economies

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The Impact of COVID-19 on Economic Growth of Countries: What Role Has Income Inequality in It?

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Abstract: This paper argues that income inequality explains the variation in the economic performance of different countries over the first year of the COVID-19 pandemic. Unlike the conclusions reported by some studies, this study shows that health casualties caused by COVID-19 has had a *higher adverse economic impact* on countries with lower income inequality. Notwithstanding, the decline in the economic growth as well as the number of casualties caused by COVID-19 are, overall, proportionate to the level of income inequality of the country. Furthermore, the results show that countries with more dependence on the service sector and countries that implemented more restrictive measures (lockdowns) experienced a higher decline in GDP growth over the first year of the pandemic period. The paper concludes with some important policy implications that support the role of strong institutions in making economies resilient over a period of pandemic.

Keywords: COVID-19; income inequality; institutions; categorical regression; stringency measures

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Citation: Ghecham, Mahieddine Adnan. 2022. The Impact of COVID-19 on Economic Growth of Countries: What Role Has Income Inequality in It? *Economies* 10: 158. https://doi.org/10.3390/economies10070158

Academic Editor: Ştefan Cristian Gherghina

Received: 28 May 2022
Accepted: 23 June 2022
Published: 1 July 2022

1. Introduction

COVID-19 has had a major impact on our social life and our work environment. Most, if not all countries, were not ready for the dire consequences of this pandemic and many of these countries failed to handle the issue properly. The adverse economic impact of this pandemic has been felt worldwide. According to the World Bank (2021b), "COVID-19 caused a global recession whose depth was surpassed only by the two World Wars and the Great Depression over the past century and a half", leading to a global economic contraction of 4.3% in 2020. Moreover, the level of global GDP in 2021 was expected to average 5.3%, which is below the pre-pandemic projections (World Bank 2021b) and the full impact of this large-scale health issue is yet to be fully determined as the virus still lingers around the globe.

It is hard to find economies that have escaped the negative impact of COVID-19. Nonetheless, some countries have experienced less decline in economic growth compared to others. Knowing the reasons behind the differences in the performance will help design appropriate policies that allow for countries to be more resilient in the face of future pandemics. Our paper endeavors to shed light on one of the potential factors that could explain the variation in the economic performance of countries during the period of COVID-19.

Therefore, this study attempted to investigate the impact of major health issues on the economic growth of countries with different levels of income inequality. It is quite difficult to find studies that have investigated the impact of health on economic growth while considering the role of income distribution in explaining the impact in question. It is even more difficult to find studies assessing the impact of pandemics such as COVID-19 on the GDP growth of countries while taking into consideration the role of income inequality. Therefore, this paper helps in the understanding of what circumstances health problems can exacerbate poor economic growth. This is quite an important insight that will help design policies to build resilient economies in the medium- and long- run during a health crisis.

2. Literature Review

The literature on the relationship between income inequality and economic growth is extensive (see, for example, Persson and Tabellini 1994; Alesina and Rodrik 1994; Bénabou 1996; Barro 1999). Perhaps one of the most prominent studies that brought attention to this relationship is what has become known as Kuznets' hypothesis, in relation to the work of Kuznets (1955). This hypothesis highlights the existence of an inverted U relationship between economic growth and income distribution, implying a positive relationship between income inequality and economic growth at the initial stages of economic development. This hypothesis underlines a correlation, rather than a causality between the two variables. In this regard, works that have explored the causal relationship have not come to a consensus, underlying the complex relationship between the two. While some studies have underlined the recursive causality between income inequality and economic growth (Ostry et al. 2014), others contend that the impact of income inequality on economic growth is non-monotonic. In other words, income inequality would raise the economic growth of a category of countries and would decrease it in another income category of countries. However, the empirical findings are mixed, and is not clear which income category of countries benefit from the increase in income inequality and which category does not. Indeed, for example, Barro (1999) argued that income inequality tends to be detrimental to the economic growth of poor countries and beneficial to the economic growth of rich[1] countries. Others such as Brueckner and Lederman (2015) have contended the opposite. For them, income inequality is rather beneficial for the economic growth of poor countries, and rather detrimental to the economic growth of high-and middle-income countries.

Income inequality can have a detrimental impact on economic growth for several reasons. Income inequality can undermine the human capital of a country as result of a lower investment of individuals in education. Less incentive to invest in education is a consequence of a distorted distribution of national income, whose largest amount accrues only to a small part of the population. Along this argument, some contend (Grigoli et al. 2016) that inequality can be harmful to sustained growth by reducing social consensus, dampening investment, and affecting health outcomes (Persson and Tabellini 1994; Alesina and Perotti 1996; Bénabou 1996; Easterly 2007; Ostry and Berg 2011). Moreover, the inequality is usually associated with excessive redistribution policies that are often blamed for slowing economic growth (Persson and Tabellini 1994; Alesina and Rodrik 1994; Rajan 2011). Moreover, the potential negative impact of inequality on growth can be explained by its role in creating financial imbalances due to the influence of a richer population on the legislative (Stiglitz 2012) and its role in exacerbating leverage and financial cycles (Rajan 2011). Acknowledging this negative effect, other authors have reported that this adverse effect of inequality on growth is contingent on the presence of poverty. This means that inequality will have a negative impact on economic growth only in the presence of rising poverty (Breunig and Majeed 2020).

The relationship that exists between income inequality and economic growth is quite important in the sense that it can help our limited understanding of how health issues impact economic growth. Although the positive cross-country correlation between health and economic growth is fairly accepted, there is still a need for further effort to explore the underlying mechanisms (Bloom et al. 2018) as well as the variations in the size of the impact of health on economic growth across countries. In this regard, Bhargava et al. (2001), for example, argued that the effect of health on economic growth was larger in poor countries than in richer countries, while Mandal et al. (2018) highlighted the difference in the returns to investment in health amongst low-income and high-income countries.

In this regard, the current world health crisis caused by COVID-19 has shown how health issues can cause serious social and economic crises. Indeed, COVID-19 has had a devastating multifaced effect on the world economy. By the end of 2020, the global economy had contracted by 3.5% (IMF 2021), and its impact stretches over a number of dimensions. It has been responsible for an increase in poverty, a deterioration of women's work and social conditions, disrupted education, and an increase in job and food insecurity (United Nations

2020). For example, between 2019 and 2020, the employment of women declined by 4% compared to a 3% decline for men. Part of this can be explained by the fact that women had to spend more time caring for children at home during the lockdowns (World Bank 2021a). Furthermore, the pandemic has exacerbated the private and public debt burden on economies around the world. This is particularly drastic in developing countries and even more acute in low-income countries (World Bank 2021a). While the pandemic has had a devastating impact on all segments of society, the pandemic has had a disproportionate effect on the most economically vulnerable group of society. The income of the poorest 20 percent experienced a sharper decline in 2021 compared to a higher income group. This decline in income has translated into around 100 million more people living in extreme poverty (World Bank 2021a).

The variation in the impact of health on economic growth across countries with different levels of income as well as the role of income inequality in explaining economic growth provide us with a good reason to investigate whether the impact of COVID-19 on economic growth was sensitive to differences in the income distribution amongst countries. It is hard to find studies that have tackled the effect of COVID-19 on economies while taking into consideration the role of income inequality. Moreover, this research has a major policy implication in the sense that it underlines the type of policies that governments should focus on in order to make the economy more resilient in the face of major health crises.

3. Conceptual Framework

The relationship between health and economic growth is not a new topic. Perhaps what has come to be known as the Preston curve (Preston 1975) illustrates well the old interest in this relationship. In this regard, a number of studies interested in the determinants of economic growth have highlighted the role of health in explaining the variations in GDP level, though the importance of its impact varies across studies. For example, Barro (1996) highlights that the increase in life expectancy from 50 to 70 years would raise the growth rate by 1.4 percentage point per year. Gallup and Sachs (2001) argued that a 10% drop in malaria would lead to a 0.3% higher growth. This positive impact on growth takes place because an improvement in health leads to an increase in the rate of saving, which in turn increases the physical capital accumulation that feeds back into GDP growth (see, for example, Zhang et al. (2003)). Challenging the view that health has a first-order impact on economic growth, Acemoglu and Johnson (2007) contended that, although, an improvement in health conditions (translated into an increase in life expectancy) could boost the total GDP, its impact on income per capita would not necessarily be significant and may be negative. Similarly, Ashraf et al. (2008) minimized the impact of health improvements on income per capita while arguing that health improvement in developing countries could have an adverse economic impact due to the rapidly growing population. This was contested, however, by Aghion et al. (2011), who contended that a higher initial level and a *higher rate of improvement* in life expectancy did have a significant positive impact on per capital GDP growth, a result that shows that better health at a young age has long-term consequences in terms of worker productivity.

The enquiry into the role of health in explaining economic growth stretches over the issue of income differences between rich countries and poor countries. Indeed, Well (2007), for example, argued that health is an important part of the productivity residual and subsequently explains the income variations across rich and poor countries. Similarly, Cole and Neumayer (2006) claimed that poor health is a key factor explaining the persistence of the underdevelopment of a number of countries due to its negative impact on the total factor productivity. Moreover, health interventions could be beneficial to economic growth, more importantly in low-income countries than in rich countries (Bhargava et al. 2001). Even low-intensity health interventions can have strong positive effects on the health of the working-age population in less developed countries where health status is low to begin with (Field et al. 2009; Luca et al. 2018, according to Bloom et al. 2018).

The causality between health and income is, however, not necessarily unidirectional. Although some researchers disagree on this matter (see, for example, Kuehnle 2014), income could explain why individuals would end up having good or bad health. According to Deaton (2003), the probability of death is sensitive to the income level of household, while the effect of income on mortality is more important among the poor than among the rich. This supports the conclusions of Case et al. (2002) that highlighted the importance of the households' income level in determining the health conditions of children with chronic disease. While discussing the findings of the latter authors, Currie and Stabile (2003) recommended that policymakers should promote access to care in order to reduce socioeconomic status-related health disparities. This sustains earlier recommendations to increase the eligibility to health insurance for better health outcomes for low-income children (Currie and Gruber 1996). Having access to a better health insurance due to high income could explain why parental income would have an impact on child health (see, for example, Reinhold and Jürges 2012).

Hence, this health–income nexus underlines a complex relationship wherein income disparities amongst households could play an important role. The health of the population would be an explanatory variable for income growth at the macro level. However, health itself is sensitive to the household's income at the micro level. The two ideas combined underpin a conceptual framework that describes the problem that this paper investigated. This conceptual framework postulates that health can explain economic growth and that its impact varies with the income disparities (inequality) amongst households. The case of COVID-19 offers a good opportunity to test this hypothesis. In fact, the nature of being an exogenous phenomenon, COVID-19 helps us overcome the endogeneity problem that characterizes the bidirectional causality between health and economic growth, an issue that often complicates the assessment of the consequences of health improvement for economic growth (Bloom et al. 2018). This study adds to the existing studies that have covered the impact of COVID-19 at the global level (see, for example, World Bank 2021a, 2021b) or at a country level (see, for example, De Lyon and Dhingra 2021). Moreover, it complements other studies that have investigated the economic impact of COVID-19 on a specific segment of population such as women (see, for example, Goldin 2022) or a poor population (see, for example, Rönkkö et al. 2022; Durizzo et al. 2021).

4. Methodology

In order to tackle the question of this research, our paper tested the following hypothesis:

H_0: *The economic impact of COVID-19 varies with the level of income distribution of countries.*

Our paper tested the hypothesis of this research by using the following equations:

$$\begin{gathered}\text{GDP growth} = \alpha + \text{number of death} + \text{quality of institutions} + \text{education} + \\ \text{age composition of population} + \text{out of pocket expenditure} + \text{Sector} + \\ \text{stringency index} + \text{GINI} + \text{number of death*GINI} + \varepsilon\end{gathered} \tag{1}$$

$$\begin{gathered}\text{GDP growth} = \alpha + \text{number of infected} + \text{quality of institutions} + \text{education} + \\ \text{age composition of population} + \text{out of pocket expenditure} + \text{Sector} + \\ \text{stringency index} + \text{GINI} + \text{number of infected*GINI} + \varepsilon\end{gathered} \tag{2}$$

Equations (1) and (2) include the interaction terms (number of death*GINI) and (number of infected*GINI) in order to capture any heterogeneous impact of COVID-19 on the GDP growth of countries with different levels of income inequality. Equations (1) and (2) use the number of deaths and the number of infected people, respectively, as the indicators of health issues caused by COVID-19.

As our paper tested the impact of COVID-19 on economic growth, it was reasonable to use the number of casualties and infected individuals as indicators to health related issues that arose during the pandemic. The statistics on mortality drew our attention to the number of policy issues, chief amongst them, health issues (Sen 1998). The extent to

which COVID-19 can affect economic growth is contingent upon how effective government institutions are in managing a pandemic crisis, to what degree the population understand and adhere voluntarily to the health and safety measures, to what extent households can have access to treatment, and how intense is the interaction of the local population with the rest of the world. Therefore, our paper included the following variables for countries of different levels of development and levels of income[2]:

1. Quality of institutions: Institutions can be important channels through which health conditions can affect economic growth (see, for example, Acemoglu et al. 2003).
2. Education: Education is a crucial factor that significantly interacts with health. Health conditions can be explained by the level of education and the interaction between them contributes to the development level of countries (see, for example, Buor 2003; Bloom 2007; Vogl 2012) and explains the economics growth of countries (see Zhang et al. 2003).
3. Age composition: Both health outcomes (see, for example, Mehta et al. 2019) and health expenditure growth (see, for example, de Meijer et al. 2013) correlate with age. This correlation explains the impact that age can have on the GDP growth of various economies (see, for example, Kelley and Schmidt 2005; Lee and Mason 2017);
4. Access to insurance: Having access to affordable insurance affects health outcomes (see, for example, Currie and Gruber 1996; Reinhold and Jürges 2012). Therefore, any potential impact of health issues on economic growth should take into consideration the extent that health insurance is accessible (see, for example, Levine and Rothman 2006).
5. Sector: The COVID-19 pandemic has affected various economic sectors with different degrees of severity. The service sector (except for information technology-based services) has probably been the most affected by this pandemic. For example, the United Nation World Tourism Organization (UNWTO 2020) reported a 22% fall in international tourism receipts of $80 billion in 2020, corresponding to a loss of 67 million international arrivals. Therefore, the GDP of economies with a high reliance on such sectors would be more affected by this pandemic.

The dependent variable of the equation refers to the country's real GDP growth. The explanatory variables were the number of infected individuals by COVID-19; the number of death because of COVID-19; the quality of the institutions; the age composition (the share of a society aged 65+); the education level of the population (measured by the level of school enrolments at the secondary level); the percentage contribution of the service sector to GDP; and the stringency index (Oxford stringency index, which records the strictness of 'lockdown style' policies that primarily restrict people's behavior)[3].

The model was tested using categorical regression (CATREG) available in SPSS. Unlike standard multiple regression, CATREG incorporates optimal scaling and can be used when the predictor(s) and outcome variables are any combination of numerical, ordinal, or nominal. Therefore, categorical regression is an appropriate statistical technique to test our model since the latter includes various explanatory variables, which have different scales.

The two explanatory variables that captured the impact of health issues, namely, the number of deaths and the number of individuals infected by COVID-19 were not included in the same equation in order to avoid a multicollinearity problem.

It should be noted that in order to avoid the potential effect of the introduction of the vaccine after the start of 2021, which would lead to a biased interpretation of the results, the data of the variables were limited to the one year period since the breakout of the pandemic. This means that our paper considered data recorded from 31 December 2020 in order to test the model. In fact, a one year cycle should provide good insights into the impact of health issues due to the COVID-19 pandemic on the GDP growth of countries.

Furthermore, it should be noted that as this model considered an impact of an exogenous phenomenon (pandemic), there was no need to worry about the endogeneity problem due to the complex causal relationship between GDP and health.

5. Results and Discussion

The regressions highlighted some very interesting points. First of all, it confirmed the negative impacts of health issues (represented by the number of dead because of COVID-19 and the number of infected people with COVID-19) on the economic growth of countries (see Table A1 in Appendix A). It also showed that the overall economic performance of countries over the first year of COVID-19 varied negatively with the level of income inequality. In other words, the adverse economic shock becomes, in general, more important as the income inequality increases (Equations (1) and (2) of Table A1 in the Appendix A shows that as the GINI coefficient increased, the economic growth during COVID-19 decreased).

However, similar to the findings of some recent important studies (e.g., Deaton 2021), the impact of COVID-19 seemed to be more important in countries with lower income inequality compared to countries with higher income inequality (this was captured by the two interaction terms GINI $\times$ number of death and GINI $\times$ number of infected, see Table A1 in Appendix A). Several reasons can explain why the death toll has been on average larger for more developed countries. This includes demographics, the degree of international integration, and the fact that most of the Northern Hemisphere countries went through two winters (and two therefore COVID waves) (see Levy-Yeyati and Filipini 2021). Moreover, countries with more developed economies have higher degrees of intermediation and a higher fraction of services, both of which make infection easier (Deaton 2021).

Other reasons can also explain this result. Higher income inequality underlines weaker economic productivity in either developing countries (see IMF 2015) or developed countries (see, for example, Blundell et al. 2013; Atkinson 2015). Weak economic productivity associated with poor income distribution (or high income inequality) might explain why the impact of health issues caused by COVID-19 on economic growth in a group of countries with higher income inequality was subdued. The significant impact of health on economic growth is partly through its impact on labor productivity. If the latter is weak (as it would be in countries with higher income inequality), then one would expect that a health crisis such as those emanating from pandemics would lead to a less dramatic drop in the economic growth of countries with higher income inequality. Therefore, the impact of a health crisis on GDP growth is relatively greater in countries with lower income inequality, which potentially have higher productivity.

Notwithstanding, these results do not imply that COVID-19 had no cost to countries with higher income inequality. As previously mentioned, our results showed that higher income inequality was associated with a greater decline in GDP growth over the period under study. These results, in particular, are consistent with the pandemic increasing poverty around the world, especially with estimates that between 88 and 115 million people will be pushed into poverty (World Bank 2021a, 2021b), as reported by Deaton (2021). Moreover, income inequality is a major factor that exacerbates the impacts of pandemics since it is a hazard to individual health (see Deaton 2003) due to its negative effect on mental health and social cohesion (see, for example, Pickett and Wilkinson 2015; Kawachi et al. 1997).

Within this context, our study ran two other regressions in order to highlight the role of income inequality and the other variables in explaining the level of casualties of COVID-19 (as measured by the number of infections and deaths) during the first year of the pandemic. The two regressions take the following form and were also tested using categorical regression:

$$\begin{gathered}\text{Number of death} = \alpha + \text{quality of institutions} + \text{education} + \\ \text{age composition of population} + \text{out of pocket expenditure} + \text{stringency index} + \\ \text{Service sector} + \text{GINI} + \varepsilon\end{gathered} \tag{3}$$

$$\begin{gathered}\text{Number of infected} = \alpha + \text{quality of institutions} + \text{education} + \\ \text{age composition of population} + \text{out of pocket expenditure} + \text{stringency index} + \\ \text{Service sector} + \text{GINI} + \varepsilon\end{gathered} \tag{4}$$

The results are in line with the findings of some recent studies (for example, Von Chamier 2021). The level of income inequality (as measured by GINI coefficient) explains the number of deaths and the number of infections (see Table A2 in the Appendix A); a high level of income inequality was associated with the level of deaths and infections across different countries. Therefore, income inequality seems to exacerbate the impact of pandemics on individuals (see Deaton 2003).

Additionally, the results showed that age (the share of society 65+) had a significant role in explaining the number of COVID-19 casualties. This explains why, as observed by Deaton (2021), the death toll in high-income countries, characterized by an aging population, was more important than in poor countries during the pandemic. Moreover, the results showed that the more important the service sector was in the economy, the higher the COVID-19 casualties. This outcome is quite normal given the fact that the spread of the infection is easier in this sector (Deaton 2021).

Our results, however, showed that the level of restriction (measured by the stringency index) does not explain the level of casualties of COVID-19. This might seem surprising at a first glance, but it could show that the restrictions and the lockdowns implemented by countries came mostly as a response to the number of casualties rather than as a precautionary measure. Moreover, stricter regulations do not always lead to higher compliance with social distancing (see Durizzo et al. 2021).

Furthermore, our study showed that the role of institutions is important in explaining the economic performance of countries over the period of pandemic as well as the number of deaths caused by COVID-19 (see Tables A1 and A2 in Appendix A). Indeed, countries with better institutional frameworks seem to have experienced less drop in GDP growth over the first year since the start of the pandemic compared to countries characterized by weak institutions (this result is true when number of infections is included in the regression rather than number of death). Similarly, the results showed that countries with better institutional frameworks experienced less death although, according to the results, this did not seem to have a significant role in preventing the number of infections.

6. Conclusions, Policy Implications, Limitation of Study and Further Research

This study highlights some quite important conclusions. The impact of health issues caused by the COVID-19 pandemic on the economic growth of countries clearly varied across countries. Our study showed that income inequality can explain this variation. The economic growth of countries with a lower income inequality was more sensitive to the COVID-19 pandemic than those with a higher income inequality. However, our study showed that, in general, countries with a higher income inequality experienced more important decline in economic growth as well as more COVID-19 casualties during the first year of the pandemic (before the start of the vaccination campaign).

The findings of this study provide further support for improving the redistributive policies that promote better income distribution. These redistributive policies, together with better institutions, should promote better opportunities to education and to health care, which in turn would promote the population health (see, for example, Deaton 2003) and make it resilient during pandemics. Increased public social spending generally fosters human development, but this link seems weaker in the presence of high-income inequality (see Kohler 2015).

The conclusions of this study need to be taken with caution. The interpretation of the results of this study was constrained by the availability and quality of the data in relation, particularly, to the GINI coefficient. Information about the latter variable is, unfortunately, not constantly available, which creates a constraint on the sample size as well as on the ability to undertake a time-series study.

Notwithstanding, this research opens up opportunities for the further investigation of the impact of the introduction of the vaccine on the relationship between income inequality and the recovery/resilience of various economies. The role of and access to vaccines could offer an interesting insight into the capacity of countries with different levels of income,

different income distributions, and different institutions to recover from the aftermath of a pandemic.

Funding: This research received no external funding.

Institutional Review Board Statement: Not applicable.

Informed Consent Statement: Not applicable.

Data Availability Statement: The data presented in this study are openly available in the following websites: https://data.worldbank.org/ (accessed on 22 June 2022); https://datahelpdesk.worldbank.org/ (accessed on 22 June 2022).

Conflicts of Interest: The author declares no conflict of interest.

Appendix A

Table A1. The regression results of Equations (1) and (2).

Dependent Variable: Real GDP Growth		
	Equation (1)	**Equation (2)**
Institutions	0.347 (0.279)	0.408 ** (0.245)
Sector	−0.262 (0.203)	−0.386 (0.183)
Number of Deaths	−1.039 * (0.693)	
Number of Infected		−1.184 * (1.004)
GINI	−0.235 * (0.154)	−0.285 * (0.182)
Age	−0.199 (0.293)	−0.132 (0.260)
Education	−0.307 (0.284)	−0.382 (0.285)
Insurance	0.178 (0.260)	0.205 (0.227)
Stringency index	−0.388 (0.126)	−0.385 *** (0.119)
GINI*number of death	1.135 ** (0.644)	
GINI*number of infected		1.602 ** (0.898)
Sample size (N) R^2	109 0.49	112 0.54

*, **, and *** indicate the significance level at 10, 5, and 1%, respectively, based on the two-tailed test. The standard error estimates are in parentheses.

Table A2. The regression results of Equations (3) and (4); death cases (eq3) and infected cases (eq4) are the dependent variables.

Dependent Variable: Death Cases (eq3) and Number of Cases (eq4)		
	Equation (3)	**Equation (4)**
Institutions	−0.294 ** (0.157)	−0.184 (0.149)
GINI	0.334 *** (0.107)	0.222 *** (0.108)
Age	0.253 * (0.143)	0.293 *** (0.141)
Education	0.276 ** (0.131)	−0.023 (0.104)
Insurance	−0.161 (0.102)	−0.162 (0.103)
Stringency index	0.112 (0.099)	0.137 (0.123)
Service	0.265 *** (0.093)	0.289 *** (0.095)
N (sample size)	111	114
R^2	0.25	0.21

*, **, and *** indicates the significance level at 10, 5, and 1%, respectively, based on the two-tailed test. Standard error estimates are in parentheses.

Table A3. The descriptive statistics of the variables used in the study.

Variables	Observations	Mean	Standard Deviation
Real GDP	140	−4.75	5.19
Institutions	139	0	0.97
Sector	138	55.50	11.76
Number of Deaths	137	13,093.56	39,525.82
Number of Infected	137	13,093.56	39,525.82
GINI	140	37.85	7.91
Age	138	9.83	6.94
Education	124	85.33	29.65
Insurance	136	32.83	17.94
Stringency index	133	46.09	9.51

Table A4. The correlation matrix.

Variables	Real GDP	Institutions	Sector	Number of Death	Number of infected	GINI	Age	Education	Insurance	Stringency Index
Real GDP	1									
Institutions	−0.22	1								
Sector	−0.36	0.69	1							
Number of Deaths	−0.12	0.08	0.26	1						
Number of Infected	−0.08	0.10	0.23	0.95	1					
GINI	−0.06		−0.14	0.14	0.09	1				
Age	−0.25	0.70	0.62	0.15	0.14	−0.51	1			
Education	−0.31	0.75	0.62	0.14	0.11	−0.38	0.76	1		
Insurance	0.22	−0.59	−0.46	−0.12	−0.12	0.08	−0.46	−0.47	1	
Stringency index	−0.38	0.14	0.29	0.25	0.23	0.09	0.13	0.25	−0.03	1

Number of observations = 109.

Table A5. The countries included in the sample.

Albania	Algeria	Angola	Argentina	Armenia	Australia	Austria	Bangladesh	Belarus	Belgium
Benin	Bhutan	Bolivia	Botswana	Brazil	Bulgaria	Burkina Faso	Burundi	Cabo Verde	Cameroon
Canada	Chad	Chile	China	Colombia	Comoros	Congo, Dem. Rep.	Congo, Rep.	Costa Rica	Cote d'Ivoire
Croatia	Cyprus	Czech Republic	Denmark	Djibouti	Dominican Republic	Ecuador	Egypt, Arab Rep.	El Salvador	Estonia
Eswatini	Ethiopia	Fiji	Finland	France	Gabon	Gambia, The	Georgia	Germany	Ghana
Greece	Guatemala	Guinea	Haiti	Honduras	Hungary	Iceland	India	Indonesia	Iran, Islamic Rep.
Iraq	Ireland	Israel	Italy	Japan	Kazakhstan	Kenya	Korea, Rep.	Kosovo	Kyrgyz Republic
Latvia	Lesotho	Liberia	Lithuania	Luxembourg	Madagascar	Malawi	Malaysia	Maldives	Malta
Mauritania	Mauritius	Mexico	Moldova	Mongolia	Montenegro	Morocco	Mozambique	Myanmar	Namibia
Netherlands	Nicaragua	Niger	Nigeria	North Macedonia	Norway	Pakistan	Panama	Paraguay	Peru
Philippines	Poland	Portugal	Romania	Russian Federation	Rwanda	Sao Tome and Principe	Senegal	Serbia	Seychelles
Sierra Leone	Slovak Republic	Slovenia	Somalia	South Africa	South Sudan	Spain	Sri Lanka	St. Lucia	Sudan
Sweden	Switzerland	Tajikistan	Tanzania	Thailand	Timor-Leste	Togo	Tunisia	Turkey	Uganda
Ukraine	United Arab Emirates	United Kingdom	United States	Uruguay	Vietnam	West Bank and Gaza	Yemen, Rep.	Zambia	Zimbabwe

Source of data:
Real GDP growth (%): International Monetary Fund (IMF.org)
COVID-19 Cases and Death: Our World in Data (Ourworldindata.org)
GINI coefficient: World Bank (Worlbank.org)
Stringency index: World Health Organization (Who.org)
Insurance: Worldbank.org
Age composition (65 years + % of total population): UN.org; population division.
Service sector (% value added to total GDP): Worldbank.org
Institutions (based on governance indicators): World Bank (Worlbank.org)
Variables definition:

Institutions variable: A composite index (measuring quality of institutions) is formed by taking an average estimate using the following governance indicators: Government Effectiveness; Regulatory Quality; Rule of Law; Control of Corruption. Estimates range from approximately −2.5 (weak) to 2.5 (strong) governance performance.

GINI coefficient: This measures the income inequality. This is based on the comparison of the cumulative proportions of the population against the cumulative proportions of the income they receive, and ranges between 0 in the case of perfect equality and 1 in the case of perfect inequality (see the definition of OECD.org).

Stringency Index: This is a composite measure based on nine response indicators including school closures, workplace closures, and travel bans, rescaled to a value from 0 to 100 (100 = strictest). (full information could be retrieved from https://www.bsg.ox.ac.uk/research/research-projects/COVID-19-government-response-tracker#data (accessed 15 January 2022)).

Age composition (65 years and over): The percentage of the total population by broad age group.

Insurance: This captures the amount disbursed by households for medical care not covered by insurance. Share of out-of-pocket payments of the total current health expenditures.

Service: These include value added in the wholesale and retail trade (including hotels and restaurants), transport, and government, financial, professional, and personal services such as education, health care, and real estate services. These also included the imputed bank service charges, import duties, and any statistical discrepancies noted by the national compilers as well as the discrepancies arising from rescaling. Value added is the net output of a sector after adding up all the outputs and subtracting the intermediate inputs. This is calculated without making deductions for the depreciation of fabricated assets or the depletion and degradation of natural resources. The industrial origin of value added is determined by the International Standard Industrial Classification (ISIC).

Notes

[1] Note that the meaning of rich/poor countries and high/low-income countries is used interchangeably. The study uses, in this context, the definition of the World Bank. Therefore, low-income economies are defined as those with a GNI per capita, calculated using the World Bank Atlas method, of $1045 or less in 2020; lower middle-income economies are those with a GNI per capita between $1046 and $4095; upper middle-income economies are those with a GNI per capita between $4096 and $12,695; high-income economies are those with a GNI per capita of $12,696 or more (see https://datahelpdesk.worldbank.org/knowledgebase/articles/906519-world-bank-country-and-lending-groups (accessed on 18 June 2022)).

[2] The sample of this research includes 35 high-income countries and 105 low- and middle-income countries (categorized according to the definition of the World Bank). See Appendix A Table A5.

[3] More definitions, sources, and descriptive statistics of the variables are found in Appendix A Tables A3 and A4.

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