Log outbound tourism		0.606*** (3.76)	0.537*** (3.07)	0.551*** (3.49)
Log population density		-0.118 (-1.26)	-0.136 (-1.13)	
Log hospital beds		-0.833* (-1.93)	-0.814* (-1.85)	-0.411 (-1.48)
Population 65 and beyond in total population		0.077* (1.86)	0.092 (1.57)	
Log out-of-pocket health spending p.c.		0.230 (1.14)	0.157 (0.61)	
Africa		0.013 (0.01)	0.372 (0.26)	-0.712 (-0.74)
America		-0.292 (-0.57)	-0.288 (-0.46)	-0.268 (-0.55)
Asia		-1.333** (-2.40)	-1.286 (-1.42)	-1.876*** (-3.71)
Europe		-0.957** (-2.09)	-0.812 (-1.43)	-0.827*** (-2.82)
N	64	64	64	64
adj. R-sq	0.194	0.424	0.392	0.438

Robust t-statistics are included in (), Constant is included but not reported. \*\*\*, \*\*, \* refer to statistical significance at 99%, 95% and 90% confidence intervals. Higher scores of WGI corruption mean higher levels of corruption in 2019.

**Table A2.** COVID-19 fatality rate and corruption (TI): cross-section regressions

	(1)	(2)	(3)	(4)
<b>Dependent variable:</b> cumulative COVID-19 case fatality rate % (14 December 2020)				
TI Corruption index	0.035*** (3.34)	0.054** (2.31)	0.057** (2.61)	0.039*** (3.60)
ICRG internal conflict			0.027 (0.10)	
ICRG military in politics			0.040 (0.20)	
ICRG government stability			0.060 (0.14)	
ICRG law and order			-0.228 (-0.78)	
ICRG democratic accountability			-0.192 (-0.75)	
ICRG bureaucratic quality			0.529 (1.48)	
Internet users in population		-0.021 (-1.27)	-0.019 (-1.08)	
Log GDP per capita		0.446 (0.61)	0.306 (0.41)	
Log inbound tourism		-0.098 (-0.51)	-0.075 (-0.37)	
Log outbound tourism		0.568*** (3.55)	0.497*** (2.85)	0.554*** (3.46)
Log population density		-0.146 (-1.45)	-0.172 (-1.32)	
Log hospital beds		-0.831* (-1.90)	-0.827* (-1.85)	-0.415 (-1.50)
Population 65 and beyond in total population		0.074* (1.83)	0.090 (1.50)	
Log out-of-pocket health spending p.c.		0.299 (1.41)	0.248 (0.94)	
Africa		-0.004 (-0.00)	0.436 (0.31)	-0.691 (-0.73)
America		-0.385 (-0.71)	-0.411 (-0.61)	-0.299 (-0.58)
Asia		-1.277** (-2.32)	-1.192 (-1.30)	-1.857*** (-3.59)
Europe		-0.940* (-2.00)	-0.794 (-1.33)	-0.817*** (-2.74)
N	64	64	64	64
adj. R-sq	0.190	0.419	0.388	0.428

Robust t-statistics are included in (). Constant is included but not reported. \*\*\*, \*\*, \* refer to statistical significance at 99%, 95% and 90% confidence intervals. Higher scores of TI Corruption index mean higher levels of corruption in 2019.