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The effects of daily growth in COVID-19 deaths, cases, and governments’ response policies on stock markets of emerging economies

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ABSTRACT

Since the beginning of COVID-19, human beings have been threatened by various aspects. As of February 14, 2022, this global pandemic has caused about 412 million cases and 5.8 million deaths worldwide. Stock markets are one of the most agile economic indicators. In this context, this study investigates how daily growth in deaths, daily growth in cases, and governmental interventions affect stock market returns in 21 emerging economies from January 22 to December 31, 2020. Our results indicate that government response policies to Covid-19 positively impact stock returns. Besides, the daily growths in deaths and cases negatively affect stock market returns. The results also indicate that government response policies also have an indirect positive effect on stock market returns by weakening the negative impact of the daily growth in COVID-19 confirmed cases and deaths.

1. Introduction

Humanity faced a virus causing the deadly and contagious COVID-19 disease that first occurred in Wuhan, China, at the end of 2019, and the definition of “normal life” changed with this encounter. Since the pandemic’s beginning, the fight against COVID-19 has continued due to not finding a proven cure. Furthermore, before the virus’s characteristics were understood, the wide international spread of COVID-19 became inevitable, owing to individuals’ life routines. As a result of these circumstances, the epidemic has rapidly continued to spread worldwide in a short time. The Chinese government has implemented policies such as border restrictions, school closures, lockdowns, public awareness programs, and health-related issues (Cheng et al., 2020).

Consequently, governmental interventions affect societies’ daily lives and directly affect economic stability. As a result, all financial markets and the global economy have been affected harshly by the pandemic (Bai et al., 2021; Goodell, 2020). This statement’s reasons are ambiguity in the business environment, production reduction, not fulfilling supply chain activity demands, and uncertainty in imports-exports gates (Usman et al., 2020). Furthermore, the fluctuations in the economy caused by the chaotic environment due to COVID-19 were seen in some sectors faster than others.
Additionally, stock markets are the most rapid and direct responsive sectors among economic and financial systems (Bai et al., 2021). The disruption in stock markets has been one of the historical declines since stock markets’ existence. For example, the US stock market has seen the most volatile movements since Black Monday in 1987 (Baker et al., 2020). Therefore, governments have been struggling to minimize the side effects of volatile stock markets. Moreover, COVID-19 disrupts stock markets alongside risking human health and causing deaths (He et al., 2020). Subsequently, achieving a balance between sustainable economic stability and preserving lives is the ultimate objective for governments during this pandemic. Numerous studies have studied how the COVID-19 daily cases and daily deaths affected stock markets (Albulescu, 2021; Sharif et al., 2020; Zhang et al., 2020). Al-Awadhi et al. (2020) found that the daily growth in total cases and deaths caused by COVID-19 negatively affected Chinese companies’ stock returns. Sharif et al. (2020) found noteworthy connectedness among stock market returns, confirmed COVID-19 cases, economic policy uncertainty measures, and geopolitical risk in the US. They also showed that the epidemic affected economic uncertainty and geopolitical risk more than the stock market. Albulescu (2021) discovered that both new cases and deaths reported in the US and globally increased US financial markets’ volatility.

Other studies have focused on governments’ policy responses on stock markets (Ashraf, 2020a; Bickley et al., 2020; Zaremba et al., 2020; Narayan et al., 2021; Ashraf and Goodell, 2021). Ashraf (2020a) examined how daily growth in cases and governments’ response policies affected the stock markets of 77 countries from January 22 to April 17, 2020. Bickley et al. (2020) showed that governments’ policy interventions had stabilized the financial markets of a sample of 28 countries about 61% of the time. Zaremba et al. (2020) used the stringency index in their model to explore stock exchange daily volatility changes impacted by government interventions, daily COVID-19 infection, and death changes among 67 countries between January 1, 2020, to April 3, 2020. Narayan et al. (2021) have investigated the impact of government policies such as travel bans, national lockdowns, stimulus packages on country stock index return between July 1, 2019, to April 16, 2020, for G7 countries. They found that although all government policies positively impacted stock market returns, lockdowns were the most effective ones to lessen the effects of COVID-19. Ashraf and Goodell (2021) utilized quarterly GDP growth data from 46 countries over the period first quarter 2020 to second quarter 2021, and found that stringent social distancing policies caused sharp declines in GDP growth rates in the same quarter while enabling GDP-growth recovery the next quarter. The recovery effect was three times larger than the initial decline. These researches are examples from the first phases of COVID-19 spread. However, as time passed, the virus has spread worldwide, and unfortunately, the number of daily cases and deaths became ordinary, and people got used to them.

Implementing such policies has been drastically more difficult for emerging economies (Hevia and Neumeyer, 2020; Lemos et al., 2020; Stiglitz, 2020) owing to their shared characteristics such as low levels of economic development, high levels of financial and social risks, weak institutional and legal settings, and inadequate health infrastructures (Surico and Galeotti, 2020). Hence, emerging countries’ governments had a reduced number of instruments and alternatives to restrain the devastating influences of the COVID-19 and became the worst-hit ones.

Although emerging economies constitute about 42% of the world’s GDP and 55% of the world’s population (Cavusgil et al., 2021), few studies have investigated how COVID-19 influenced emerging economies. A significant portion of these studies focused only on a single emerging economy such as Bangladesh (Karmaker et al., 2021), Brazil (Bretas and Alon, 2020), China (Al-Awadhi et al., 2020; Gu et al., 2020; He et al., 2020), India (Mishra et al., 2020; Singh and Neog, 2020), Pakistan (Khan et al., 2020), and Turkey (Aydin and Ari, 2020). Examples of other studies focusing on clusters of emerging stock markets consist of Haroon and Rizvi (2020), Salisu et al. (2020), and Topcu and Gulal (2020). Haroon and Rizvi (2020) indicated that the increased number of confirmed COVID-19 cases negatively influenced the liquidity of the emerging stock markets. Salisu et al. (2020) showed that developed markets are less susceptible to pandemic uncertainty than emerging markets. Thus a superior hedge exists in developed markets than emerging markets. Topcu and Gulal (2020) showed that emerging markets in Europe were less affected by COVID-19 than emerging markets in Asia. They also pointed out that the destructive impact of COVID-19 had subsided over time. Despite the well-anticipated and reported effects in individual emerging markets or a narrow set of emerging markets, we still do not know much about how COVID-19 empirically affected emerging stock markets as a whole group after the measures taken. Therefore, this work takes an initial step toward explicitly understanding how the COVID-19 outbreak has impacted emerging economies using data from a wider timespan than covered by previous studies.

The contributions of our research are as follows. First, this study is an addition to the existing literature that examines the influence of the COVID-19 on the emerging stock markets. We particularly examined how emerging stock markets reacted to governments’ response policies to restrain the pandemic, how government response policies interact with COVID-19 daily cases and deaths. Second, this study used data from a wider timespan of which COVID-19 has penetrated the whole world. Third, it offers evidence towards implementing more comprehensive and supportive government policies urgently. Fourth, the evidence presented in this study can be used by emerging country governments, policymakers, or investors to understand the stock market’s response in the case of potential pandemics in the future. Fifth, this study uses panel data models with some advantages over time series and cross-section models. Besides, the panel data estimators we use allow for cross-section dependence problems in panel data models. As explained in the coming sections, this problem has severe consequences. This is the first study to consider such a problem in this context to the best of our knowledge. The paper is organized as follows:

The following section describes the data and methodology employed. Section 3 reports and discusses the empirical results, and Section 4 offers our conclusions from the findings and recommendations.
2. Data and methodology

2.1. Data

In this study, we use a panel data set covering 21 emerging markets. The data on 21 emerging markets for all variables were collected from January 22 to December 31, 2020, which gave us 5166 observations. The major stock indices of 21 emerging countries were collected based on the Morgan Stanley Capital International (MSCI) country classification, where non-trading days were omitted. Our sample countries were Argentina, Brazil, China, Colombia, Czech Republic, Greece, Hungary, India, Indonesia, Malaysia, Mexico, Pakistan, Peru, Philippines, Poland, Russia, South Korea, Taiwan, Thailand, and Turkey. We obtained the percentage of daily stock index returns (RET) in each country from www.investing.com. The list of emerging countries in our sample, the stock indices used, and the dates of the first confirmed COVID-19 cases are given in Table 1.

We obtained data on COVID-19 from Worldometer Statistics (2020). As suggested and used by Harjoto et al. (2021), we calculated the percentage of daily increase in the percentage of new cases by dividing the daily new cases by the cumulative cases and using it as a measure of daily transmission speed (DTS). In the same manner, we calculated the percentage of new deaths by dividing the daily new deaths by the cumulative cases and used it as a measure of the daily mortality rate (DMR).

The data relating to government policies were collected from the Oxford Coronavirus Government Response Tracker (OXCGRT) (Hale et al., 2020). Hale et al. (2020) have been collecting data to create four indices based on countries’ containment and closure policies, economic policies, and health system policies. The containment and closure policies include school closings (C1), workplace closings (C2), canceling public events (C3), restrictions on gathering size (C4), public transport closures (C5), stay at home requirements (C6), restrictions on internal movement (C7), and restrictions on international travel (C8). The economic policies consist of income support (E1), debt/contract relief for households (E2), fiscal measures (E3), and giving international support (E4). The health system policies include public information campaign (H1), testing policy (H2), contact tracing (H3), emergency investment in health care (H4), and investment in COVID-19 vaccines (H5). With the data collected based on 17 indicators, four standard indices, namely the overall government response index, containment & health index, economic support index, and stringency index, were developed.

As suggested and used by Siedschlag and Yan (2020) and Mueller et al. (2021), the overall government response index (GRI) is utilized in this study since it is the most comprehensive one with the highest number of policies. These policies incorporate all containment and closure policies, the economic policies of E1 and E2, and the health system policies of H1, H2, and H3. Each country has an overall government response index score between 0 and 100 each day.

Table 2 provides descriptive statistics of the main variables. The average stock market returns during our sample period were 0.02891%, which shows that overall stock markets increased over the sample period. During our sample period, the daily growth in cases and deaths due to COVID-19 were 3.37385% and 2.54773%, respectively. The government responsibility index had a mean value of 54.38512 and ranged from 0 to 89.17.

Table 3 reports the pairwise correlations between the main variables. Correlations between the main variables were not exceptionally high, suggesting the lower chances of multicollinearity in multivariate analysis.

In the studies by Ashraf (2020a) (2020b), some control variables such as uncertainty avoidance, log (GDP), investment freedom,
The cross-section dependence tests have been carried out using the bias-adjusted LM test developed by Pesaran et al. (2008), and recent tests by Pesaran and Yamagata (2008) and Blomquist and Westerlund (2013). The CIPS test is known as the second generation panel unit root test because it allows for cross-sectional dependence.

The cross-section dependence tests have been carried out using the bias-adjusted LM test developed by Pesaran et al. (2008), and panel unit root tests are conducted using the CIPS statistic advanced by Pesaran (2007). As for the slope heterogeneity, we conducted recent tests by Pesaran and Yamagata (2008) and Blomquist and Westerlund (2013). The CIPS test is known as the second generation panel unit root test because it allows for cross-sectional dependence.

### Table 2
Descriptive statistics of the main variables.

| Variable                        | Mean   | Std. Dev. | Min.   | Max.   |
|---------------------------------|--------|-----------|--------|--------|
| RET                             | 0.0002891 | 0.0195825 | -0.1478 | 0.1391 |
| DGCASE                          | 0.0337385 | 0.0866444 | -0.0021097 | 1      |
| DGDEATH                         | 0.0254773 | 0.0738883 | -0.1176471 | 1      |
| Government response index (GRI) | 54.38512 | 21.1545   | 0      | 89.17  |

### Table 3
Pairwise correlations between the main variables.

| Variables                        | (1)   | (2)    | (3)    | (4)    |
|----------------------------------|-------|--------|--------|--------|
| RET                              | 1.00  |        |        |        |
| DGCASE                           | -0.1110*** | 1.00  |        |        |
| DGDEATH                          | 0.0367*** | 0.3072*** | 1.00  |        |
| Government response index (GRI)  | 0.1533*** | -0.1451*** | 0.0736*** | 1.00  |

**Note:** *** denotes 1% confidence levels.

Note: democratic accountability were employed to check the robustness of the models. However, the impact of those variables on the results was negligible. In this study, we don’t use such variables for the following reasons: First, the daily data on the variables are not available. Second, our estimators such as Augmented Mean Group Estimator (AMG), Common Correlated Effects Mean Group Estimator (CCEMG), and Driscoll-Kraay do not support the inclusion of time-invariant variables. More precisely AMG estimator takes the first difference of the variables in the first step while the Driscoll-Kraay estimator based on two-way fixed effects models performs within the transformation. Thus both estimators wipe out time-invariant variables. As for the CCEMG estimator, the cross-sectional means of those variables will consist of the same values across different periods, making it impossible to obtain the associated coefficients.

### 2.2. Methodology

We utilized similar models and explanatory variables as Ashraf (2020a) (2020b), Siedschlag and Yan (2020), Mueller et al. (2021), and Harjoto et al. (2021). However, our study differs from the earlier ones because it considers the cross-section dependence problem in panel data. As argued in Hsiao (2014, p.327), most of the earlier studies using panel data have assumed that except for the possible presence of time-specific effects, the effects of the omitted variables are independently distributed across cross-sections forming the panel. However, the cross-sectional dependence could lead to more efficient estimates of parameters and simplify statistical inference when taken into account. In this study, to take into account the cross-section dependence problem, we employ a CCEMG estimator. Kapetanios et al. (2011) further showed that the CCEMG advanced by Pesaran (2006) is robust to a wide variety of data-generating processes.

Cross-section dependence is also an important issue in testing the time-series properties of the variables. O’Connell (1998) argued that ignoring this issue could lead to over-rejection of the null hypothesis of a unit root in panel data. For this purpose, we allow for cross-section dependence while testing for unit root for all variables and also test for the absence of cross-section dependence for the six models (1–6) below before estimating them. The models below have partially been borrowed from Ashraf (2020a) (2020b), who used pooled OLS with and without country dummies to estimate them. Therefore, cross-section dependence, as well as slope heterogeneity, have been ignored in those studies. However, the sample periods are short in those studies, and it is a well-known fact that cross-sectional dependence is less concerned in short T panels. In this respect, the CCEMG estimator has the advantage that it allows for both slope heterogeneity and cross-section dependence.

\[
\begin{align*}
RET_t &= \beta_0 + \beta_1 DGCASE_{t-1} + \epsilon_t \\
RET_t &= \beta_0 + \beta_1 DGCASE_{t-1} + \beta_2 GRI_t + \epsilon_t \\
RET_t &= \beta_0 + \beta_1 DGCASE_{t-1} + \beta_2 GRI_t + \beta_3 DGCASE_{t-1} \times GRI_t + \epsilon_t \\
RET_t &= \beta_0 + \beta_1 DGDEATH_{t-1} + \epsilon_t \\
RET_t &= \beta_0 + \beta_1 DGDEATH_{t-1} + \beta_2 GRI_t + \epsilon_t \\
RET_t &= \beta_0 + \beta_1 DGDEATH_{t-1} + \beta_2 GRI_t + \beta_3 DGDEATH_{t-1} \times GRI_t + \epsilon_t
\end{align*}
\]
Heteroskedasticity and serial correlation are also important issues that could cause estimators to be inefficient. We employ a recent test developed by Jühl and Sosa-Escudero (2014) to test heteroskedasticity. This test has several similarities with White’s (1980) general test of heteroskedasticity, which has been used in standard econometric models with time series or cross-section data. White’s test is a i) LM type test based on a restricted model, ii) variance of disturbance term can be of any form, iii) LM test statistic can be obtained through an auxiliary regression of residuals on exogenous variables consisting of explanatory variables of the original model, their powers and their cross products. Likewise, the test developed by Jühl and Sosa-Escudero (2014) is an LM type test, and the variance of the error term can be any function of the exogenous variables. Unlike White’s test, the test by Jühl and Escudero (2014) has been specifically developed to test for heteroskedasticity in the panel data model with a fixed-effects model.

We use Baltagi and Li’s (1995) test regarding serial correlation, which allows us to test for serial correlation in a fixed-effects panel data model.

3. Results and discussion

Cross-sectional dependency and panel unit root test results are shown in Table 4. Accordingly, all variables seem to be stationary, and the absence of cross-section dependence is strongly rejected for all variables.

The heteroscedasticity, serial correlation, and cross-sectional dependence test results for the disturbances terms of the above models are shown in Table 5. It seems that models suffer from serial correlation, heteroskedasticity, and cross-sectional dependence. When it comes to the slope heterogeneity test’s results, as seen in Table 6, slope heterogeneity is a valid hypothesis when heteroscedasticity and serial correlation are not taken into account. However, the slope homogeneity hypothesis is not rejected when the tests are carried out by using HAC (Heteroskedasticity and Autocorrelation Consistent) option developed by Blomquist and Westerlund (2013). Given these mixed results, in the rest of the paper, we estimate the above models using both the estimators allowing for slope heterogeneity and the estimators that do not. In all cases, the estimators used throughout the paper allow for cross-sectional dependence.

The results obtained by CCEMG are shown in Table 7. It seems that the mean group estimator coefficients associated with Government Response Index (GRI) are significant across all equations. However, the coefficients of the daily growth in deaths (DGDEATH) are, although negative, are not statistically significant in most of the models.

Likewise, AMG is an alternative method to CCEMG, taking into account both cross-sectional dependence and slope heterogeneity. Advanced by Eberhardt and Teal (2010, 2011) and Eberhardt and Bond (2009), AMG estimators can be obtained in two steps. We add time dummies to the model to include cross-section dependence and take the first difference in the first step. Then, we employ OLS to estimate the coefficients of time dummies. In the second step, we use these coefficients of time dummies as independent variables along with levels of other independent variables. Therefore, we obtain the coefficients of the whole panel, taking the average of the estimated coefficients across individual regressions.

The results obtained by the AMG are given in Table 8. Similar to the CCEMG, the Government Response Index (GRI) coefficients and those of interaction variables are all significant. As for the daily growth in cases (DGCASE) and daily growth in deaths (DGDEATH), their coefficients are not also significant in models estimated by the Augmented Mean Group Estimator.

Since we focus more on the impact of the Government Response Index on stock returns in the paper, we report the country-specific GRI coefficients obtained from CCEMG and AMG estimators in Fig. 1 and Fig. 2, respectively. As seen, country-specific GRI coefficients are all positive across all equations with AMG estimators, while some are unexpectedly negative with the CCEMG estimator. Meanwhile, Taiwan has the largest GRI coefficients across all models.

Finally, the results obtained by Driscoll and Kraay’s (1998) estimator are illustrated in Table 9. It should be noted that the Driscoll-Kraay estimator can apply to random and fixed effects models to obtain a consistent estimate of variances and covariances of parameters. In this study, we assume that the individual effects (namely country effects) are fixed as we don’t draw our sample from a large population randomly. The absence of fixed effects is strongly rejected, as shown in Table 5. Therefore, we apply the Driscoll-Kraay estimator to the fixed effects models and obtain robust standard errors of the fixed effects model’s parameters. As shown in Table 9, most of the coefficients are significant and of the expected sign. The results are in line with those obtained in earlier studies.

4. Conclusions and recommendations

This study aimed to explore how growth in daily deaths, growth in daily cases, and government response policies affect stock markets in 21 emerging economies from January 22 to December 31, 2020. According to the results, daily growths in deaths and cases

| Variables | LM_ADJ intercept | LM_ADJ intercept + trend | CIPS intercept | CIPS intercept + trend |
|-----------|------------------|--------------------------|----------------|-----------------------|
| RET       | 2429.705***      | 2423.218***              | -11.1979***    | -11.21***             |
| DGCASE    | 2381.352***      | 2365.773***              | -7.9357***     | -8.0112***            |
| DGDEATH   | 2422.330***      | 2407.766***              | -8.8690***     | -8.9148***            |
| Government response index (GRI) | 2360.120*** | 2348.121*** | -2.6138*** | -3.1948*** |

Note: *** denotes 1% confidence level, LM_ADJ stands for bias-adjusted LM Test (Pesaran et al. (2008). Critical values in Pesaran (2007) are used for the CIPS test.
### Table 5
Diagnostic tests results.

| Variables | Model 1 | Model 2 | Model 3 | Model 4 | Model 5 | Model 6 |
|-----------|---------|---------|---------|---------|---------|---------|
| F_FE      | 13.05*** | 12.52*** | 12.49*** | 13.97*** | 13.22*** | 13.13*** |
| LM_ADJ    | -10.078*** | -10.087*** | -10.122*** | -10.071*** | -10.080*** | -10.079*** |
| LM_H      | 1075.63*** | 1067.86*** | 1068.57*** | 1079.21*** | 1072.98*** | 1091.82*** |
| LM_SC     | 58.13*** | 60.60*** | 60.02*** | 56.25*** | 58.34*** | 57.72*** |

**Note:** *, **, *** denote 1%, 5% and 10% confidence levels, respectively. LM_ADJ: bias-adjusted LM Test Statistic (Pesaran et al., 2008). LM_H: LM test statistic to test for heteroscedasticity (Juhl and Sosa-Escudero, 2014). LM_SC: LM test statistic to test for serial correlation (Baltagi and Li, 1995).

### Table 6
Slope homogeneity (Pesaran and Yamagata, 2008).

| Variables | Model 1 | Model 2 | Model 3 | Model 4 | Model 5 | Model 6 |
|-----------|---------|---------|---------|---------|---------|---------|
| Delta_tilde | 12.552*** | 8.05*** | 11.63*** | 12.01*** | 6.59*** | 7.37*** |
| Adjusted Delta_tilde | 12.629*** | 8.12*** | 11.75*** | 12.08*** | 6.64*** | 7.45*** |
| Delta_tilde_HAC | 0.306 | -0.866 | -1.340 | 1.471 | -0.528 | -0.617 |
| Adjusted Delta_tilde_HAC | 0.308 | -0.873 | -1.353 | 1.480 | -0.533 | -0.624 |

**Note:** *** statistics are significant at 1% level of significance. Delta_tilde: Slope homogeneity test statistic (Pesaran and Yamagata, 2008). Adjusted Delta_tilde: Adjusted Slope homogeneity test statistic (Pesaran and Yamagata, 2008). Delta_tilde_HAC: Slope homogeneity test statistic with HAC option (Blomquist and Westerlund, 2013). Adjusted Delta_tilde_HAC: Slope homogeneity test statistic with HAC option (Blomquist and Westerlund, 2013).

### Table 7
CCEMG estimation results of emerging countries.

| Variables | Model 1 | Model 2 | Model 3 | Model 4 | Model 5 | Model 6 |
|-----------|---------|---------|---------|---------|---------|---------|
| DGCASE    | 0.0000319 | 0.0008914 | -0.0152852*** | [0.08] | [0.22] | [-2.08] |
| DGDEATH   | 0.0000575* | 0.0000864*** | [1.82] | [2.75] | [0.06] | [0.97] |
| GRI       | 0.0004039*** | 0.0002781*** | [10.05] | [16.66] | [6.66] | [8.88] |
| DGCASE x GRI | 0.0005015* | 0.0004438 | [1.23] | [1.23] | [0.06] | [0.06] |
| Intercept | 0.0000259 | 0.0005031 | -0.00000127 | [0.12] | [0.64] | [0.06] |
| Observations | 5166 | 5166 | 5166 | 5166 | 5166 | 5166 |

**Note:** *, **, *** denote 1%, 5% and 10% confidence levels, respectively. Values in [ ] show the z-statistics.

### Table 8
AMG estimation results of emerging countries.

| Variables | Model 1 | Model 2 | Model 3 | Model 4 | Model 5 | Model 6 |
|-----------|---------|---------|---------|---------|---------|---------|
| DGCASE    | -0.0005038 | -0.0052829 | -0.0084867 | [-0.18] | [-1.15] | [-1.19] |
| DGDEATH   | 0.0004039*** | 0.002781*** | [10.05] | [16.66] | [6.66] | [8.88] |
| GRI       | 0.0004039*** | 0.002781*** | [10.05] | [16.66] | [6.66] | [8.88] |
| DGDEATH x GRI | 0.0005015* | 0.0005015* | [1.70] | [1.70] | [1.70] | [1.70] |
| Intercept | -0.0004942*** | -0.025508*** | -0.018919*** | [-3.35] | [-16.24] | [-17.61] |
| Observations | 5166 | 5166 | 5166 | 5166 | 5166 | 5166 |
| Wald      | 0.03 | 101.61*** | 281.80*** | 0.84 | 79.06*** | 278.16*** |

**Note:** *, **, *** denote 1%, 5% and 10% confidence levels, respectively. Values in [ ] show the z-statistics.
negatively influence stock market returns. Daily growth in COVID-19 deaths and cases creates a chaotic environment in society; the reason behind this might be the uncertainty about how much time it needs to be required to find a widely accepted treatment method. The numbers of deaths and cases are much more than a statistic; they are loved ones of one of us. Eventually, fear is produced by this situation has altered regular habits and behaviors. Thus, the changing actions affect sectors (such as the aviation industry has had one of the most challenging times while fast consumption industry products have been in high demand). In this context, government response policies are important to mitigate this virus because individual-level efforts are not enough to fight it. Hence, the effects of government response policies on stock market returns were taken into consideration in this study. Government response policies had a positive impact on stock market returns. Supporting citizens with these policies has created a positive vision for the future. Hence governments should maintain these supports by extending the coverage to sustain this environment.

Besides, the interaction effects of government policies and daily growth in deaths and cases on stock market returns were positive. This result indicates that people become optimistic that things will improve when effective and comprehensive government response policies are implemented against the increased daily growth in deaths and cases. Therefore, increases in stock market returns might be explained by these perceptions. On the other hand, it is too early to predict how each implemented policy will influence stock markets.

### Table 9

| Variables          | Model 1         | Model 2         | Model 3         | Model 4         | Model 5         | Model 6         |
|--------------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|
| DGCASE             | -0.03918***     | -0.03465**      | -0.05031***     |                 |                 |                 |
|                    | [-2.62]         | [-2.52]         | [-2.67]         |                 |                 |                 |
| DGDEATH            | -0.00722        | -0.01107        |                 | -0.00722        | -0.01107        | -0.0052**       |
|                    | [-0.62]         | [-1.00]         | [-0.62]         | [-1.00]         | [-1.00]         | [-2.42]         |
| GRI                | 0.00014***      | 0.0001268***    | 0.00017***      | 0.00017***      | 0.00016***      |                 |
|                    | [3.71]           | [3.30]           | [3.44]           | [3.44]           | [3.23]           |                 |
| DGCASE x GRI       |                 |                 | 0.00056         | -0.00088**      |                 |                 |
|                    |                 |                 | [0.96]           |                 | [-0.0088**]     |                 |
| DGDEATH x GRI      | 0.00161**       | -0.00642***     | -0.0058608***   | 0.00047         | -0.00866***     | -0.0081***      |
|                    | [2.59]           | [-2.86]         | [-19.56]        | [0.63]          | [-2.80]         | [-2.69]         |
| Intercept          |                 |                 |                 |                 |                 |                 |
| Country dummies    | Yes             | Yes             | Yes             | Yes             | Yes             | Yes             |
| Daily dummies      | Yes             | Yes             | Yes             | Yes             | Yes             | Yes             |
| Observations       | 5166            | 5166            | 5166            | 5166            | 5166            | 5166            |
| F Test             | 6.88***         | 7.37***         | 5.19***         | 0.38            | 5.91***         | 4.98***         |

**Note:** *, **, *** denote 1%, 5% and 10% confidence levels, respectively. Values in [] show the t-statistics.
in the short-, mid-, and long term. Further research is needed to understand better such government response policies’ impact on emerging economies’ stock markets. Besides, in these unpredictable situations where uncertainty is high, conducting scenario-based simulations can help policymakers develop effective policies.

As the main result of these remarks, stock market returns were affected by daily growth in deaths, daily growth in cases, government response policies, and the interaction of independent variables. These findings provide evidence towards implementing more comprehensive and supportive government policies on an urgent basis. They can also be used by emerging country governments, policymakers, or investors to understand the stock market’s response in the case of potential pandemics in the future.

CRediT authorship contribution statement

Murat Guven: Methodology, Software, Formal analysis, Writing – review & editing. Basak Cetinguc: Investigation, Data curation. Bulent Guloglu: Methodology, Formal analysis, Writing – review & editing. Fethi Calisir: Conceptualization, Supervision, Visualization, Writing – review & editing.

Conflict of Interest

There is no conflict of interest.

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