SDGs and economic resilience: Evidence from the COVID-19 shock

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Abstract

Since the adoption of the 2030 Agenda for Sustainable Development by all United Nations member states in 2015, nations have been striving to achieve sustainable development goals (SDGs) with varying degrees of progress. Sustainable development is likely to provide economic resilience by smoothing out the volatility of adverse shocks. Utilizing COVID-19 distress as an exogenous shock, we examine whether countries' progress toward SDGs during the pre-COVID-19 period provided economic stability during the subsequent COVID-19 shock. However, we do not find such evidence using daily data of stock market volatility and confirmed COVID-19 cases over the first two years of the pandemic from 72 countries. On the contrary, our model demonstrates that cultural, openness and economic factors provided resilience during the shock. Our results challenge the progress made toward SDGs and provide important policy and academic implications.

Keywords*:* Stock market; Sustainable development goals; COVID-19; Systemic risk; Financial stability

1. Introduction

We examine whether countries' progress toward SDGs during the pre-COVID-19 period provided economic stability during the COVID-19 shock. Specifically, we seek to ascertain whether countries prioritizing sustainable development demonstrate greater resilience in their financial markets when confronted with external shocks.

The idea of sustainable development has been at the forefront of policy debates since the adoption of the 2030 Agenda for Sustainable Development by all United Nations member states in 2015. The 17 Sustainable Development Goals (SDGs), comprising 169 targets, which build on the earlier Millennium Development Goals (MDGs) for 2000-2015, are designed to monitor and support transformation towards sustainable development. While the MDGs achieved success in tackling hunger and poverty, especially in the global south, the SDGs have a broader focus. The SDGs prioritize the protection of planet Earth for future generations in the same way as protecting the world from hunger and poverty (Sachs 2012). As such, the SDGs stress ending poverty, reducing economic and gender inequalities, improving access to healthcare and education facilities, and spurring economic growth while at the same time tackling climate change and working to preserve oceans and forests (https://sdgs.un.org/goals). In essence, the SDGs represent a comprehensive approach encompassing economic, social, and environmental development objectives.

However, achieving the SDGs by 2030 is not without challenges. There are concerns regarding the pace of progress and the design and theoretical underpinnings of the SDGs framework. The 2019 Global Sustainable Development Report, the first of its kind prepared by independent scientists appointed by the UN Secretary-General, highlighted that progress towards achieving the SDGs was not only lagging behind schedule in 2019 but also unevenly distributed across different countries (Messerli *et al.* 2019). The 2023 edition of the report reiterates the lack of progress and underscores the necessity for more ambitious, science-based transformations and active political leadership. Additionally, it emphasizes the significance of sustainable development practices during the COVID-19 pandemic (Miranda *et al.* 2023). Regarding design and framework, though the SDGs are a more integrated system than the MDGs, they may not adequately capture the complex interconnections between different goals across social, economic, and environmental dimensions that hinder efforts toward policy integration

across sectors (Le Blanc 2015). Further, the targets and indicators used for SDGs continue to prioritize economic growth over ecological sustainability and fail to reduce the consumption of resources (Eisenmenger et al., 2020). Given this tension, it is important to examine the effects of sustainable development measured with SDGs on economic and financial outcomes, especially during adverse economic shocks.

The outbreak of the COVID-19 pandemic and accompanying social distancing policies had a robust adverse bearing on economies around the world (Ashraf, 2020c; Ashraf and Goodell, 2022a; Goodell, 2020; Altig et al., 2020; Brodeur et al., 2021). The world's real GDP shrunk by 3.3% in 2020, a decrease akin to the Great Depression of the 1930s (IMF, 2021). Despite the global nature of the COVID-19 shock, the drop in economic output across countries was quite heterogeneous. For instance, the real GDP of the United States dropped by 3.5% for the year 2020, Canada by 5.4%, the United Kingdom by 9.9%, Germany by 4.9%, France by 8.2%, Spain by 11%, Japan by 4.8%, India by 8%, Russia by 3.1%, Brazil by 4.1%, Mexico by 8.2%, Nigeria by 1.8% and South Africa by 7%. This raises the question of what country-specific factors have led to such divergent economic performance.

Extant literature identifies cross-country differences in national cultures (Fernandez-Perez et al., 2021; Ashraf, 2021), societal trust level (Ashraf and Goodell, 2022a; Engelhardt et al., 2021), and economic freedom (Erdem, 2020) as potential explanations. Extending this literature, we hypothesize that countries' progress toward SDGs during the pre-COVID-19 period is another potential factor. In this regard, we test whether the stock markets in countries with higher progress toward SDGs reacted less negatively to the COVID-19 outbreak.

Our investigation is motivated by three strands of recent research. First are studies that find that stock market volatility increased in response to an increase in COVID-19 confirmed cases and announcements of government social distancing policies (Al-Awadhi et al., 2020; Ashraf, 2020c; Zhang et al., 2020; Ashraf, 2020a). Second are studies that point out that cross-country stock markets' adverse reaction to the pandemic varied based on the risk of underlying assets (Albuquerque et al., 2020; Ramelli and Wagner, 2020; Ding et al., 2021) as well as due to countries' institutional and economic environments, such as freedom, culture, and societal trust (Erdem, 2020; Ashraf, 2021; Ashraf and Goodell, 2022a; Engelhardt et al., 2021). Third are studies that highlight the role of finance for

sustainability and sustainable development (Liljeblom *et al.* 2024; Schoenmaker & Schramade 2024) emphasizing that unsustainable practices increase the financial risks (Hudson 2024).

Higher progress towards SDGs can enhance economic resilience, particularly during adverse shocks, leading to reduced stock market volatility. By promoting economic diversification, reducing inequalities, ensuring equitable access to essential services, and addressing environmental challenges, SDGs can create a more robust and resilient economic and financial system. This resilience can help mitigate the negative impacts of economic shocks, such as those experienced during the COVID-19 pandemic.

We employ a cross-country dataset of daily stock market returns volatility and daily new COVID-19 confirmed cases from January 01, 2020, to December 31, 2021. Measuring countries' progress toward SDGs with country scores of SDG index from Sachs et al. (2019), we do *not* find supportive evidence that the increase in stock market volatility in response to the COVID-19 confirmed cases and social distancing policies was milder in countries with higher progress toward SDGs.

This study makes threefold contributions to the extant literature. First, it is related to the studies showing that stock markets responded adversely to COVID-19 outbreaks with heightened volatility and lower returns (Al-Awadhi et al., 2020; Alfaro et al., 2020; Ashraf, 2020c; Baker et al., 2020; Bavel et al., 2020; Phan and Narayan, 2020; Ramelli and Wagner, 2020; Zhang et al., 2020; Corbet et al., 2020; Sharif et al., 2020). Most previous studies on the impact of COVID-19 on stock market volatility focused on the early days of the pandemic, primarily in the first two quarters of 2020. While the initial shock was global, local COVID-19 outbreaks continued to occur throughout 2020 and 2021, with varying timing across countries due to weather conditions and government policies. By analyzing data from this extended period, we demonstrate that stock market volatility remained elevated during COVID-19 outbreaks.

Second, we add to the literature that explores country-level factors that provided immunity to stock markets during the pandemic. Adverse stock market response to COVID-19 outbreaks was milder in countries with stringent government social distancing measures (Ashraf, 2020a), strong government fiscal capacity (Augustin et al., 2022), higher levels of economic freedom (Erdem, 2020), low uncertainty avoidance (Fernandez-Perez et al., 2021; Ashraf, 2021; Shear et al., 2020), low

unemployment levels (Zaremba et al., 2021), higher societal general trust level (Engelhardt et al., 2021) and tight cultures (Ashraf and Goodell, 2022b). Here we explore whether the adverse stock market response was milder in countries with higher progress toward SDGs.

Third, we add to studies that examine the role of sustainable practices in providing economic resilience. This literature reports mixed evidence. For instance, one group of studies reports that firms with higher levels of ESG activities performed better during the COVID-19 as compared to their counterparts with lower levels of ESG activities (Albuquerque et al., 2020; Broadstock et al., 2021; Ding et al., 2021; Garel and Petit-Romec, 2021; Fernandez-Mendez and Pathan, 2022). However, others find engagement with ESG activities made no difference in terms of firm performance during the shock (Bae et al., 2021; Demers et al., 2021; Demir and Danisman, 2021; Takahashi and Yamada, 2021; Abedifar et al., 2022). This literature is largely firm-level (corporate firms or banks), employs samples from different geographical regions (e.g., USA, Japan, developed countries, or international samples), and uses firm-level ESG scores data from Thomson Reuters ASSET4 ESG, Refinitiv, and/or MSCI databases. The findings of this literature imply that the effect of ESG scores is not consistent on firm performance. Moreover, the results of the latter group of studies also suggest that although ESG scores didn't provide resilience, other firm-level characteristics such as large size, liquid assets holdings, lower leverage, less exposure to international supply chains, and internally generated intangible assets did provide resilience during the COVID-19 shock. Departing from this literature, our analysis is at the country level, where we measure the volatility of the stock market and the progress toward SDGs at the country level. We analyze whether cross-country differences in stock market volatility during the COVID-19 shock depended on countries' progress toward SDGs during the pre-COVID-19 period.

The rest of the paper proceeds: Section 2 introduces the sample. Section 3 presents the testable hypothesis. Section 4 outlines empirical methodology. Section 5 reports empirical results. The final section concludes the study.

2. Theoretical framework and the hypothesis

Sustainability is the interplay between three crucial elements: environment, economy, and equity. Sustainable development entails conducting economic activities in a manner that safeguards the

environment and resources while promoting individual and community well-being. As such, sustainable development differs from economic growth, which occurs when individuals utilize resources and reorganize them to increase their value.

The UN 17 SDGs provide a comprehensive framework to trace and support sustainable development. The SDGs stress enhancing diversity, reducing inequalities, increasing inclusiveness, using balanced resources, creating sustainable infrastructure, and a better institutional environment.

2.1 Sustainable development and economic shocks

Higher progress towards SDGs, equivalent to achieving more sustainable economic development, may make an economy more resilient, especially to adverse shocks. For instance, SDGs encourage countries to diversify their economies by promoting sectors such as renewable energy, sustainable agriculture, and innovation-driven industries. Such diversification enhances the resilience of an economic system (Levin et al., 1998). A diverse economic system can serve human well-being across multiple social and environmental dimensions (Common and Perrings, 1992; Perrings, 2006).

SDGs embed lower inequalities and ensure equitable access to economic opportunities, resources, and social services, facilitating societies to be more inclusive and cohesive. Higher-income and gender inequalities make economies unsustainable and vulnerable to crises. High-income inequality, while it results in higher wealth for some, increases the leverage for a large population of middle- and lower-income households (Kumhof et al., 2015; Bazillier and Hericourt, 2017). Likewise, excluding women from financial and economic decision-making deprives societies of diverse approaches that may result in stable economies, as women refrain from taking excessive risks and emphasize public service provision (Walby, 2009).

Access to essential services such as education, health, financing, and housing increases the resilience of economic systems. Socioeconomic factors, such as populations' general education levels, wealth, the quality of the healthcare system, employment status, and living conditions, are an effective defence against externally caused social and economic stresses.

Sustainable development also warrants that the value of the asset base available to a particular population does not decline over time. Climate change led by the excessive depletion of natural resources, including polluting environment. and water reserves, is resulting in more extreme weather

conditions such as droughts, hurricanes, fewer rainfalls, heat waves, and rising sea levels (Davis et al., 2010; Montzka et al., 2011). A resilience perspective requires that the quantity and composition of the asset base are critical. Protecting ecosystems, reducing greenhouse gas emissions, and adopting sustainable practices help mitigate environmental risks and reduce vulnerability to natural disasters and climate-related events.

Building resilient infrastructure promotes economic productivity, facilitates trade, attracts investments, and enhances a country's ability to respond to and recover from natural disasters, climate change impacts, and other disruptions. Likewise, strengthening governance practices, reducing corruption, and ensuring accountability fosters an enabling environment for economic activities.

2.2 Sustainable development and COVID-19 outcomes

Recent literature has linked different aspects of sustainable development, including diversity, socioeconomic conditions, institutional environment, and efficient infrastructure, to COVID-19 outcomes. For instance, Garikipati and Kambhampati (2020) show that countries with female heads of state fared better in responding to COVID-19. Ashraf (2020b) explores that COVID-19 confirmed cases and deaths are lower in countries with better socioeconomic conditions, including lower unemployment and poverty levels and higher consumer confidence. International trade suffered less during COVID-19 in countries with social and economic globalization and better logistics performance (Mena et al., 2022). COVID-19 deaths were comparatively lower in countries with more effective governments (Serikbayeva et al., 2021). Overall, the findings of these studies imply better COVID-19 outcomes in countries with higher levels of sustainable development.

2.3 Sustainable development, COVID-19 shock, and stock market volatility

The COVID-19 pandemic was a sudden shock with strong economic implications. Both the voluntary social distancing to avoid COVID-19 infections and government social distancing policies halted economic activity. Stock markets reacted negatively to the pandemic; stock market volatility increased in response to an increase in COVID-19 confirmed cases and announcements of government social distancing policies (Al-Awadhi et al., 2020; Ashraf, 2020c; Zhang et al., 2020; Ashraf, 2020a). We expect the stock market's response to COVID-19 to depend on country-level sustainable development practices.

Human capital, institutional, and ecological modernization theories provide the theoretical lenses for examining this potential link. Human capital theory acknowledges the importance of human capital in the form of knowledge, ideas, skills, information, and health (Becker, 2009). Investing in human capital development, including education, healthcare, and skills training, can enhance productivity, innovation, and economic growth, potentially positively influencing stock market valuations. Institutional theory offers valuable insights by emphasizing the significance of formal and informal rules, norms, and practices within a society (North, 1990). Countries with strong institutional frameworks, including effective regulatory frameworks and governance structures, can attract investments, foster innovation, and enhance overall economic and social well-being. Ecological modernization theory emphasizes integrating environmental considerations into economic activities (Spaargaren and Mol, 1992; Huber, 2000).

Countries actively pursuing sustainable development through eco-friendly policies, clean technologies, and low-carbon transitions are more likely to experience stable stock market valuations. Investors recognize the long-term economic benefits of resource efficiency and ecosystem conservation. Countries with greater progress towards SDGs are likely to have lower exposure to reputational, political, and regulatory risks, creating a more stable economic environment with reduced cash flow uncertainty, particularly during downturns. Consequently, the financial performance of countries with higher levels of sustainable development tends to be superior to those with lower levels. This, in turn, can lead to lower stock market volatility in these countries.

Further, there has recently been an enhanced recognition that financial market participants increasingly integrate environmental, social, and governance (ESG) criteria into their investment decisions (Busch *et al.* 2016). For instance, Liu *et al.* (2023) show that higher investment in ESG activities lowers a country's financial risk, decreasing the stock market volatility. Bax *et al.* (2024) find that assets with better ESG denomination generate significant spillovers throughout the system, especially during shocks.

Based on the above discussion, we write our hypothesis in the following form:

H1: Stock markets' adverse responses to the COVID-19 outbreaks were milder in countries with higher progress toward achieving SDGs.

3. Sample construction

The country-level data of daily stock market returns over the two years of the COVID-19 pandemic (i.e., January 01, 2020, to December 31, 2021) was collected from the website *www.investing.com*. For this purpose, we choose each country's main stock market index. The data of national-level daily COVID-19 confirmed cases, the announcements of government social distancing measures, and vaccination coverage policies come from the Oxford COVID-19 Government Response Tracker (OxCGRT) database. Country rankings on the progress toward SDGs at the end of 2019 were obtained from Sachs et al., (2019).

To prepare the sample, we first merged daily stock returns data with daily COVID-19 data. Then, we link the country-level SDG Index scores for 2019 with the daily dataset of stock market returns and COVID-19 variables. We dropped missing values and winsorized daily stock market returns and COVID-19 confirmed cases variables at a 1% level in both tails to eliminate outliers.

Our final dataset is an unbalanced panel with 34201 daily observations from 72 countries from January 2020 to December 2021.

4. Methodology

Motivating by Ashraf (2021) and Ashraf and Goodell (2022b), we specify the following panel regression model for empirical analysis:

$$\begin{aligned} Y_{c,t} = \ & \alpha_c + \beta_1(COVID-19\ confirmed\ cases_{c,t} \times \text{SDG Index}_c) \\ & + \beta_2(COVID-19\ confirmed\ cases_{c,t}) + \beta_3(SDG\ Index_c) \\ & + \beta_4(Govt.social\ distancing\ policies_{c,t}) + \beta_5(\text{Vaccination index}_c) \\ & + \varepsilon_{c,t} \quad \_\_\_\_\_ Eq.(1) \end{aligned}$$

Country and day are represented here with c and *t* subscripts, respectively. α_c stands for the constant term. The interaction term, $COVID-19\ confirmed\ cases_{c,t} \times SDG\ Index_c$ is the primary variable of interest. COVID-19 confirmed cases represent COVID-19 outbreaks and SDG Index the countries' progress toward achieving the UN 2030 Sustainable Development Agenda. The significant coefficient on interaction term would imply that the impact of the pandemic on stock market volatility depends on countries' relative performance in achieving SDGs. Others are control variables. $\mathcal{E}_{c,t}$ is an

error term. We use pooled panel ordinary least squares regression models to estimate Eq. (1). As the SDG index doesn't vary over time with only one value per country, running a model with fixed effects is not appropriate. Heteroskedastic-robust standard errors are clustered at country-level to estimate *p*-values in regressions.

4.1 Stock market volatility

The dependent variable, Y, stands for stock market volatility, measured as the 7-day rolling window standard deviation of daily stock market returns. Daily stock market returns are calculated with the change in the primary stock market index of each country as ($Index\ value_t - Index\ value_{t-1}/ Index\ value_{t-1}$).

4.2 COVID-19 confirmed cases

Following Ashraf (2020c), who finds that stock markets mainly reacted to an increase in COVID-19 confirmed cases; we represent country-level COVID-19 outbreaks with daily new COVID-19 confirmed cases in a country. An increase in this variable indicates that a country was going through a COVID-19 outbreak. We expect a positive association between confirmed COVID-19 cases and stock market volatility.

4.3 SDG index

We measure countries' progress toward 17 UN SDGs with the country-level SDG index scores from the annual *Sustainable Development Report* (SDR), prepared jointly by the Bertelsmann Stiftung and the Sustainable Development Solutions Network (SDSN).

The construction of the SDG Index in the SDR involves several key steps. First, relevant indicators are selected for each of the 17 SDGs. Data for these indicators are then collected from various official data providers such as the World Bank, the World Health Organisation, the International Labour Organization, research centers, and non-governmental organizations. The indicators are normalized for comparability. Then weights are assigned to each indicator to reflect its relative importance. Normalized and weighted indicators are combined to represent an SDG on a scale from 0 to 100. The arithmetic mean of scores of 17 SDGs is calculated to obtain the country-level SDG index.

The SDG index represents where each country stands regarding achieving the United Nations 17 Sustainable Development Goals (Sachs et al., 2019). It shows the percentage of progress made in

achieving SDGs, with the highest value of 100 depicting that a country has achieved all SDGs. We take data from the SDR 2019 version to represent the countries' progress toward SDGs just before the outbreak of COVID-19. Denmark achieved the highest score of 85.2 by the end of 2019.

For this study, we take the country-level values of the SDG Index at the end of 2019 that would capture the effect of countries' pre-pandemic progress toward achieving SDGs.

4.4 Control variables

We add two control variables related to the pandemic: Government social distancing policies and vaccination index. Government social distancing policies are represented by daily changes in the Stringency Index (SI) from the OxCGRT database. SI measures the stringency of government social distancing policies, increasing with the announcements of lockdowns of schools, businesses, and social gatherings and a ban on local and international travel. SI ranges from 0 to 100, where it increases with the announcements while decreases with the easing of government lockdown restrictions. Building on the findings of recent studies such as Ashraf (2020a), Baker et al. (2020), and Zaremba et al. (2020), which explore that stock markets reacted negatively to the government announcements of lockdowns, we expect a positive association between government social distancing policies and stock market volatility.

The vaccination index is calculated by combining the vaccine availability, prioritization, and financial support sub-indexes. The vaccine availability sub-index measures whether a country was administering the COVID-19 vaccine. Its values get the highest if all individuals above the age of 16 qualified to be vaccinated. The vaccine prioritization sub-index captures whether a country's official priority group plan was published. The vaccine financial support sub-index indicates whether the vaccine was government- or self-supported. Vaccination provided immunity and reduced COVID-19 deaths. We expect stock markets will calm down with higher vaccination index values.

5. Empirical analyses

This section reports the results of empirical analysis, including the sample distribution, summary statistics, correlations, and multivariate regression estimations. We also report the results of

various robustness tests, including model validation by replicating the findings of previous studies, adding additional control variables, and alternative sample compositions.

5.1 Sample distribution

Table 1 reports country-wise sample distribution. The sample consists of 34,201 daily observations from 72 countries from January 01, 2020, to December 31, 2021. Daily mean confirmed COVID-19 cases are the highest in the US with 43,107 cases, followed by Brazil with 30,467 cases and India with 28,447 cases. Denmark has the highest score of 85.2 for the SDG Index, followed by Sweden with a value of 85, and so on. On the other end, Nigeria has the lowest value of 46.4.

(Insert Table 1 here)

5.2 Summary statistics and pairwise correlations

Summary statistics of the main variables are given in Table 2. The stock market volatility has a mean value of 1 with a standard deviation of 0.667 and minimum and maximum values of 0 and 4.492, respectively, suggesting stocks' volatility exhibits substantial variation. 4.508 mean value of daily COVID-19 confirmed cases shows that, on average, sample countries have daily 4508 confirmed cases. SDG Index has a mean value of 71.68 with a standard deviation of 7.9. Pairwise Pearson correlations in Table 3 are not high, suggesting lower chances of multicollinearity in multivariate analysis.

(Insert Table 2 here)

(Insert Table 3 here)

5.3 Main results

Table 4 reports the main empirical results. Model 1 is the baseline regression. Consistent with the expectation, COVID-19 confirmed cases variable is significantly positive, suggesting that stock market volatility increased as the COVID-19 outbreaks intensified. These results confirm the findings of previous studies, such as Ashraf (2020c), Al-Awadhi et al. (2020), and Zhang et al. (2020).

The results of pandemic-related control variables are also consistent with the expectation. Govt. social distancing measures variable enters positive, significant suggesting that the announcements of government social distancing measures increased stock market volatility. These findings are consistent

with Ashraf (2020a), Baker et al. (2020), and Zaremba et al. (2020) that the announcements of government social distancing policies have adverse effects on stock markets. The vaccine variable enters significantly negative, confirming that higher vaccine availability and coverage calmed down the stock markets. This result is consistent with Rouatbi et al. (2021), Chan et al. (2022), and Ashraf and Goodell (2022b) that vaccine development and vaccine administration to broader populations reduce stock market volatility. Together, these results of baseline regression validate our model for further analysis.

In Model 2, we add the interaction term between COVID-19 confirmed cases and the SDG Index to examine whether the adverse impact of the COVID-19 outbreaks varies depending on the countries' progress in achieving SDGs. The interaction term enters insignificant, implying that the stock market volatility in response to COVID-19 does not change with the values of the SDG index. This suggests countries' progress toward SDGs has not provided considerable immunity during the COVID-19 shock, a result not consistent with our hypothesis.

In Models 3 and 4, we add more control variables to eliminate the omitted variable bias. Motivated by previous literature (Erdem, 2020; Ashraf, 2021; Ashraf and Goodell, 2022a; Engelhardt et al., 2021; Fernandez-Perez et al., 2021), we include ΔGovt fiscal support, Market trading volume, GDP, Economic freedom, and Democratic accountability.

Model 3 includes ΔGovt fiscal support and Market trading volume, which are measured at a daily frequency over the period January 01, 2020, to December 31, 2021. ΔGovt fiscal support variable equals the daily change in the government economic support index, the data of which is obtained from the OxCGRT database (Hale et al., 2021). Market trading volume equals the natural log of the daily trading volume of each stock market. Data on daily trading volume is obtained from *www.investing.com*.

Model 4 also includes GDP, economic freedom, and democratic accountability, the variables measured with their values at the end of 2019. We take the natural log of nominal gross domestic product in US dollars for each country to measure the GDP variable. Data on nominal GDP is collected from the World Development Indicators. The economic freedom index is from the Heritage Foundation (Heritage_Foundation, 2020). Data on the democratic accountability index is from the International Country Risk Guide (ICRG) database.

The interaction term, COVID-19 confirmed cases × SDG index, remains insignificant after including these additional variables in Models 3 and 4. From this, we may imply that the results are not biased because of the control variables in the model. Another interesting observation in these results is that the SDG index captures some effect of a country's economic development, as it lost its significance when GDP is added in regression in Model 4.

(Insert Table 4 here)

5.4 Alternative measure of COVID-19

To assess the robustness of our findings, we replaced confirmed COVID-19 cases with daily COVID-19 deaths as an alternative proxy for COVID-19 outbreaks. Data on daily COVID-19 deaths were obtained from the OxCGRT database.

We re-estimated all specifications of Table 4 using this new variable. As shown in Table 5, we find that stock market volatility increased with a rise in daily COVID-19 deaths, a result consistent with previous research (Ashraf and Goodell, 2022b). The interaction term between COVID-19 confirmed deaths and the SDG index remains insignificant, suggesting that the impact of COVID-19 deaths on market volatility is not influenced by countries' progress toward the SDGs. These findings further validate our main results.

(Insert Table 5 here)

5.5 Progress toward SDGs and stock market response to government social distancing policies

Besides COVID-19 outbreaks, a parallel literature has explored that stock market volatility increased in response to the announcements of government social distancing policies such as lockdowns (Ashraf, 2020a; Baker et al., 2020; Zaremba et al., 2020). Lockdowns might have milder adverse economic effects in countries with higher scores on the SDG index as innovation, better institutional environments, and inclusiveness may have provided dividends to cater to the adverse effect of halting economic activity. As such, stock market investors might have considered the extent of countries' sustainability while responding to the announcements of lockdowns. To examine this, we interact the SDG index with the ΔStringency index. Like the results of $COVID-19\ confirmed\ cases_{c,t} \times$

SDG Index$_c$, this interaction term is insignificant as well, as shown in Table 6. These results again suggest that countries' progress toward SDGs didn't affect stock markets' reaction toward COVID-19-related social distancing policies.

(Insert Table 6 here)

5.6 Other robustness tests

As another robustness test, we dropped the data of the PFTS index of Ukraine from the sample and re-estimated all results. Many times, over our sample period, the values of the PFTS index don't change for several days, resulting in 0 values for the dependent variable, stock market volatility. Results remain similar after dropping the PFTS index from the sample. For brevity, we don't report these results.

5.7 Model validation

So far, our results suggest that countries' progress toward SDGs has not provided considerable resilience against the COVID-19 shock. One question here is whether our model is not mis-specified. To check our model's validity, we replicate previous studies' findings with our baseline model. As mentioned above, adverse stock market response to COVID-19 outbreaks was milder in countries with stringent government social distancing measures (Ashraf, 2020a), strong government fiscal capacity (Augustin et al., 2022), higher levels of economic freedom (Erdem, 2020), low uncertainty avoidance (Fernandez-Perez et al., 2021; Ashraf, 2021; Shear et al., 2020), low unemployment levels (Zaremba et al., 2021), and higher societal general trust level (Engelhardt et al., 2021). To replicate the findings of these studies, we interact COVID-19 cases with the stringency index, cultural variables including uncertainty avoidance and trust, total gross domestic product, unemployment level as a percentage of the total labour force, and economic freedom index.

The interaction term between COVID-19 confirmed cases and the stringency index enters negative and significant, demonstrating that government social distancing policies reduce the adverse effect of COVID-19 cases on stock market volatility, a result consistent with Ashraf (2020a). Interaction term with trust enters negative and significant suggesting that stock market adverse reaction was weaker in countries with cultures of high trust, the results confirming the findings of Engelhardt et al. (2021). On the contrary, the interaction term with uncertainty avoidance is positive and significant, confirming the findings of Ashraf (2021) and Fernandez-Perez et al. (2021) that stock markets responded more

negatively to COVID-19 outbreaks in countries with higher levels of cultural uncertainty aversion. The interaction term with unemployment enters positive and significant that stock market adverse reaction was stronger in countries with higher pre-pandemic unemployment levels confirming the findings of Zaremba et al. (2021). On the other hand, interaction terms with GDP and economic freedom enter negative and significant, ensuring that adverse stock reaction was milder in countries with solid fiscal capacity and higher economic freedom, validating the findings of Augustin et al. (2022) and Erdem (2020). Overall, the results of these replications indicate that our model is well-specified for examining the research question.

(Insert Table 7 here)

6. Conclusions

Since the adoption of SDGs by UN member states in 2015, much attention has been paid to achieving these goals but with varying degrees of progress across countries. Sustainable economic development is likely to smooth out the adverse effects of economic shocks. Based on this expectation, we explore whether countries' progress toward UN 17 SDGs provides economic resilience against the COVID-19 shock.

Using data from 72 countries, we find that stock market volatilities during the COVID-19 shock were not any different for countries with higher progress toward achieving SDGs. On the contrary, consistent with previous studies, we observe that government social distancing policies and cultural and economic factors have provided resilience during the COVID-19 shock.

Together our results suggest that countries' progress toward SDGs has not delivered economic resilience. One potential reason is that governments have not achieved enough progress, and the highest value of 85 reached for Denmark is relatively lower than the benchmark of 100. Our findings, to some extent, align with studies that argue that UN 17 SDGs prioritise economic growth over the broader sustainable development agenda and rely on those institutions which promote unsustainable resource use and partly propose measures that reinforce unsustainability (Eisenmenger et al., 2020).

Our findings challenge the progress toward SDGs on the one hand, while the overarching role of SDGs in sustainable development on the other hand. As such, this study is a starting point for a potentially strong research area. We acknowledge that our insignificant findings could be because of the specific context of COVID-19, which we use to provide evidence. Future studies may examine whether financial markets' reaction to other global events, such as the Russia-Ukraine war, varied in countries with different levels of progress toward SDGs. Future studies may also examine the effect of SDGs on other markets, such as bond or commodity markets, as well as the reaction of different sub-sectors, such as insurance, tourism, health, or energy, of the economy. We measure economic resilience with stock market volatility. Future research may consider other aspects, such as the drop in GDP, consumption, investment, firm profits, or a rise in firm default rates during COVID-19, and explore whether they depend on countries' progress toward SDGs.

Measuring countries' progress toward SDGs is a work in progress in the literature. The SDG index, which we use to proxy the cross-country differences in achieving SDGs may not be a perfect measure, and better proxies can become available. The recent literature has highlighted the difficulties in measuring sustainable development with the SDG index (Diaz-Sarachaga *et al.* 2018) and proposed alternative measures (Blancas & Contreras 2024). Future studies may also examine the same research question by employing other proxies to measure countries' progress toward SDGs.

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Table 1: Sample information

This table reports the sample countries, stock market index of each country for which daily returns were taken, the number of daily observations from each country, country-level values and rankings of the SDG index, and country-level mean values of stock market volatility, COVID-19 confirmed cases, Vaccine index, and Stringency index.

Sr. #	Country	Stock market index	Obs.	Stock market volatility	SDG index	SDG index ranking	COVID-19 confirmed cases	Vaccine	ΔStringency index
1	Argentina	S&P Merval	485	2.035	72.4	45	8.736	4.054	0.079
2	Australia	S&P_ASX 200	508	1.009	73.9	38	0.599	3.762	-0.107
3	Austria	ATX	506	1.250	81.1	5	1.754	3.915	0.110
4	Bahrain	Bahrain All Share	490	0.475	68.7	76	0.387	5.404	0.089
5	Bangladesh	DSE 30	448	0.952	60.9	116	2.288	3.567	-0.049
6	Belgium	BEL 20	514	1.162	78.9	16	3.418	4.333	0.026
7	Brazil	Bovespa	495	1.520	70.6	57	30.467	3.925	0.101
8	Bulgaria	BSE SOFIX	492	0.695	74.5	36	1.273	4.713	0.168
9	Canada	S&P_TSX Composite	502	0.872	77.9	20	3.215	4.759	0.161
10	Chile	S&P CLX IPSA	500	1.421	75.6	31	2.305	4.358	0.042
11	China	Shanghai Composite	485	0.966	73.2	39	0.139	4.233	0.004
12	Colombia	COLCAP	487	1.074	69.6	67	6.984	3.665	0.145
13	Croatia	CROBEX	499	0.608	77.8	22	0.967	4.184	0.045
14	Cyprus	Main Market	492	0.835	70.1	61	0.248	4.356	0.100
15	Czech Republic	PX-GLOB	500	0.903	80.7	7	3.461	4.234	0.083
16	Denmark	OMX Copenhagen 20	477	1.150	85.2	1	1.152	4.249	0.094
17	Ecuador	Guayaquil Select	493	0.401	72.3	46	0.766	4.045	0.111
18	Egypt, Arab Rep.	EGX 70 EWI	19	1.409	66.2	92	0.000	0.000	0.000
19	Finland	OMX Helsinki	185	1.849	82.8	3	0.038	0.000	0.175
20	France	CAC 40	514	1.138	81.5	4	12.533	4.407	0.084
21	Germany	DAX	508	1.198	81.1	6	10.855	4.447	0.182
22	Greece	Athens General Composite	497	1.280	71.4	50	1.877	4.274	0.090
23	Hungary	Budapest SE	502	1.173	76.9	25	1.880	4.550	0.037
24	Iceland	ICEX Main	497	0.956	79.2	14	0.048	4.374	0.032
25	India	BSE Sensex 30	498	1.107	61.1	115	28.448	3.588	-0.004
26	Indonesia	Jakarta SEC	488	1.035	64.2	102	5.915	4.238	0.094
27	Iraq	ISX Main 60	406	0.936	60.8	117	3.172	4.054	0.135
28	Ireland	ISEQ Overall	514	1.235	78.2	19	1.090	3.784	-0.001
29	Israel	TA 35	490	1.033	71.5	49	1.970	4.820	0.011
30	Italy	FTSE MIB	510	1.210	75.8	30	7.813	4.469	0.045
31	Jamaica	JSE Market	471	0.774	68.8	74	0.123	3.403	0.124
32	Japan	Nikkei 225	487	1.211	78.9	15	2.376	3.542	0.064
33	Kenya	NSE 20	501	0.578	57	125	0.416	3.321	0.032
34	Korea, Rep.	KOSP	495	1.130	78.3	18	0.917	3.644	0.066
35	Kuwait	All Share PR	404	0.864	63.5	106	0.590	3.847	0.053
36	Lebanon	BLOM Stock	384	0.980	65.7	94	0.864	3.255	-0.149
37	Malaysia	FTSE KLCI	492	0.826	69.6	68	3.752	3.709	0.055
38	Malta	MSE	491	0.667	76.1	28	0.072	4.198	0.072
39	Mexico	S&P_BMV IPC	504	1.112	68.5	78	5.765	4.101	0.051
40	Morocco	Moroccan All Shares	498	0.616	69.1	72	1.271	3.803	0.130
41	Namibia	FTSE NSX Overall	499	1.565	59.9	119	0.193	3.481	0.110
42	Netherlands	AEX	514	1.099	80.4	9	4.397	4.241	0.137
43	New Zealand	NZX 50	606	0.748	79.5	11	0.019	3.521	0.070
44	Nigeria	NSE 30	496	0.735	46.4	159	0.350	3.079	0.018
45	Norway	OSE Benchmark	502	1.084	80.7	8	0.612	4.058	0.103
46	Oman	MSM 30	489	0.451	67.9	83	0.571	4.129	0.097
47	Pakistan	Karachi 100	496	1.016	55.6	130	1.744	3.615	0.126

48	Peru	S&P Lima General	504	1.210	71.2	51	3.072	3.433	0.037
49	Philippines	PSEi Composite	493	1.266	64.9	97	3.758	3.410	-0.046
50	Poland	WIG 30	502	1.299	75.9	29	5.477	4.536	0.011
51	Portugal	PSI 20	514	1.085	76.4	26	1.959	4.212	0.068
52	Qatar	QE General	497	0.686	66.3	91	0.334	4.427	0.127
53	Romania	BET	500	0.861	72.7	42	2.591	4.682	0.126
54	Russian Federation	MOEX	504	1.080	70.9	55	14.125	3.978	0.098
55	Saudi Arabia	Tadawul All Share	499	0.803	64.8	98	0.717	4.593	0.065
56	Serbia	Belex 15	502	0.632	72.5	44	1.886	4.574	0.072
57	Singapore	FTSE ST All Share	98	1.416	69.6	66	0.214	0.000	0.662
58	Slovenia	Blue-Chip SBITOP	503	0.725	79.4	12	0.663	4.042	0.090
59	South Africa	TOP 40	521	1.174	61.5	113	4.730	3.536	0.064
60	Spain	IBEX 35	512	1.252	77.8	21	11.370	4.176	0.046
61	Sri Lanka	CSE All-Share	448	1.051	65.8	93	0.897	3.761	-0.009
62	Sweden	OMX Stockholm 30	504	1.169	85	2	2.572	4.266	0.084
63	Switzerland	SMI	505	0.886	78.8	17	2.544	4.131	0.141
64	Tanzania	All Share	494	0.530	55.8	128	0.059	1.741	-0.013
65	Thailand	SET Index	483	1.004	73	40	3.012	3.650	0.102
66	Turkey	BIST 100	500	1.256	68.5	79	12.417	3.790	0.056
67	Ukraine	PFTS	488	0.170	72.8	41	5.386	3.281	0.114
68	United Kingdom	FTSE 100	506	1.098	79.4	13	16.602	4.401	0.070
69	United States	S & P 500	504	1.083	74.5	35	43.108	4.744	0.080
70	Vietnam	VN	501	1.097	71.1	54	2.453	2.635	0.079
71	Zambia	LSE All Share	331	0.358	52.6	139	0.195	0.275	0.090
72	Zimbabwe	ZSI All Share	359	1.580	59.7	121	0.396	3.365	0.147
	Total/Mean		34102	1.000	71.677	54.052	4.508	3.921	0.072

Table 2: Summary statistics

This table reports the summary statistics of primary variables.

Variable	Observations	Mean	Standard deviation	Minimum value	Maximum value
Stock market volatility	34,102	1.000	0.667	0	4.492
SDG index	34,102	71.677	7.935	46.400	85.200
COVID-19 confirmed cases	34,102	4.508	10.328	0	59.384
Vaccine	34,102	3.921	4.230	0	10
ΔStringency index	34,102	0.072	2.546	-50.920	74.080

Table 3: Correlations matrix

This table reports the pairwise Pearson correlations between the main variables. * indicates significance at 5% level.

	Variables	(1)	(2)	(3)	(4)	(5)
(1)	Stock market volatility	1.00				
(2)	SDG index	0.095*	1.00			
(3)	COVID-19 confirmed cases	0.003	0.042*	1.00		
(4)	Vaccine	-0.258*	0.075*	0.181*	1.00	
(5)	ΔStringency index	0.094*	0.004	-0.007	-0.047*	1.00

Table 4: SDG index and stock markets' response to COVID-19: main specifications

This table reports panel pooled ordinary least squares regressions results for the moderating effect of the SDG index on the relationship between stock market volatility and confirmed COVID-19 cases. The dependent variable is stock market volatility in all regressions, measured as the seven-day rolling window standard deviation of daily stock market returns. Interaction terms, Covid-19 confirmed cases × SDG index, is the main independent variable of interest. COVID-19 confirmed cases represents COVID-19 outbreaks, measured as the daily new lab-confirmed cases of COVID-19. The vaccine index captures the extent of prioritization, availability, and financial support for COVID-19 vaccines. ΔStringency index represents the announcements regarding the government's social distancing policies, such as lockdowns. Data for COVID-19 daily new confirmed cases, Vaccine index, Stringency index and Income support index comes from Oxford COVID-19 Government Response Tracker (OxCGRT) database. Market trading volume is measured as the natural log of the daily trading volume of the stock market. GDP equals the natural log of nominal gross domestic product in US dollars for each country. The economic freedom index is from the Heritage Foundation (Heritage_Foundation, 2020). Data on the Democratic accountability index is from the International Country Risk Guide (ICRG) database. GDP, Economic freedom, and Democratic accountability are at the country level, measured with their values at the end of 2019. All regression models incorporate heteroskedasticity robust standard errors clustered at the country level. P-values are given in parentheses. ***, **, * represent statistical significance at 1%, 5%, and 10% levels, respectively.

Variables	Stock market volatility			
	(1)	(2)	(3)	(4)
COVID-19 confirmed cases × SDG index		-0.000	-0.000	-0.000
		(0.550)	(0.649)	(0.718)
SDG index		0.010**	0.008*	0.006
		(0.029)	(0.072)	(0.355)
COVID-19 confirmed cases	0.003*	0.015	0.012	0.004
	(0.055)	(0.463)	(0.560)	(0.839)
Vaccine	-0.042***	-0.043***	-0.043***	-0.041***
	(0.000)	(0.000)	(0.000)	(0.000)
ΔStringency index	0.022***	0.021***	0.021***	0.022***
	(0.000)	(0.000)	(0.000)	(0.000)
ΔIncome support index			0.013***	0.013***
			(0.000)	(0.000)
Market trading volume			0.004	-0.001
			(0.321)	(0.774)
GDP				0.086***
				(0.002)
Democratic accountability				0.027
				(0.286)
Economic freedom				-0.004
				(0.584)
Constant	1.146***	0.437	0.495	-1.407*
	(0.000)	(0.193)	(0.142)	(0.099)
Observations	34,102	34,102	34,097	33,200
R-squared	0.076	0.089	0.096	0.125

Table 5: SDG index and stock markets' response to COVID-19: alternative measure of COVID-19

This table reports panel pooled ordinary least squares regressions results for the moderating effect of the SDG index on the relationship between stock market volatility and confirmed COVID-19 deaths. The dependent variable is stock market volatility in all regressions, measured as the seven-day rolling window standard deviation of daily stock market returns. The interaction term, Covid-19 confirmed deaths × SDG index, is the main independent variable of interest. COVID-19 confirmed deaths represents COVID-19 outbreaks, measured as the daily new confirmed deaths of COVID-19. The vaccine index captures the extent of prioritization, availability, and financial support for COVID-19 vaccines. ΔStringency index represents the announcements regarding the government's social distancing policies, such as lockdowns. Data for COVID-19 daily new confirmed deaths, Vaccine index, Stringency index and Income support index comes from Oxford COVID-19 Government Response Tracker (OxCGRT) database. Market trading volume is measured as the natural log of the daily trading volume of each stock market. GDP equals the natural log of nominal gross domestic product in US dollars for each country. The economic freedom index is from the Heritage Foundation (Heritage_Foundation, 2020). Data on the Democratic accountability index is from the International Country Risk Guide (ICRG) database. GDP, Economic freedom, and Democratic accountability are at the country level, measured with their values at the end of 2019. All regression models incorporate heteroskedasticity robust standard errors clustered at the country level. P-values are given in parentheses. ***, **, * represent statistical significance at 1%, 5%, and 10% levels, respectively.

Variables	Stock market volatility			
	(1)	(2)	(3)	(4)
COVID-19 confirmed deaths × SDG index		0.011	0.014	0.012
		(0.336)	(0.227)	(0.415)
SDG index		0.009**	0.007	0.006
		(0.043)	(0.108)	(0.393)
COVID-19 confirmed deaths	0.256***	-0.543	-0.731	-0.844
	(0.002)	(0.505)	(0.372)	(0.420)
Vaccine	-0.041***	-0.043***	-0.043***	-0.043***
	(0.000)	(0.000)	(0.000)	(0.000)
ΔStringency index	0.022***	0.022***	0.021***	0.022***
	(0.000)	(0.000)	(0.000)	(0.000)
ΔIncome support index			0.013***	0.013***
			(0.000)	(0.000)
Market trading volume			0.005	-0.000
			(0.270)	(0.985)
GDP				0.073***
				(0.010)
Democratic accountability				0.024
				(0.319)
Economic freedom				-0.004
				(0.603)
Constant	1.137***	0.488	0.553*	-1.032
	(0.000)	(0.143)	(0.099)	(0.218)
Observations	34,102	34,102	34,097	33,200
R-squared	0.080	0.094	0.101	0.123

Table 6. SDG Index and stock markets' response to social distancing policies

This table reports panel pooled ordinary least squares regressions results for the moderating effect of the SDG index on the relationship between stock market volatility and government social distancing policies. The dependent variable is stock market volatility, measured as the seven-day rolling window standard deviation of daily stock market returns. The interaction term, ΔStringency index × SDG index, is the main independent variable of interest. COVID-19 confirmed cases represents COVID-19 outbreaks, measured as the daily new lab-confirmed cases of COVID-19. The vaccine index captures the extent of prioritization, availability, and financial support for COVID-19 vaccines. ΔStringency index represents the announcements regarding the government's social distancing policies, such as lockdowns. Data for COVID-19 daily new confirmed deaths, Vaccine index, Stringency index, and Income support index comes from the Oxford COVID-19 Government Response Tracker (OxCGRT) database. Market trading volume is measured as the natural log of the daily trading volume of each stock market. GDP equals the natural log of nominal gross domestic product in US dollars for each country. The economic freedom index is from the Heritage Foundation (Heritage_Foundation, 2020). Data on the Democratic accountability index is from the International Country Risk Guide (ICRG) database. GDP, Economic freedom, and Democratic accountability are at the country level, measured with their values at the end of 2019. All regression models incorporate heteroskedasticity robust standard errors clustered at the country level. P-values are given in parentheses. ***, **, * represent statistical significance at 1%, 5%, and 10% levels, respectively.

Variables	Stock market volatility			
	(1)	(2)	(3)	(4)
ΔStringency index × SDG index	0.000	0.000	0.000	0.000
	(0.841)	(0.986)	(0.984)	(0.983)
COVID-19 confirmed cases × SDG index				-0.000
				(0.718)
SDG index	0.009**	0.008*	0.006	0.006
	(0.021)	(0.057)	(0.366)	(0.355)
COVID-19 confirmed deaths	0.003*	0.003**	-0.003	0.004
	(0.059)	(0.045)	(0.138)	(0.839)
Vaccine	-0.043***	-0.043***	-0.041***	-0.041***
	(0.000)	(0.000)	(0.000)	(0.000)
ΔStringency index	0.017	0.021	0.021	0.021
	(0.440)	(0.343)	(0.351)	(0.351)
ΔIncome support index		0.013***	0.013***	0.013***
		(0.000)	(0.000)	(0.000)
Market trading volume		0.004	-0.001	-0.001
		(0.315)	(0.791)	(0.774)
GDP			0.086***	0.086***
			(0.002)	(0.003)
Democratic accountability			0.027	0.027
			(0.275)	(0.286)
Economic freedom			-0.004	-0.004
			(0.570)	(0.584)
Constant	0.471	0.522*	-1.380*	-1.407*
	(0.122)	(0.086)	(0.095)	(0.099)
Observations	34,102	34,097	33,200	33,200
R-squared	0.089	0.096	0.125	0.125

Table 7. Empirical model validation: replication of results of previous studies

This table reports panel pooled ordinary least squares (OLS) regression results where we replicate previous studies' findings to ensure our empirical model's validation. We estimate the moderating effects of government social distancing measures, cultural variables (uncertainty avoidance, trust and tightness), fiscal capacity and unemployment rate on the relationship between stock market volatility and COVID-19 confirmed cases. The dependent variable is stock market volatility in all regressions, measured as the seven-day rolling window standard deviation of daily stock market returns. Interaction terms, Covid-19 confirmed cases × ΔStringency index, Covid-19 confirmed cases × Uncertainty Avoidance, Covid-19 confirmed cases × Trust, COVID-19 confirmed cases × GDP, COVID-19 confirmed cases × Unemployment rate, and COVID-19 confirmed cases × Economic freedom, are the main explanatory variables of interest. Uncertainty Avoidance index is from (Hofstede et al., 2010)'s framework of national culture. Trust equals the generalized societal trust level, calculated with data from World Values Surveys. GDP and Unemployment rate are from World Development Indicators, measured for 2019. The economic freedom index is from the Heritage Foundation (Heritage_Foundation, 2020). COVID-19 confirmed cases represents COVID-19 outbreaks, measured as the daily new confirmed cases. Vaccine index captures the extent of prioritisation, availability and financial support for COVID-19 vaccines. ΔStringency index represents the announcements regarding the government's social distancing policies, such as lockdowns. Data for COVID-19 daily new confirmed cases, Vaccine index and Stringency index come from Oxford COVID-19 Government Response Tracker (OxCGRT) database. All regression models incorporate heteroskedasticity robust standard errors, clustered at country-level. P-values are given in parentheses. ***, **, * represent statistical significance at 1%, 5%, and 10% levels, respectively.

Variables	Stock market volatility					
	(1)	(2)	(3)	(4)	(5)	(6)
COVID-19 confirmed cases × ΔStringency index	-0.001***					
	(0.000)					
COVID-19 confirmed cases × Uncertainty avoidance		0.000**				
		(0.030)				
COVID-19 confirmed cases × Trust			-0.048***			
			(0.001)			
COVID-19 confirmed cases × Tightness						
COVID-19 confirmed cases × GDP				-0.000**		
				(0.025)		
COVID-19 confirmed cases × Unemployment rate					0.000**	
					(0.022)	
COVID-19 confirmed cases × Economic Freedom						-0.000**
						(0.038)
Uncertainty avoidance		0.001				
		(0.712)				
Trust			0.654			
			(0.120)			
GDP				0.000*		
				(0.091)		
Unemployment rate					0.003	
					(0.722)	
Economic Freedom						0.005
						(0.377)
COVID-19 confirmed cases	0.003*	-0.005	0.026***	0.005**	0.001	0.019
	(0.054)	(0.165)	(0.001)	(0.030)	(0.742)	(0.155)
Vaccine	-0.042***	-0.043***	-0.043***	-0.042***	-0.045***	-0.043***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
ΔStringency index	0.024***	0.021***	0.024***	0.022***	0.022***	0.022***

	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Constant	1.146***	1.131***	0.871***	1.125***	1.161***	0.820**
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.045)
Observations	34,102	31,284	23,646	33,611	27,012	33,205
R-squared	0.077	0.081	0.086	0.085	0.093	0.083