Socio-economic and corporate factors and COVID-19 pandemic: a wake-up call

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Abstract

The novel coronavirus 2019 (COVID-19) emerges from the Chinese city Wuhan and its spread to the rest of the world, primarily affected economies and their businesses, leading to a global depression. The explanatory and cross-sectional regression approach assesses the impact of COVID-19 cases on healthcare expenditures, logistics performance index, carbon damages, and corporate social responsibility in a panel of 77 countries. The results show that COVID-19 cases substantially increase healthcare expenditures and decrease corporate social responsibility. On the other hand, an increase in the coronavirus testing capacity brings positive change in reducing healthcare expenditures, increased logistics activities, and corporate social responsibility. The cost of carbon emissions increases when corporate activities begin to resume. The economic affluence supports logistics activities and improves healthcare infrastructure. It linked to international cooperation and their assistance to supply healthcare logistics traded equipment through mutual trade agreements. The greater need to enhance global trade and healthcare logistics supply helps minimize the sensitive coronavirus cases that are likely to provide a safe and healthy environment for living.

Keywords Carbon damages · Healthcare expenditures · COVID-19 cases · Logistics activities · Corporate social responsibility · Cross-sectional regression

Introduction

In more than 200 countries/regions, the coronavirus pandemic affected about 139,807,715 people, out of which 3,002,302 people have died, and critical cases reached 106,819. The total recovered cases are 118,834,719 on 16 April 2021 (ECDC 2021). The Europe region which is greatly affected by the COVID-19 pandemic is high in infected cases (i.e. 42,434,910) and death toll (i.e. 968,702). The North

American region has infected and death cases that reached 37,189,637 and 843,407, respectively. Asia, South America, Africa, and Oceania region have infected cases reaching to 32,653,212; 23,033,678; 4,434,957; and 60,600 respectively. The reported death rates in these regions are 459,324; 612,317; 117,317; and 1166 respectively. The total recovered cases are greater in Europe (i.e. 36,681,937), followed by North America (i.e. 28,864,266), Asia (i.e. 28,674,874), South America (20,651,442), Africa (i.e. 3,963,514), and

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Oceania region (i.e. 34,729). The coronavirus has gripped the world so badly (Worldometer 2021, 16 April 2021). The global case fatality ratio (CFR) reached 2.147%. South America has a high CFR (i.e. 2.658%), followed by Africa (i.e. 2.646%), North America (i.e. 2.268%), Europe (i.e. 2.283%), Oceania (i.e. 1.924%), and Asia (i.e. 1.407%). The case recovered ratio (CRR) is highest in the South America (i.e. 89.658%), followed by Africa (i.e. 89.370%), Asia (i.e. 87.816%), Europe (i.e. 86.443%), North America (i.e. 77.614%), and Oceania (i.e. 57.309%). The critical case ratio (CCR) is highest in the South America (i.e. 0.106%), followed by Asia (i.e. 0.088%), Africa (i.e. 0.086%), Europe (i.e. 0.077%), Europe (i.e. 0.013%), and Oceania (i.e. 0.007%) (Author's calculation based on Worldometer 2021 database). Figure 1 shows the current facts about COVID-19 pandemic vulnerability across the world regions for ready reference.

The USA is seriously affected by coronavirus disease. Its total infected cases and reported deaths are higher in the world regions, followed by India, Brazil, France, Russia, UK, Turkey, and Italy. The overall reported deaths reached 578,993 in the USA, 365,954 in Brazil, 174,335 in India, 127,191 in UK, 115,937 in Italy, 104,795 in Russia, 100,073 in France, and 35,031 in Turkey. The critical cases remain higher in the USA (i.e. 9759), followed by India (i.e. 8944), Brazil (i.e. 8318), France (i.e. 5924), Italy (i.e. 3417), Turkey (i.e. 3080), Russia (i.e. 2300), and UK (i.e. 351). The

CFR is higher in Italy, i.e. 3.030%; followed by UK, i.e. 2.903%; Brazil, i.e. 2.660%; Russia, i.e. 2.237%; France, i.e. 1.929%; USA, i.e. 1.797%; India, i.e. 1.220%; and Turkey, i.e. 0.857%. The CRR is highest in the UK, followed by Russia, Brazil, India, Turkey, Italy, France, and the USA. The CCR is higher in France while lower in the UK (Kaggle 2021). Figure 2 shows the statistics of the world's top eight countries affected by the COVID-19 pandemic and presented it here for ready reference.

The impact of COVID-19 pandemic on corporate social responsibility: a semantic review

Corporate social responsibility (CSR) is the business model that discussed different components of the corporation's working style to get accountable to its stakeholders and customers (Kong et al. 2020). During the COVID-19 pandemic, the business model certainly shifted to contingent models to take care of their employees, customers, and stakeholders through adopting preventive healthcare measures (He and Harris 2020; Anser et al. 2020a, 2020b). The study used the "Collabovid" search engine to assess the publication details related to COVID-19 impact on CSR worldwide. Figure 3 shows the date-wise summary of publications associated with

Figure 1 COVID-19 pandemic, CFR, CRR, and CCR estimates. Source: ECDC (2021), Worldometer (16 April 2021), and Author's estimates

Figure 2 The COVID-19 extreme facts in the top eight countries of the world. Source: ECDC (2021), Kaggle (2021), Worldometer (16th April 2021), and Author's estimates

the topic across time. It shows that from 9 February 2020 to 21 March 2021, around 812 papers were published jointly related to CSR policies during the COVID-19 pandemic. It is evident that since 19 April 2020, the publications begin to rise and keep the momentum till the given dates. The 23 August 2020 shows the highest peak where the maximum number of papers was published.

Figure 4 shows that 2352 authors published 812 papers on the stated topic. The four primary dataset sources published their documents in the given databases, including PubMed, arXiv, Elsevier, and medRxiv. PubMed has a more significant share of 76%; followed by Elsevier, i.e. 20%; arXiv, i.e. 4% share; and medRxiv, which has a 0.004% share in the given publications.

Figure 5 shows that about 775 published papers are mostly related to the “prevention” from the COVID-19 pandemic, whereas 36 studies fall in the “general” category. In addition, three studies focused on “transmission channel” while one study related to “diagnosis” through which COVID-19 affects the corporate business.

Preventive measures adopted by corporate for attaining social responsibility

The corporate sector should adopt precautionary measures to reduce humans’ sufferings and death tolls that are important in a given time. The following CSR is deemed desirable during the COVID-19 pandemic:

Figure 3 Total publication by dates. Source: Authors extracted from “Collabovid” search engine

Figure 4 Total publications overview. Source: Authors extracted from “Collabovid” search engine

- i) To take care of their employees by providing a safe environment.
- ii) To display all-important preventive and safety measures on the wall of the offices and strictly followed them.
- iii) To hire the services of consultation of the physicians to treat any emergency.
- iv) To assign work at home during a strict lockdown.
- v) Encourage employees to work through incentive-based targeted assignments.
- vi) To give confidence and motivation to their employees through brainstorming and psychological sessions.
- vii) To adopt ease in the boss's strict behaviour and shifted into a friendly demeanour.
- viii) To minimize fear of job loss and give autonomy of their work to complete it in a stipulated time.
- ix) To deliver the end product to their customers on time.
- x) The corporate should be socially accountable and take care of its customers' rights.
- xi) To respond to customers' complaints and inform the minor delay in the services because of the COVID-19 pandemic
- xii) To provide a clean zone for their employees and their customers to stay at more extended hours.
- xiii) To obey all the safety measures abide by the Government's rules and regulations.
- xiv) To keep contact with the logistics supply firms to provide the essential raw material for their product manufacturing
- xv) To fight against the pandemic with unified global policies.

Figure 5 Publication categories. Source: Authors extracted from “Collabovid” search engine

The few studies provoked the need to make effective CSR policies to prevent it from the COVID-19 pandemic and shift their businesses towards more legitimate and reliable CSR, which can deal with social and environmental challenges globally (Donthu and Gustafsson 2020; Aguinis et al. 2020; García-Sánchez & García-Sánchez 2020).

Corporate economic responsibility (CER) during COVID-19 pandemic

The following CER is mainly required during the COVID-19 pandemic:

- i) Maintaining safety standards at their workplace.
- ii) To pay government taxes and enjoy subsidies.
- iii) To relieve their staff workers in check-in and check-out timings while finishing the work.
- iv) To keep striving to explore some new avenues of businesses to expand industry size.
- v) Jobs offered to the new staff based on expanding demand.
- vi) To keep retaining their team if the market is going down for weeks or months.
- vii) To participate in the Government's charity programs for helping needy people.
- viii) To form a group of companies and jointly adopt the innovative working style to retain their customers in the COVID-19 pandemic age.
- ix) To use upgraded technology to reduce product cost.
- x) To support economic policies and implement them accordingly.
- i) During the COVID-19 pandemic, there is a high need to take more decent production practices to reduce energy demand and achieving energy efficiency. However, it is necessary for regular days as well.
- ii) To keep cleaning the streets, offices, and corporate working environment to reduce coronavirus prevalence chances.
- iii) Substituting fossil fuel combustion with renewable fuels while providing logistics transport services.
- iv) To use state-of-the-art machinery and building infrastructure to get ISO environmental certifications.
- v) Keep maintaining the distance among the workers/coworkers and producing environmentally friendly products.
- vi) In case of frequent electricity shortages, the need to liaise with the regulatory bodies to provide a free flow of energy supply.
- vii) Using greening technologies in all production systems.
- viii) Pollution-free goods make community members healthy and wealthy who can get resistant to any infectious diseases. Thus, more emphasis gives to using low-carbon technologies in production.

The earlier studies argued that CER policies should reduce the economic and financial crisis. It would be possible only when effective CER policies have developed during the crisis period. The pandemic-induced drop in stock prices is milder in those firms that have maintained the global supply chain. Thus, the need to ensure Federal interventions in the corporate bond markets may be calming down the current pandemic (Ding et al. 2020; Falato et al. 2020; Albuquerque et al. 2020a; Verma and Gustafsson 2020).

Corporate environmental responsibility (CENVR) during COVID-19 pandemic

The following CENVR is desirable for adopting clean and green corporate practices:

- i) Strict nationwide lockdown to all essentials and non-essentials businesses leads many small businesses to

The previous studies largely confined their findings to favour environmental sustainability during the COVID-19 pandemic through CENVR policies. For instance, Albuquerque et al. (2020b) found that firms with a high stock of social and environmental ratings are comparatively more successful than their counterparts. These firms maintain higher stock returns, less volatility in stock trading and prices, and more top stock trading in volume during the crisis period. Crick and Crick (2020) emphasized the need for collaborative business-to-business marketing strategies to help maintain payoffs during the current pandemic. Berman and Ebisu (2020) argued that the COVID-19 pandemic mainly affected carbon emissions stock because of an unexceptional variation in human behaviour during the crisis. Finally, Garel and Petit-Romec (2020) conclude that those firms that complied with environmental standards perform well in gaining stock trading compared to the non-compliance firms during the COVID-19 pandemic.

Corporate face logistics challenges during COVID-19 pandemic

The following multifaceted challenges faced by the corporate during the COVID-19 pandemic are as follows:

shut down, putting pressure on the other companies to fill the demand-supply gap in a country (Sibley et al. 2020).

- ii) Full and partial restrictions imposed on travel and transport services obstruct the supply chain process, leading to disrupting the supply of many critical raw materials for production. Hence, it leads to severe shortages of valuable items across countries (Beck and Hensher 2020; Gostin and Wiley 2020).
- iii) Disrupted working environment, frequent electricity shortages, low internet connectivity, naive online working office tolls, troubling communication ways, and many other issues lead to increased corporate failures (Willcocks 2020).
- iv) The corporate facing meagre government support, confusing economic policies, tax and re-tax policies, political disputes, and many more other factors that lead to deteriorating the value of the firm (Wolff and Tepperman 2020).
- v) Country's geopolitical condition, financial shocks, oil price shocks, and other internal and external issues decrease the firm's value of the profit (Zhang et al. 2020; Sharif et al. 2020).

These factors need to ensure the government officials' attention to re-correct their socioeconomic, environmental, and healthcare policies to reduce coronavirus cases and provide a progressing environment where the businesses can flourish and get at least a reasonable profit.

Cross-sectional regression estimates

An ample amount of literature is available on carbon damages and socioeconomic and environmental sustainability (see, Adedoyin et al. 2021; Rehman et al. 2021; Usman et al. 2021; Chandio et al. 2021; Ozturk et al. 2021; Anser et al. 2021a). At the same time, little is known about the effect of COVID-19 cases on environmental damages, healthcare sustainability, supply chain process, and CSR activities. Based on the substantial discussion of the stated topic, the study moves forward to empirically assess the impact of the COVID-19 pandemic on healthcare expenditures, logistics performance, carbon damages, and corporate social responsibility in a large cross-sectional panel of 77 countries (see, Table 2 in the Appendix). The data of COVID-19 cases and COVID-19 testing services are taken from the Worldometer (2021) database. In contrast, the data of carbon damages (denoted by CDAM) in US\$, healthcare expenditures (denoted by HEXP) in US\$, overall logistics performance index, 1=low to 5=high (denoted by LPI), the business extent of disclosure index (0=less disclosure to 10=more disclosure) (consider as a proxy for corporate social responsibility, denoted by CSR), GDP per capita (denoted by GDPPC) in constant 2010 US\$, and trade openness (denoted by TOP) in % of GDP are taken from the latest available data set of the respective variables from World Bank (2021) database. The cross-sectional data of COVID-19 cases and testing

Table 1 Cross-sectional regression estimates

Variables	Dependent variables: ln(CDAM)	Dependent variables: ln(HEXP)	Dependent variables: ln(LPI)	Dependent variables: ln(CSR)
CASES	0.181 (0.323)	0.201* (0.007)	0.009 (0.599)	-0.175*** (0.054)
TESTS	0.615* (0.000)	-0.183* (0.004)	0.029** (0.049)	0.240* (0.002)
GDPPC	0.094 (0.458)	1.175* (0.000)	0.098* (0.000)	-0.050 (0.425)
TOP	-0.674** (0.014)	-0.071 (0.507)	0.017 (0.487)	-0.022 (0.863)
Constant	11.777* (0.000)	-3.847* (0.000)	-0.464* (0.008)	0.939 (0.299)
Statistical tests				
R ²	0.674	0.916	0.719	0.149
Adjusted R ²	0.656	0.911	0.704	0.102
F-statistics	37.362*	194.161*	46.192*	3.176**
Probability (F-statistics)	0.000	0.000	0.000	0.018

Note: CDAM carbon damages, CASES COVID-19 cases, TESTS total COVID-19 tests, GDPPC GDP per capita, TOP trade openness, HEXP health expenditures per capita, LPI logistics performance index, and CSR corporate social responsibility. *, **, and *** shows 1%, 5%, and 10% level of significance, respectively. The small bracket shows probability values

capacity for regression analysis is extracted from the respective database on 17 April 2021 for the 77 countries. The study followed the recent scholarly work of Onofrei et al. (2021), Kumar and Kumar Singh (2021), Bherwani et al. (2021), and Qiu et al. (2021) on the stated theme that extended it by using socioeconomic and environmental factors to give more insights on the relationship between the variables. The following simultaneous equations used for the analysis are as follows:

$$CDAM = \alpha_0 + \alpha_1 CASES + \alpha_2 TESTS + \alpha_3 GDPPC + \alpha_4 TOP + \varepsilon \quad (1)$$

$$HEXP = \beta_0 + \beta_1 CASES + \beta_2 TESTS + \beta_3 GDPPC + \beta_4 TOP + \varepsilon \quad (2)$$

$$LPI = \gamma_0 + \gamma_1 CASES + \gamma_2 TESTS + \gamma_3 GDPPC + \gamma_4 TOP + \varepsilon \quad (3)$$

$$CSR = \lambda_0 + \lambda_1 CASES + \lambda_2 TESTS + \lambda_3 GDPPC + \lambda_4 TOP + \varepsilon \quad (4)$$

where CDM shows carbon damages, CASES shows COVID-19 cases, TESTS shows total COVID-19 tests, GDPPC shows GDP per capita, TOP shows trade openness, HEXP shows health expenditures per capita, LPI shows logistics performance index, CSR shows corporate social responsibility, and ε shows error term.

Equation (1) shows that COVID-19 cases are likely to increase carbon damages, healthcare sufferings, logistics issues, and corporate social responsibility, while testing capacity is likely to improve environmental quality, healthcare infrastructure, logistics performance, and CSR. The controlling variables, i.e. GDP per capita and trade openness, are likely to decrease carbon damages, improve healthcare infrastructure, increase logistics activities, and enhance CSR activities across countries.

Table 3 and Table 4 in the Appendix show the descriptive statistics and correlation matrix, respectively. Table 1 shows the Markov switching regression estimates for ready reference.

The results show that COVID-19 cases increase healthcare expenditures and decrease corporate social responsibility-based activities with elasticity estimates of 0.201, $p < 0.000$ and -0.175 , $p < 0.054$. The result

implies that an increase in COVID-19 cases brings a massive change in the national healthcare bills that disturb economic activities globally (Nicola et al. 2020). On the other hand, corporate responsibilities towards social welfare substantially decrease due to uncertain economic shocks worldwide. This situation pulls many socioeconomic and environmental issues that need to be resolved by international cooperation and assistance to devise sustainable healthcare policies across countries (Kokudo and Sugiyama 2020; Buss and Tobar 2020; Chapman and Tsuji 2020). The increase in coronavirus testing capacity supports healthcare infrastructure, increasing logistics activities and corporate social responsibility on the cost of carbon damages. The elasticity estimates show that a 1% increase in the coronavirus testing capacity brings to increase logistics activities and CSR activities by 0.029%, $p < 0.049$, and 0.240%, $p < 0.002$, respectively, while it decreases healthcare expenditures by -0.183% , $p < 0.004$. The cost of carbon emissions increases due to resuming corporate activities after minimizing the critical COVID-19 cases globally (Sovacool et al. 2020; Shan et al. 2021). Sustainable healthcare may promote healthcare logistics activities and corporate social responsibility, and reduce carbon damages, which are likely to move towards economic progression after reducing the pandemic recessionary phase (Amankwah-Amoah 2020; Ibn-Mohammed et al. 2020; Sarkis 2020). The countries' per capita income positively impacts healthcare infrastructure and logistics activities that help move towards sustainable development. Finally, trade openness positively impacts environmental quality by decreasing carbon damages through importing cleaner production technologies. The results conclude that COVID-19 cases can be minimized through joint international collaboration (Al-Shamsi et al. 2020), assistance (Stawicki et al. 2020), knowledge transfer (Lake 2020), technology transfer (Morawska et al. 2020), increasing healthcare expenditures (Verelst et al. 2020), and testing capacity (Anser et al. 2021b), which moves the economy towards the United Nations-shared prosperity agenda.

The following issues need to be addressed at the corporate level before proposing specific healthcare policies, i.e. the mystifying economic policies, energy crisis, financial issues, oil price shocks, inadequate healthcare infrastructure, and political instability, making this situation worse during the pandemic recession that negatively affects the normal business cycle (Waitzkin 2020; Chofreh et al. 2020; Salisu et al. 2021; Passos et al. 2021). The disrupted supply chain process due

to strict/partial nationwide lockdown to essential and non-essential businesses increases product shortages, leads to an increase in the general price level, which affects the socioeconomic living of the residents across countries (El Baz and Ruel 2021). The lack of technology awareness, electricity crisis, untrained healthcare workers and paramedical staff, shortage of medical equipment, inadequate healthcare infrastructure disrupted the healthcare supply chain process, and an unhealthy working environment open many questions to the policymakers to face these challenges with shared strategic wisdom (Pilabré et al. 2021; Chen et al. 2021). The corporate social, economic, and environmental responsibilities depend on the country's economic policies that need to be well defined and backed up by financial incentives. Hence, the policy mix, including corporate business, healthcare infrastructure, and economic reforms, is pivotal in moving forward in the crisis period (Qiu et al. 2021). The cyclical boom and busts are mainly evident in the corporate sector due to the disruption of the supply chain process. Simultaneously, confusing economic policies and global financial shocks also pressure corporate businesses to maintain their business products regularly (Navickas et al. 2021; Asante Antwi et al. 2021). The study suggested corporate social, economic, and environmental responsibilities during the COVID-19 pandemic. It emphasized the business sector to play their roles efficiently; hence, economies may defeat coronavirus pandemic through shared, collaborative, and action-oriented strategic wisdom.

Conclusions

The study aims to evaluate the impact of COVID-19 cases on healthcare expenditures controlling logistics performance index, corporate social responsibility, affluence, carbon damages, and trade in a large cross-section panel of 77 countries. The study openly discussed the impact of the COVID-19 pandemic on corporate social, economic, and environmental responsibilities and presented some crucial challenges faced by businesses that obstruct the firm's value of profit. The results show that coronavirus cases escalate healthcare expenditures and decrease CSR activities. At the same time, an increasing coronavirus testing capacity increases logistics and CSR activities on the cost of carbon damages. Furthermore,

economic per capita income increases healthcare logistics activities and increases healthcare expenditures, while trade openness improves environmental quality through international cooperation and assistance. Thus, there is an urgent need to devise sustainable healthcare policies through international cooperation and assistance to improve logistics and CSR activities and improve environmental quality across countries.

The global economies should move forward to devise healthy economic and healthcare policies, not limited to the following economic points agenda, i.e.

- i) International collaboration and assistance in providing protective healthcare equipment are highly needed to contain coronavirus cases. The global healthcare supply chain should not be disrupted during the pandemic recession. The international agencies and World Health Organization ensure the need to speed up the process of recovery. The strict standardized operating procedures should be universally implemented and confirmed the easy accessibility of COVID-19 vaccination on an equal basis.
- ii) Technology and knowledge transfer are highly needed to contain coronavirus cases through intelligent strategies. The digitalized information sharing centre and latest technologies would likely help identify the susceptibility cases of coronavirus cases.
- iii) Improvement in sustainable healthcare logistics activities is vital to reach their country's destination points quickly. In addition, the need to improve the green supply chain process and shipment of healthcare equipment is essential for reducing coronavirus cases.
- iv) The contagious disease can be minimized by improving air quality indicators. The cost of carbon pollution negatively affects the green environmental agenda, while its likely to be the carrier of coronavirus diseases worldwide.
- v) Corporate socioeconomic and environmental responsibility is highly needed in the COVID-19 pandemic to take care of their employees and business clients to be involved in safe and healthy transactions.

These underlying facts may help to propose healthy and sustainable policies to move forward towards shared prosperity.

Appendix

Table 2 Sample of countries

USA
India
Brazil
France
Russia
UK
Turkey
Italy
Spain
Germany
Poland
Argentina
Colombia
Mexico
Iran
Ukraine
Peru
Czechia
Indonesia
South Africa
Chile
Canada
Romania
Iraq
Belgium
Philippines
Sweden
Portugal
Pakistan
Hungary
Bangladesh
Jordan
Serbia
Austria
Japan
Lebanon
Morocco
UAE
Saudi Arabia
Bulgaria
Slovakia
Malaysia
Panama
Ecuador
Belarus
Greece
Croatia

Table 2 (continued)

Georgia
Bolivia
Kazakhstan
Nepal
Tunisia
Dominican Republic
Kuwait
Paraguay
Moldova
Lithuania
Slovenia
Costa Rica
Egypt
Guatemala
Armenia
Honduras
Qatar
Bosnia and Herzegovina
Oman
Libya
Nigeria
Bahrain
Uruguay
Kenya
North Macedonia
Albania
Algeria
Estonia
Latvia
Sri Lanka

Table 3 Descriptive statistics

Methods	CASES	TESTS	CDAM	CSR	GDPPC	HEXP	LPI	TOP
Mean	1754875	22245276	9.72E+09	6.518421	16262.30	1335.778	3.053684	83.60768
Maximum	32305912	4.27E+08	1.74E+11	10	63932.66	10623.85	4.200000	190.5436
Minimum	96186	230861.0	1.69E+08	1	817.7800	41.90906	2.180000	27.53559
Std. dev.	4310063	60233499	2.37E+10	2.393141	16202.93	1820.188	0.497066	39.04414
Skewness	5.418983	5.097728	5.217457	−0.454276	1.334896	2.627873	0.665066	0.704511
Kurtosis	36.00546	31.32763	33.60295	2.267091	3.690293	11.25283	2.484584	2.742885

Note: *CDAM* carbon damages, *CASES* COVID-19 cases, *TESTS* total COVID-19 tests, *GDPPC* GDP per capita, *TOP* trade openness, *HEXP* health expenditures per capita, *LPI* logistics performance index, and *CSR* corporate social responsibility

Table 4 Correlation matrix

Correlation probability	CASES	TESTS	CDAM	CSR	GDPPC	HEXP	LPI	TOP
CASES	1							

TESTS	0.913212	1						
	0.0000	-----						
CDAM	0.896353	0.933297	1					
	0.0000	0.0000	-----					
CSR	0.095275	0.149122	0.131374	1				
	0.4130	0.1986	0.2580	-----				
GDPPC	0.256217	0.322717	0.269144	0.034287	1			
	0.0255	0.0045	0.0187	0.7687	-----			
HEXP	0.531411	0.569069	0.519497	0.065000	0.865386	1		
	0.0000	0.0000	0.0000	0.5769	0.0000	-----		
LPI	0.283244	0.342960	0.280183	0.163433	0.852235	0.779305	1	
	0.0132	0.0024	0.0142	0.1583	0.0000	0.0000	-----	
TOP	−0.303575	−0.251253	−0.307689	−0.077031	0.190362	0.026304	0.196924	1
	0.0077	0.0286	0.0069	0.5084	0.0995	0.8215	0.0882	-----

Note: *CDAM* carbon damages, *CASES* COVID-19 cases, *TESTS* total COVID-19 tests, *GDPPC* GDP per capita, *TOP* trade openness, *HEXP* health expenditures per capita, *LPI* logistics performance index, and *CSR* corporate social responsibility

Availability of data and materials The data is freely available at Worldometer (2021) at: <https://www.worldometers.info/coronavirus/> and World Development Indicators published by World Bank (2021) at <https://databank.worldbank.org/source/world-development-indicators>.

Author contribution MKA: conceptualization, methodology, writing—reviewing and editing. SUY: conceptualization, methodology, formal analysis. SH: methodology, formal analysis. AAN: supervision, methodology, resources, software. KZ: software, formal analysis, resources. MMQA: resources, visualization, formal analysis.

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Declarations

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