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“DOES MORE STRINGENCIES IN GOVERNMENT POLICIES DURING PANDEMIC IMPACT STOCK RETURNS? FRESH EVIDENCE FROM GREF COUNTRIES, A NEW EMERGING GREEN BLOC”

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Does more stringencies in government policies during pandemic impact stock returns? Fresh evidence from GREF countries, a new emerging green bloc

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ABSTRACT

In this paper, we investigate the impact of the government economic policies in addition to the more stringent Covid-19 policies on stock index returns of GREF countries, that is, a new economic bloc of 5 countries (Pakistan, Iran, Turkey, Russia, and China) to foster for sustainable development of the region. Using the Panel, ARDL model and data for index returns and economic and Covid-19 control policies for the period March 1, 2020–June 30, 2021, results show that Income support, workplace closure, stringency index, and cancellation of public events have a significant positive impact on the stock index returns over the long run. In contrast, school closure, restriction on public gatherings, and international travel control policies negatively impact stock returns. In comparison, Debt policies, Covid-19 testing policies, health index, and face-covering policies remain insignificant. In the short run, stringent index and face-covering policies remain positively significant. Results of the study suggest significant policy implications that can help reform economic and Covid-19 control policies and promote the region's economic growth over the long-run period.

1. Introduction

COVID-19, a highly contagious pandemic, came as a surprise event, even after the formation of the vaccine, we still are uncertain about the abridged of this deadly virus (Wang et al., 2021; Su et al., 2021; Tao et al., 2021). For the last two years this deadly virus has greatly damaged the economy and finance. Given its massive human and economic impacts, the outbreak has stimulated a surge of news and opinions. It has also triggered government policy responses such as economic packages, along with some restrictive measures to control the spread of the virus, including mandatory closures and lockdowns, travel restrictions, cancellation of public events, testing and quarantining, and other emergency actions. Although COVID-19 first emerged in Wuhan, China, but several East Asian countries (e.g., South Korea and China) have basically overcome the grip of COVID-19 because of the immediate implementation of a strict home isolation policy.

The government took restrictive actions as lockdown and travel

restrictions to make the society safe from the deadly disease, but these actions cause uncertainty regarding their effectiveness (Gao et al., 2021). As lockdown and restrictions on traveling hurt the job market cause millions of people associated with the traveling industry to lose their job. Economic relief was also announced to overcome the adverse effects of restrictive measures, but these reliefs still could not overcome the uncertainties associated with the restrictive measure. Financial markets respond rapidly with drastic movements, whereas the long-term global economic consequences of the COVID-19 policies are not yet clear, since more than a year has passed to this deadly pandemic spread now at this point, we can analyze the long-term effect of the government economic and more stringent COVID -19 control policies on the stock market return. In this paper, we examine estimated long-term and short-term effects on stock markets' returns in response to government economic and COVID -19 preventive policies that are announced during this pandemic.

A stock market that is the barometer of any economy responds

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spontaneously to any change. Wagner (2020) argues that information regarding any fast-evolving and complex situations can be seen in the stock market returns. In this paper, we examine stock markets' response to economic policies as debt relief policy, income support, and other more stringent COVID -19 control policies as containment and health index, cancellation of public events, COVID testing policies, face-covering policies, international travel control, restrictions on public gatherings, school closure, stringency index, and workplace closure index.

Governments responded with multiple policy approaches to minimize the repercussions of the pandemic. Travel bans (closing international borders), lockdowns (restricting the movement of people), and stimulus economic packages (to offer support to workers and businesses who lost jobs and output, respectively) are commonly used policies by most of the countries. Understanding the impact of these policies on the economy's economic growth and financial development is imperative. The reposition of the phenomenon is that the relief economic policies and more stringent COVID-19 preventive policies alleviate the spread of the virus and help to soothe panic, positively affecting stock markets returns.

Investor sentiment impacts stock returns, as it is confirmed by numerous studies (Chen et al., 2021; Narayan, 2019; Su et al., 2020; Yan et al., 2021). We postulate that when the investors' sentiments cause the market to move down due to a pandemic, government policies that mitigate the effects of the pandemic must have a positive effect on stock returns. As the government's intention for the relief economic policies and more stringent COVID control policies is to control the intensity of the local outbreaks, they can weaken the market's negative reaction to the pandemic. Before that, it was evidenced that the world's stock markets have reacted negatively to the recent COVID-19 Pandemic (Al-Awadhi et al., 2020; Ashraf, 2020; Baker et al., 2020; Ramelli and Wagner, 2020; Su et al., 2021; Umar et al., 2021; Zhang et al., 2020).

To empirically examine the above-hypothesized relationships, we use a panel dataset of daily stock market returns, the government announced policies from GREF countries (Pakistan, Iran, Turkey, Russia, and China) over the period March 1, 2020–June 30, 2021. Using the Panel ARDL model, we find that income support, workplace closure, stringency index, and cancellation of public events significantly positively impact the stock index returns over the long run. In contrast, school closure, restriction on public gatherings, and international travel control policies negatively impact stock returns. In comparison, Debt policies, COVID -19 testing policies, health index, and face-covering policies remain insignificant. In the short run, stringent index and face-covering policies remain positively significant.

We offer at least two important contributions to the existing literature. First, we add to the emerging literature that examines the impact of government economic policies and more stringent COVID protection policies on the stock returns of an emerging economic bloc comprised of Pakistan, Iran, Turkey, Russia, and China. Almost over 30% of the human and natural resources belong to the five countries, and because of the geographical location of these countries that form a ring around Central Asia, they are named as "Golden Ring." Therefore, the Golden Ring Economic Forum (GREF) has been formed as a strategic economic policy development think tank to assist in formulating a common policy framework for developing strategic economic interests among member countries.¹

In this paper, we examine how stock markets of a newly developed bloc react to government actions aimed to relieve the economy during the pandemic and control it. We add to this literature by analyzing that stringent COVID-19 control measures have significantly weakened the stock markets' negative reaction to the growth in COVID-19 confirmed cases. Indeed, the objective is not to judge the effectiveness of government policies in a comparative manner. The paper's primary objective is

to evaluate the aggregate effect of government policies in mitigating the effects of COVID-19 on stock markets. Our findings contribute to an evolving literature on the long-term impact of government policies on stock returns when a pandemic prolonged more than a year, even after discovering its cure.

Our work is most closely related to the literature on Economic and COVID-19 related government policies and stock markets. In this paper, we analyze the impact of the government economic policies and more stringent COVID control policies (lockdowns, stimulus packages, and travel bans) on the stock market of GREF countries over the long run. Therefore, our study is the first to evaluate how COVID-19 pandemic-related government policies affected the stock market over the long run for GREF countries and complements the literature on COVID-19 and stock markets and the overall literature on COVID-19's effect on the financial and economic systems.

2. Literature review

The paper's main objective is to evaluate the impact of government economic and COVID control policies as adopted in response to pandemics on stock returns of the selected countries. The unexpected emergence of the outbreak of COVID -19 has led to global economic and financial uncertainty. Major research in this regard has focused their intentions on the outbreak's impact on financial markets returns. The given researches that focused on the fund performance, e.g., European investment fund's price reaction, performance, and volatility timing during the outbreak of COVID -19 is evaluated by (Mirza et al., 2020a), a study by (Yarovaya et al., 2021) analyze the impact of human capital efficiency (HCE) on equity funds' performance during three stages of the COVID-19 pandemic (Rizvi et al., 2020). provide preliminary evidence of European funds' performance and investment styles during the evolution of COVID -19 (Mirza et al., 2020b). investigate the impact of COVID -19 on the solvency profile of the firms in the EU member states. They introduce multiple stress scenarios on the non-financial listed firms and report a progressive increase in the probability of default, an increase of debt payback, and declining coverages.

Major Social distancing policies include (School closure, international travel ban, workplace closure, cancellation of public events), the purpose of the social distancing policies is to minimize the chances of people interaction to prevent the spread of the deadly virus, but this preventive measure imposes heavy costs on economies due to minimal economic activity. So, we are expecting that such restrictive measures can have both positive and negative effects on stock returns. As such policies cause economic activity to be reduced by shutting down workplaces such as schools, offices, and factories. The investors price these adverse valuation effects, and we can expect that these stringent policies cause a decline in stock market returns. The risk of mortalities can also be reduced by such measures of social (Greenstone and Nigam, 2020; Thunström et al., 2020). In his analysis (Hussain, 2020), countries with stringent social distancing policies have lower chances of getting infected. Thus, the benefits of social distancing are mainly achieved due to the reduced rate of new infections. If social distancing helps to reduce the new infections, then government social distancing stringent measures will positively impact the stock returns.

Government actions concerning the containment and healthcare system-related positively to stock market reaction. Government aggressive campaigns regarding sanitization, using sanitizers, washing hands, and staying home increase the awareness of the masses. Moreover, testing policies help to separate the suspected cases. Countries like Japan and South Korea had controlled the local outbreaks in the very early phases of the pandemic through extensive testing and contact tracing. In time health care policies increase the confidence of the investors in government to prevent the pandemic that causes the positive return rate in the market. Government economic relief policies, to some extent, counter the adverse impact of the pandemic. Economic packages, relief in debt payments, restrictions on lay off are good economic

¹ <https://gref.org.pk/en/about-us>.

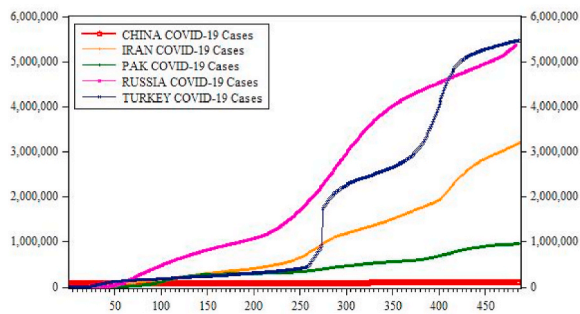


Fig. 1. Stock market returns of GREF countries for the period of March 01, 2020 to June 30, 2021.
Source: Author Estimation.

Table 1
Countries and stock market indices.

| Country | Stock Exchange | Stock Market Index |
|----------|-------------------------------|----------------------|
| Pakistan | Pakistan Stock Exchange (PSX) | Karachi 100 |
| China | Shenzhen Stock Exchange | SZSE Composite Index |
| Iran | Tehran Stock Exchange | TEDPIX |
| Russia | Moscow Stock Exchange | MOEX Russia Index |
| Turkey | Istanbul Stock Exchange | BIST 100 Index |

measures to reduce unemployment and uncertainties. Therefore, investors might react positively to such actions, and the market responded positively to such economic policies.

This paper is different in several viewpoints from the current literature. First, the existing literature largely overlooks the effects of economic policies or COVID control policies adopted by governments in response to COVID-19 at the industry stock returns for a single country. This study looks at the impact of government relief and more stringent measures on stock return (Bouri et al., 2021). analyze the New Zealand government reaction to industry returns (Rababah et al., 2020). apply an event study to uncover the effect of the COVID-19 outbreak on stock sector returns in China (Shahzad et al., 2021). indicate evidence of heterogeneity in the pandemic effect on the performance of the American equity sectors (Balli et al., 2020). study returns and volatility transmission from local and global economic policy uncertainties (EPU) and sectoral stock indices.

Secondly, the existing study focuses on a research gap that involves the context of GREF economies. Several studies have focused on different economic blocs, e.g. (Narayan et al., 2021) focused on G7 countries (Dergiades et al., 2020), focus was on 32 countries (Chang et al., 2021), focus was on 20 countries analyze the impact of COVID-19 and various government interventions on the stock market returns of OECD countries. However, none of the studies has focused on the GREF bloc. That will provide a new insight to the newly developed economic bloc for their business and economic partnership. The current study is

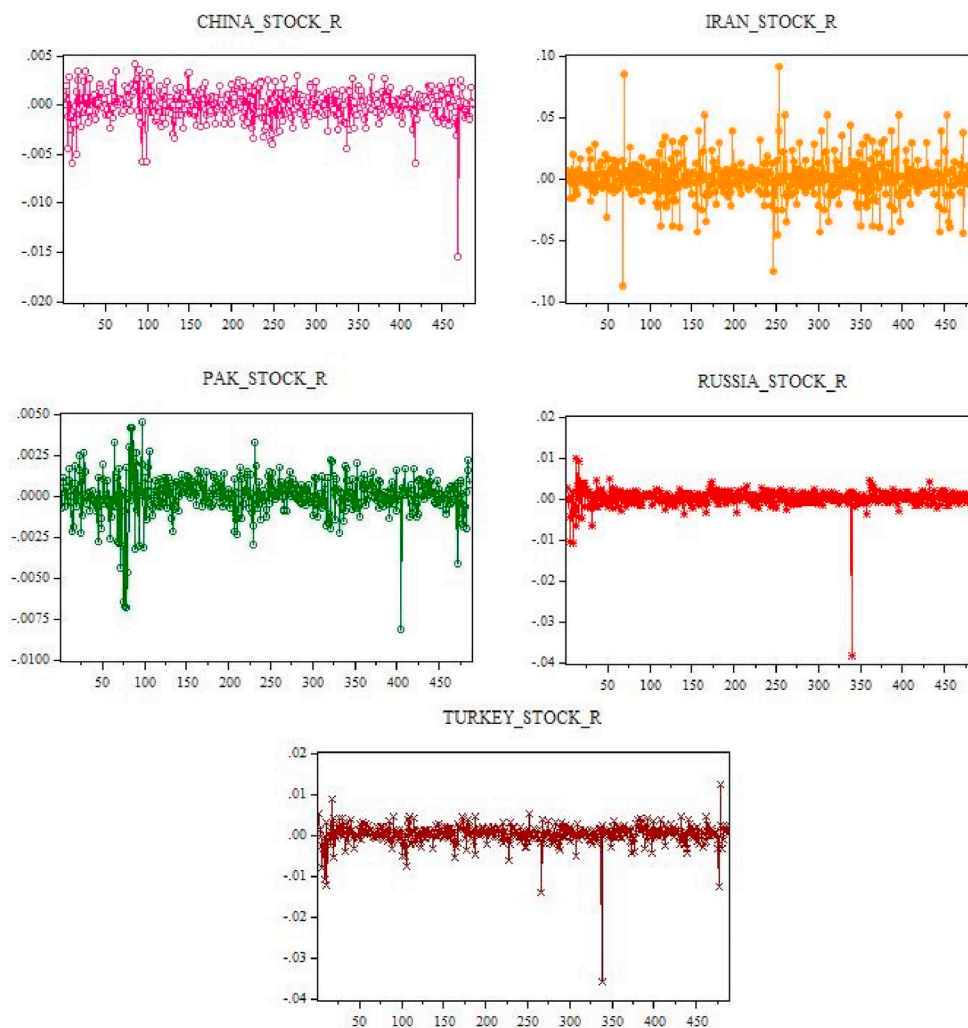


Fig. 2. Stock market returns of GREF countries for the period of March 01, 2020 to June 30, 2021.
Source: Author Estimation.

one of the earliest to reveal the special effects of the various government policies announced during COVID-19 on returns in Golden Ring Economic forum countries.

3. Methodology

3.1. Data and variables

The present study examines the impact of governments' economic policies and the more stringent policies during COVID-19 policies on the stock returns of GREF countries. The sample data consists of five countries that include the newly emerging green bloc. The GREF countries include Pakistan, China, Russia, Iran, and Turkey. GREF economic bloc is called Golden Ring because the countries included in this bloc possess more than thirty percent (30%) of human and natural resources of the world. This bloc is called ring because of a ring formation of countries included around Central Asia and Afghanistan (GREF, 2021). The panel data stock returns and governments' economic and COVID-19 policies are collected from March 01, 2020 to June 30, 2021 (see Fig. 1).

3.1.1. Dependent variable (stock returns)

The dependent variable of this study is stock market returns. The stock markets data of GREF countries were collected from the respective countries' stock exchanges and Investing.com. The stock markets and indices used in this study are shown in Table 1.

Stock market returns are calculated as;

$$\text{Stock Returns (STOCK}_R) = \ln(\text{STOCK}_t / \text{STOCK}_{t-1}) \quad (1)$$

Where.

STOCK_R = Daily stock returns of selected country indices
 Ln = Natural log of daily stock market prices of the selected index
 STOCK_t = Stock market index closing value at the day end
 STOCK_{t-1} = Stock market index closing value of the previous day

Fig. 2 shows the graphical representation of calculated stock markets returns of GREF countries. We can see that in Iran and Pakistan, stock returns have more enormous vitality due to COVID-19 shock than China, Russia, and Turkey.

3.1.2. Independent variables

The independent variables used in this study consist of total confirmed COVID-19 cases, governments' COVID-19, and economic policies. The data was collected from Johns Hopkins University Coronavirus Resource Centre (JHU-CRC) and Oxford COVID-19 Government Response Tracker (OxCGRT) databases. The description of variables used for analysis are as follows:

3.1.2.1. Total confirmed COVID-19 cases (COVID). Total confirmed COVID-19 cases (COVID) is described as the total number of confirmed COVID-19 cases per day of selected countries.

3.1.2.2. Income support (INCOME_S). Income support (INCOME_S) indicates governments' income assistance for household services during the COVID-19 pandemic. It captures the economic policy of the country during the pandemic. The income support index ranges between 0 and 100. It captures whether the government provides direct cash payments or salaries to the people who lose their jobs due to the COVID-19 pandemic.

3.1.2.3. Debt relief (DEBT_R). Debt relief (DEBT_R) indicates governments' debt relief for household services during the COVID-19 pandemic. It also captures the economic policy of the country during the pandemic. The index ranges from 0 to 100 and captures if the government is freezing its financial obligations for the public, such as

stopping loan repayments, banning evictions, etc.

3.1.2.4. Containment and health index (HEALTH). Containment and health index (HEALTH) is based on the government's policies related to public awareness programs and communication tracing of COVID-19. The index ranges between 0 and 100, in which a higher score indicates response.

3.1.2.5. Cancellation of public events (C_PUB_EVN). Cancellation of public events (C_PUB_EVN) is government policy related to canceling public events during the COVID-19 pandemic. It ranges from 0 to 1, where. 0 is assigned when the government takes no measures, one is assigned when the government recommends canceling events, and two is assigned when it requires canceling.

3.1.2.6. COVID-19 testing policies (TEST). COVID-19 testing policies (TEST) are measured as governments' policies related to the testing of COVID-19 of anyone showing symptoms and meeting specific criteria such as; overseas returned, key workers, persons admitted to hospital, etc.

3.1.2.7. Face covering policies (FACE). Face covering policies (FACE) is the indicator for governments' policies related to face-covering of the public outside the homes. It has five categories, i.e., no policy for face covering, recommended for face covering, required at specific public places, required all public places, and required outside home regardless of location.

3.1.2.8. International travel control (INT_TR). International travel control (INT_TR) is a metric that measures the government's policies related to the control of international travel. It captures four categories, i.e., no measures, screening of travelers, quarantine for arrival from high-risk infected countries, the ban on high-risk countries and regions, and total border closure.

3.1.2.9. Restrictions on public gatherings (RES_PU_GA). Restrictions on public gatherings (RES_PU_GA) capture the policies related to the restriction on public level gatherings during COVID-19. It has four dimensions, i.e., no restrictions, restrictions on huge gatherings (1000 or more persons), restrictions on gatherings between 100 and 1000 persons, restrictions on gathering between 10 and 100 persons, and restrictions on gathering less than ten persons.

3.1.2.10. School closure (SCHOOL). School closure (SCHOOL) captures the governments' policy related to the school closure during the COVID-19 pandemic. It has three categories, i.e., the government takes no measures, it recommended closing, require closing just high or public schools and all levels closure.

3.1.2.11. Stringency index (STI). Stringency Index (STI) is calculated by The Oxford Coronavirus Government Response Tracker (OxCGRT), a composite of several governments' policy-related matrices, such as the closure of transport and school closure stay at home requirements, restrictions on internal movements and international travel controls, etc.

3.1.2.12. Workplace closure index (WORK). The workplace closure index (WORK) captures the policies related to the closure of workplaces during COVID-19 pandemic lockdowns. It has three dimensions: no measures by the government, complete work from home, partial work from home for some sectors of some class of workers, and work from home for essential workplaces only.

3.2. Empirical analysis techniques

This study incorporates different econometric techniques, i.e.,

Table 2
Summary statistics of Pakistan sample.

| | STOCK_R | WORK | TEST | STI | SCHOOL | RES_PU_GA | INT_TR | INCOME_S | HEALTH | FACE | DEBT_R | COVID | C_PUB_EVN |
|--------------|---------|--------|-------|--------|--------|-----------|--------|----------|--------|--------|--------|------------|-----------|
| Mean | 0.022 | 2.151 | 2.148 | 63.400 | 2.231 | 3.728 | 2.085 | 0.922 | 59.877 | 2.847 | 1.742 | 401808.900 | 1.847 |
| Median | 0.010 | 2 | 2 | 61.110 | 2 | 4 | 2 | 1 | 61.310 | 3 | 2 | 332993 | 2 |
| Maximum | 0.005 | 3 | 3 | 96.300 | 3 | 4 | 4 | 1 | 78.150 | 4 | 2 | 957371 | 2 |
| Minimum | -0.008 | 0 | 1 | 39.350 | 0 | 0 | 1 | 0 | 24.400 | 0 | 0 | 5 | 0 |
| Std. Dev. | 0.001 | 0.914 | 0.540 | 13.887 | 0.934 | 0.758 | 0.931 | 0.269 | 9.665 | 1.425 | 0.615 | 284338.400 | 0.418 |
| Skewness | -1.538 | -0.643 | 0.098 | 0.857 | -1.235 | -3.349 | 0.770 | -3.138 | -1.194 | -1.257 | -2.187 | 0.354 | -2.811 |
| Kurtosis | 11.537 | 2.242 | 3.124 | 3.052 | 3.704 | 14.803 | 2.853 | 10.848 | 5.633 | 3.109 | 6.199 | 2.195 | 10.488 |
| Observations | 485 | 485 | 485 | 485 | 485 | 485 | 485 | 485 | 485 | 485 | 485 | 485 | 485 |

Table 3
Correlation matrix of Pakistan sample.

| | STOCK_R | WORK | TEST | STI | SCHOOL | RES_PU_GA | INT_TR | INCOME_S | HEALTH | FACE | DEBT_R | COVID | C_PUB_EVN |
|-----------|---------|--------|--------|--------|--------|-----------|--------|----------|--------|-------|--------|-------|-----------|
| STOCK_R | 1 | - | - | - | - | - | - | - | - | - | - | - | - |
| WORK | -0.021 | 1 | - | - | - | - | - | - | - | - | - | - | - |
| TEST | -0.039 | 0.277 | 1 | - | - | - | - | - | - | - | - | - | - |
| STI | -0.094 | -0.054 | -0.323 | 1 | - | - | - | - | - | - | - | - | - |
| SCHOOL | 0.022 | -0.264 | -0.306 | 0.463 | 1 | - | - | - | - | - | - | - | - |
| RES_PU_GA | -0.046 | 0.584 | 0.321 | -0.122 | -0.150 | 1 | - | - | - | - | - | - | - |
| INT_TR | -0.102 | -0.190 | -0.608 | 0.650 | 0.626 | -0.096 | 1 | - | - | - | - | - | - |
| INCOME_S | -0.029 | 0.258 | 0.620 | -0.623 | -0.240 | 0.341 | -0.444 | 1 | - | - | - | - | - |
| HEALTH | -0.007 | 0.736 | 0.459 | 0.016 | -0.118 | 0.727 | 0.002 | 0.367 | 1 | - | - | - | - |
| FACE | 0.098 | 0.341 | 0.513 | -0.668 | -0.461 | 0.172 | -0.814 | 0.583 | 0.165 | 1 | - | - | - |
| DEBT_R | 0.002 | 0.209 | 0.613 | -0.791 | -0.346 | 0.239 | -0.727 | 0.827 | 0.177 | 0.840 | 1 | - | - |
| COVID | 0.015 | 0.316 | 0.834 | -0.410 | -0.580 | 0.243 | -0.825 | 0.411 | 0.366 | 0.672 | 0.582 | 1 | - |
| C_PUB_EVN | -0.049 | 0.579 | 0.301 | -0.004 | -0.111 | 0.872 | -0.084 | 0.297 | 0.755 | 0.190 | 0.200 | 0.247 | 1 |

descriptive statistics, correlation matrix, panel unit root test, Pooled Mean Group (PMG) Estimation technique, panel Autoregressive Distributive Lag (ARDL) model. Our sample data is a panel of five countries with 2425 (485 × 5) observations. Descriptive statistics help us look at the data initially and provide summaries of the variables included. The correlation matrix shows the correlation among the variables included in the model, through which we identify the highly correlated variables (Peatman, 1947). Finally, to achieve the purpose of this study, we perform a unit root test to find out the stationarity levels of the variables included in the model. After finding the stationarity of

the data, we applied a pooled mean group estimation technique to determine the impact of governments' economic and stringent COVID-19 policies during pandemics on the stock returns of GREF countries.

The use of first-generation diagnostics techniques such as descriptive statistics and correlation matrix, before applying PMG estimator, help to look at the issues of multicollinearity because the purpose is to initially overlook the data and variables to sort out the normality and multicollinearity problem in the model (Ahmad et al., 2020; Altiner et al., 2021; Jiang et al., 2021; Shen et al., 2021).

The econometric panel data model of this study to find the impact of

Table 4
Summary statistics of China sample.

| | STOCK_R | WORK | TEST | STI | SCHOOL | RES_PU_GA | INT_TR | INCOME_S | HEALTH | FACE | DEBT_R | COVID | C_PUB_EVN |
|--------------|---------|--------|--------|--------|--------|-----------|--------|----------|--------|-------|--------|-----------|-----------|
| Mean | 0.034 | 2.348 | 2.940 | 71.260 | 2.288 | 3.889 | 2.949 | 0.918 | 70.929 | 2.543 | 1.337 | 86465.430 | 1.957 |
| Median | 0.015 | 2 | 3 | 78.240 | 3 | 4 | 3 | 1 | 72.920 | 2 | 2 | 86031 | 2 |
| Maximum | 0.004 | 3 | 3 | 81.940 | 3 | 4 | 3 | 1 | 78.630 | 4 | 2 | 91846 | 2 |
| Minimum | -0.015 | 1 | 2 | 46.760 | 0 | 1 | 2 | 0 | 52.680 | 2 | 0 | 80036 | 1 |
| Std. Dev. | 0.002 | 0.606 | 0.237 | 9.912 | 0.844 | 0.431 | 0.221 | 0.275 | 6.568 | 0.865 | 0.744 | 3286.683 | 0.204 |
| Skewness | -2.094 | -0.346 | -3.718 | -0.779 | -0.955 | -4.940 | -4.061 | -3.040 | -1.033 | 1.026 | -0.634 | 0.067 | -4.493 |
| Kurtosis | 18.687 | 2.334 | 14.822 | 2.205 | 3.039 | 30.493 | 17.494 | 10.240 | 3.162 | 2.128 | 2.054 | 1.750 | 21.188 |
| Observations | 485 | 485 | 485 | 485 | 485 | 485 | 485 | 485 | 485 | 485 | 485 | 485 | 485 |

Table 5
Correlation matrix of China sample.

| | STOCK_R | WORK | TEST | STI | SCHOOL | RES_PU_GA | INT_TR | INCOME_S | HEALTH | FACE | DEBT_R | COVID | C_PUB_EVN |
|-----------|---------|--------|--------|--------|--------|-----------|--------|----------|--------|-------|--------|--------|-----------|
| STOCK_R | 1 | - | - | - | - | - | - | - | - | - | - | - | - |
| WORK | -0.018 | 1 | - | - | - | - | - | - | - | - | - | - | - |
| TEST | 0.065 | -0.271 | 1 | - | - | - | - | - | - | - | - | - | - |
| STI | 0.012 | 0.098 | 0.098 | 1 | - | - | - | - | - | - | - | - | - |
| SCHOOL | 0.005 | -0.099 | -0.213 | 0.500 | 1 | - | - | - | - | - | - | - | - |
| RES_PU_GA | -0.023 | 0.314 | -0.065 | 0.014 | 0.077 | 1 | - | - | - | - | - | - | - |
| INT_TR | 0.065 | -0.235 | 0.885 | 0.047 | -0.174 | -0.038 | 1 | - | - | - | - | - | - |
| INCOME_S | 0.045 | -0.224 | 0.841 | 0.203 | -0.253 | -0.077 | 0.744 | 1 | - | - | - | - | - |
| HEALTH | -0.044 | 0.479 | -0.046 | 0.183 | -0.004 | 0.375 | -0.045 | 0.023 | 1 | - | - | - | - |
| FACE | -0.073 | -0.086 | -0.063 | 0.233 | 0.305 | 0.162 | -0.091 | -0.002 | 0.385 | 1 | - | - | - |
| DEBT_R | -0.039 | -0.352 | 0.453 | 0.095 | -0.112 | -0.018 | 0.406 | 0.539 | 0.376 | 0.381 | 1 | - | - |
| COVID | -0.040 | -0.439 | 0.427 | -0.084 | -0.229 | -0.074 | 0.390 | 0.487 | 0.240 | 0.099 | 0.880 | 1 | - |
| C_PUB_EVN | -0.033 | 0.473 | -0.054 | -0.127 | -0.179 | 0.439 | -0.049 | -0.064 | 0.215 | 0.134 | -0.189 | -0.242 | 1 |

Table 6
Summary statistics of Russia sample.

| | STOCK_R | WORK | TEST | STI | SCHOOL | RES_PU_GA | INT_TR | INCOME_S | HEALTH | FACE | DEBT_R | COVID | C_PUB_EVN |
|--------------|---------|--------|--------|--------|--------|-----------|--------|----------|--------|--------|--------|---------|-----------|
| Mean | 0.068 | 1.770 | 2.579 | 52.834 | 1.768 | 3.054 | 3.141 | 1.151 | 48.459 | 2.035 | 0.979 | 2230203 | 1.718 |
| Median | 0.022 | 2 | 3 | 47.690 | 2 | 3 | 3 | 1 | 52.680 | 2 | 1 | 1561737 | 2 |
| Maximum | 0.010 | 3 | 3 | 87.040 | 3 | 4 | 4 | 2 | 79.460 | 4 | 2 | 5367317 | 2 |
| Minimum | -0.038 | 0 | 1 | 8.330 | 0 | 0 | 2 | 0 | 0.000 | 0 | 0 | 3 | 0 |
| Std. Dev. | 0.002 | 0.647 | 0.624 | 16.136 | 1.085 | 1.048 | 0.533 | 0.615 | 20.408 | 0.811 | 0.810 | 1821054 | 0.697 |
| Skewness | -8.490 | -0.430 | -1.198 | 0.611 | -0.635 | -1.864 | 0.123 | -0.101 | -0.993 | -1.047 | 0.038 | 0.318 | -2.062 |
| Kurtosis | 134.704 | 3.445 | 3.322 | 2.659 | 2.109 | 6.250 | 3.225 | 2.542 | 3.571 | 4.817 | 1.527 | 1.515 | 5.252 |
| Observations | 485 | 485 | 485 | 485 | 485 | 485 | 485 | 485 | 485 | 485 | 485 | 485 | 485 |

Table 7
Correlation matrix of Russia sample.

| | STOCK_R | WORK | TEST | STI | SCHOOL | RES_PU_GA | INT_TR | INCOME_S | HEALTH | FACE | DEBT_R | COVID | C_PUB_EVN |
|-----------|---------|--------|--------|--------|--------|-----------|--------|----------|--------|-------|--------|-------|-----------|
| STOCK_R | 1 | - | - | - | - | - | - | - | - | - | - | - | - |
| WORK | 0.076 | 1 | - | - | - | - | - | - | - | - | - | - | - |
| TEST | 0.071 | 0.603 | 1 | - | - | - | - | - | - | - | - | - | - |
| STI | 0.043 | 0.753 | 0.336 | 1 | - | - | - | - | - | - | - | - | - |
| SCHOOL | 0.023 | 0.708 | 0.555 | 0.782 | 1 | - | - | - | - | - | - | - | - |
| RES_PU_GA | 0.035 | 0.371 | 0.219 | 0.665 | 0.371 | 1 | - | - | - | - | - | - | - |
| INT_TR | 0.001 | 0.378 | 0.092 | 0.714 | 0.420 | 0.385 | 1 | - | - | - | - | - | - |
| INCOME_S | -0.025 | -0.539 | -0.175 | -0.533 | -0.614 | 0.000 | -0.268 | 1 | - | - | - | - | - |
| HEALTH | 0.005 | -0.040 | 0.527 | -0.099 | 0.070 | 0.141 | -0.042 | 0.451 | 1 | - | - | - | - |
| FACE | -0.013 | 0.134 | 0.567 | 0.148 | 0.255 | 0.284 | 0.186 | 0.377 | 0.609 | 1 | - | - | - |
| DEBT_R | 0.039 | 0.732 | 0.735 | 0.763 | 0.759 | 0.459 | 0.503 | -0.549 | 0.272 | 0.317 | 1 | - | - |
| COVID | -0.011 | -0.552 | -0.277 | -0.635 | -0.637 | -0.088 | -0.414 | 0.817 | 0.142 | 0.183 | -0.711 | 1 | - |
| C_PUB_EVN | 0.007 | -0.237 | 0.395 | -0.408 | -0.197 | -0.002 | -0.341 | 0.682 | 0.850 | 0.577 | -0.069 | 0.489 | 1 |

COVID-19 policies on stock returns of GREF countries is given in equation (2):

$$STOCK_R_{it} = \alpha_0 + \alpha_1 INCOME_S_{it} + \alpha_2 DEBT_R_{it} + \alpha_3 WORK_{it} + \alpha_4 TEST_{it} + \alpha_5 STI_{it} +$$

$$\alpha_6 SCHOOL_{it} + \alpha_7 RES_PU_GA_{it} + \alpha_8 INT_TR_{it} + \alpha_9 HEALTH_{it} + \alpha_{10} FACE_{it} + \alpha_{11} COVID_{it} + \alpha_{12} C_PUB_EVN_{it} + \varepsilon_i \quad (2)$$

In the above equation, *i* represents countries included in the panel (Pakistan, China, Iran, Russia, and Turkey), and *t* represents the time period of the study, which is March 01, 2020 to June 30, 2021.

Table 8
Summary statistics of Iran sample.

| | STOCK_R | WORK | TEST | STI | SCHOOL | RES_PU_GA | INT_TR | INCOME_S | HEALTH | FACE | DEBT_R | COVID | C_PUB_EVN |
|--------------|---------|--------|--------|--------|--------|-----------|--------|----------|--------|--------|--------|---------|-----------|
| Mean | 0.011 | 2.342 | 1.329 | 66.327 | 2.691 | 2.401 | 2.191 | 0.823 | 55.579 | 1.864 | 1.292 | 1025604 | 1.955 |
| Median | -0.043 | 3 | 1 | 70.830 | 3 | 3 | 3 | 1 | 57.140 | 2 | 1 | 608862 | 2 |
| Maximum | 0.092 | 3 | 2 | 81.480 | 3 | 4 | 3 | 1 | 71.550 | 3 | 2 | 3204557 | 2 |
| Minimum | -0.088 | 0 | 0 | 41.670 | 1 | 0 | 0 | 0 | 13.100 | 0 | 0 | 1501 | 1 |
| Std. Dev. | 0.017 | 0.903 | 0.731 | 12.369 | 0.548 | 1.644 | 1.333 | 0.382 | 12.386 | 1.248 | 0.683 | 954430 | 0.208 |
| Skewness | 0.210 | -1.415 | -0.599 | -0.475 | -1.589 | -0.320 | -1.039 | -1.693 | -0.639 | -0.539 | -0.444 | 0.824 | -4.375 |
| Kurtosis | 7.824 | 4.198 | 2.075 | 1.984 | 4.573 | 1.393 | 2.079 | 3.866 | 2.697 | 1.624 | 2.166 | 2.443 | 20.138 |
| Observations | 485 | 485 | 485 | 485 | 485 | 485 | 485 | 485 | 485 | 485 | 485 | 485 | 485 |

Table 9
Correlation matrix of Iran sample.

| | STOCK_R | WORK | TEST | STI | SCHOOL | RES_PU_GA | INT_TR | INCOME_S | HEALTH | FACE | DEBT_R | COVID | C_PUB_EVN |
|-----------|---------|--------|--------|--------|--------|-----------|--------|----------|--------|--------|--------|-------|-----------|
| STOCK_R | 1 | - | - | - | - | - | - | - | - | - | - | - | - |
| WORK | -0.013 | 1 | - | - | - | - | - | - | - | - | - | - | - |
| TEST | -0.019 | -0.196 | 1 | - | - | - | - | - | - | - | - | - | - |
| STI | -0.006 | 0.446 | 0.028 | 1 | - | - | - | - | - | - | - | - | - |
| SCHOOL | -0.003 | -0.170 | -0.121 | 0.191 | 1 | - | - | - | - | - | - | - | - |
| RES_PU_GA | 0.004 | 0.516 | 0.053 | 0.893 | 0.044 | 1 | - | - | - | - | - | - | - |
| INT_TR | -0.002 | 0.230 | 0.407 | 0.781 | 0.149 | 0.784 | 1 | - | - | - | - | - | - |
| INCOME_S | 0.001 | 0.259 | 0.106 | 0.056 | -0.261 | 0.077 | 0.156 | 1 | - | - | - | - | - |
| HEALTH | -0.005 | 0.520 | 0.312 | 0.811 | -0.086 | 0.821 | 0.855 | 0.359 | 1 | - | - | - | - |
| FACE | 0.005 | 0.290 | 0.375 | 0.796 | 0.011 | 0.771 | 0.864 | 0.062 | 0.881 | 1 | - | - | - |
| DEBT_R | 0.009 | -0.182 | -0.020 | -0.655 | -0.078 | -0.690 | -0.453 | 0.514 | -0.362 | -0.543 | 1 | - | - |
| COVID | -0.006 | 0.558 | 0.062 | 0.721 | -0.474 | 0.705 | 0.582 | 0.315 | 0.812 | 0.690 | -0.416 | 1 | - |
| C_PUB_EVN | 0.021 | 0.082 | -0.200 | 0.139 | -0.087 | 0.294 | 0.314 | -0.101 | 0.222 | 0.199 | -0.226 | 0.181 | 1 |

Table 10
Summary statistics of Turkey sample.

| | STOCK_R | WORK | TEST | STI | SCHOOL | RES_PU_GA | INT_TR | INCOME_S | HEALTH | FACE | DEBT_R | COVID | C_PUB_EVN |
|--------------|---------|--------|---------|--------|--------|-----------|--------|----------|--------|--------|--------|---------|-----------|
| Mean | 0.009 | 1.786 | 1.994 | 66.527 | 2.305 | 2.033 | 2.348 | 1.652 | 58.535 | 3.202 | 1.152 | 1737166 | 1.667 |
| Median | 0.039 | 2 | 2 | 68.060 | 2 | 3 | 3 | 2 | 65.180 | 4 | 2 | 398095 | 2 |
| Maximum | 0.012 | 3 | 2 | 87.040 | 3 | 4 | 4 | 2 | 86.430 | 4 | 2 | 5472127 | 2 |
| Minimum | -0.036 | 0 | 1 | 19.440 | 0 | 0 | 1 | 0 | 0.000 | 0 | 0 | 1 | 0 |
| Std. Dev. | 0.003 | 0.559 | 0.078 | 12.465 | 0.714 | 1.745 | 1.079 | 0.730 | 20.613 | 1.600 | 0.929 | 1900414 | 0.727 |
| Skewness | -4.784 | -1.012 | -12.610 | -1.490 | -0.996 | -0.155 | -0.072 | -1.717 | -1.489 | -1.503 | -0.306 | 0.810 | -1.787 |
| Kurtosis | 55.784 | 4.766 | 160.006 | 6.346 | 4.240 | 1.255 | 1.618 | 4.089 | 4.234 | 3.260 | 1.231 | 2.166 | 4.291 |
| Observations | 485 | 485 | 485 | 485 | 485 | 485 | 485 | 485 | 485 | 485 | 485 | 485 | 485 |

closures carry high social and economic costs for people across communities. Their impact, however, is particularly severe for the most vulnerable and marginalized families. The resulting disruptions exacerbate existing disparities within the education system and in other aspects of their lives, including social isolation, increased exposure to violence and exploitation, and high economic costs. The government face-covering policies may also affect the stock markets in such a way that, when there is a compulsion on wearing face masks, the people must buy masks, and therefore, the demand for face masks in the market ultimately rises and stocks prices of pharmaceuticals and biotechnology companies can be affected (Li et al., 2021).

The outbreak of the COVID-19 pandemic came as a rare, unprecedented event, and governments around the globe scrambled with emergency actions, including social distancing measures, public awareness programs, testing and quarantining policies, and income support packages, and debt relief by the governments. These all consequences may lead to affect the overall financial markets and investment behaviors of individuals. For example (Ashraf, 2020), conducted a study on 77 countries and found that announcements of government social distancing measures directly negatively affect stock market returns due to their adverse effect on economic activity. In contrast, an indirect positive effect through the reduction in COVID-19 confirmed cases. Government announcements regarding public awareness programs, testing and quarantining policies, and income support packages largely result in positive market returns. This paper is the first attempt to analyze the stock markets' evaluation of government policies amid the COVID-19 pandemic.

3.2.1. Panel unit root test

The unit root test is performed to identify the level of stationarity of variables included in the empirical analysis because the model selection is based on stationarity. Different panel unit root tests have been developed and widely used over the last decade (Hlouskova and Wagner, 2006). This study's panel unit root test consists of two tests, the Levin, Lin & Chu (LLC) and Breitung. The Levin, Lin & Chu test further extends the Augmented Dickey-Fuller (ADF) test. The ADF test has been extended to the panel data sets to find the stationarity of variables with various degrees of heterogeneity (Levin et al., 1992) and (Pesaran et al., 1997). The main purpose of the panel unit root test application is to increase the power of the increased number of panels (Karlsson and Löthgren, 2000). Levin, Lin & Chu test allows for heterogeneity by the unit-specific fixed effect and the dependent lag coefficients because heterogeneity was not dealt with ADF test (Huang et al., 2020). Similarly (Breitung, 2001), developed a panel unit root test that does not require bias correction factors, and due to its pooled construction, the Breitung test is the test against homogeneous alternatives. Breitung test consists of t ratio type test statistics with nice power properties within the local neighborhood of unity (Moon et al., 2006).

3.2.2. Pooled mean group estimation (panel ARDL)

The use of dynamic panel data models has been increased in recent years because of the researcher's interest in cross-country analysis and where the number of time series observations is larger than the number of groups (countries). Generally, the parameters of interest are long-run effects (Boyd and Smith, 1999). Two commonly used procedures for such types of panel data are; the mean group estimator (MG) and pooled mean group estimator (PMG). In MG, the particular interest is the mean estimates (Pesaran and Smith, 1995). In earlier work showed that MG would produce consistent estimates of the average parameters of the model. However, MG does not take the fact that some parameters may not be the same across the groups. In other types of traditional pooled estimators, i.e., fixed effect and random effect, the intercepts are allowed to be the different across the groups, while all other parameters of the model such as, error variances and coefficients are constrained to be the same. Pooled mean group estimator (PMG)/panel ARDL, developed by (Pesaran et al., 1999), allows the short-run coefficients of the

Table 11
Correlation matrix of Turkey sample.

| | STOCK_R | WORK | TEST | STI | SCHOOL | RES_PU_GA | INT_TR | INCOME_S | HEALTH | FACE | DEBT_R | COVID | C_PUB_EVN |
|-----------|---------|--------|--------|--------|--------|-----------|--------|----------|--------|-------|--------|-------|-----------|
| STOCK_R | 1 | – | – | – | – | – | – | – | – | – | – | – | – |
| WORK | 0.103 | 1 | – | – | – | – | – | – | – | – | – | – | – |
| TEST | 0.020 | –0.030 | 1 | – | – | – | – | – | – | – | – | – | – |
| STI | 0.090 | 0.667 | –0.048 | 1 | – | – | – | – | – | – | – | – | – |
| SCHOOL | 0.118 | 0.262 | 0.034 | 0.183 | 1 | – | – | – | – | – | – | – | – |
| RES_PU_GA | –0.031 | 0.453 | 0.001 | 0.366 | –0.425 | 1 | – | – | – | – | – | – | – |
| INT_TR | –0.005 | –0.020 | 0.025 | 0.375 | 0.098 | –0.427 | 1 | – | – | – | – | – | – |
| INCOME_S | –0.003 | 0.100 | –0.038 | 0.138 | 0.251 | 0.075 | –0.331 | 1 | – | – | – | – | – |
| HEALTH | 0.010 | 0.152 | –0.070 | 0.228 | –0.124 | 0.464 | –0.385 | 0.353 | 1 | – | – | – | – |
| FACE | –0.012 | 0.122 | –0.039 | 0.037 | –0.184 | 0.582 | –0.618 | 0.270 | 0.837 | 1 | – | – | – |
| DEBT_R | –0.033 | –0.056 | 0.098 | –0.250 | 0.428 | 0.091 | –0.536 | 0.556 | 0.096 | 0.276 | 1 | – | – |
| COVID | –0.009 | 0.217 | –0.147 | 0.407 | –0.552 | 0.444 | 0.060 | –0.028 | 0.611 | 0.431 | –0.597 | 1 | – |
| C_PUB_EVN | –0.016 | 0.108 | –0.036 | 0.094 | –0.062 | 0.444 | –0.462 | 0.341 | 0.922 | 0.820 | 0.283 | 0.397 | 1 |

Table 12
Panel unit root test.

| Variables | Panel Unit Root Test At (Level) | | | Panel Unit Root Test At (1st Difference) | | | | |
|-----------|---------------------------------|----------|-------------------------|--|---------------------------------|----------|-------------------------|----------|
| | Levin, Lin & Chu Test statistic | Prob. | Breitung Test statistic | Prob. | Levin, Lin & Chu Test statistic | Prob. | Breitung Test statistic | Prob. |
| STOCK_R | –0.535 | 0.296 | –1.404 | 0.080* | –11.682 | 0.000*** | –4.986 | 0.000*** |
| INCOME_S | –3.220 | 0.000*** | –0.123 | 0.046** | –15.562 | 0.000*** | –21.562 | 0.000*** |
| DEBT_R | 2.887 | 0.000*** | 0.200 | 0.057* | –31.183 | 0.000*** | –21.588 | 0.000*** |
| WORK | –1.959 | 0.025** | –0.934 | 0.175 | –28.823 | 0.000*** | –9.057 | 0.000*** |
| TEST | –4.172 | 0.000*** | –0.997 | 0.159 | –33.220 | 0.000*** | –21.971 | 0.000*** |
| STI | –2.990 | 0.000*** | –1.351 | 0.088* | –21.840 | 0.000*** | –5.404 | 0.000*** |
| SCHOOL | –0.526 | 0.300 | 0.695 | 0.756 | –32.008 | 0.000*** | –20.028 | 0.000*** |
| RES_PU_GA | –1.106 | 0.134 | –1.631 | 0.051* | –30.449 | 0.000*** | –21.450 | 0.000*** |
| INT_TR | –0.815 | 0.208 | –1.764 | 0.038** | –33.093 | 0.000*** | –21.982 | 0.000*** |
| HEALTH | –3.052 | 0.000*** | –0.064 | 0.475 | –12.153 | 0.000*** | –4.518 | 0.000*** |
| FACE | 0.256 | 0.601 | –0.683 | 0.247 | –37.013 | 0.000*** | –21.127 | 0.000*** |
| COVID | –7.071 | 0.000*** | –3.460 | 0.000*** | 0.068 | 0.000*** | 2.593 | 0.000*** |
| C_PUB_EVN | –2.028 | 0.021** | –1.972 | 0.024** | –28.804 | 0.000*** | –21.528 | 0.000*** |

Table 13
Panel long-run results of pooled mean group estimation.

| Long-run results of Pooled Mean Group estimation | | | | |
|--|-------------|------------|-------------|----------|
| Dependent variable: LN_STOCK_R | | | | |
| Variables | Coefficient | Std. Error | T-Statistic | P-value |
| INCOME_S | 0.039 | 0.023 | 1.665 | 0.096* |
| DEBT_R | –0.020 | 0.033 | –0.604 | 0.546 |
| WORK | 0.074 | 0.030 | 2.460 | 0.014** |
| TEST | 0.052 | 0.050 | 1.046 | 0.296 |
| STI | 0.010 | 0.002 | 4.426 | 0.000*** |
| SCHOOL | –0.088 | 0.029 | –3.054 | 0.002*** |
| RES_PU_GA | –0.043 | 0.016 | –2.709 | 0.006*** |
| INT_TR | –0.139 | 0.022 | –6.230 | 0.000*** |
| HEALTH | –0.002 | 0.002 | –1.145 | 0.252 |
| FACE | 0.010 | 0.017 | 0.627 | 0.531 |
| COVID | 0.006 | 0.016 | 0.364 | 0.716 |
| C_PUB_EVN | 0.072 | 0.043 | 1.670 | 0.095* |
| Observations | 2425 | | | |
| AIC | –3.907 | | | |
| HQC | –3.726 | | | |
| SC | –3.411 | | | |

model, including the speed of adjustment and the regression, intercepts to be the country level specific while restricting the long-run slope coefficients of the model to be the same across the groups. This method is called PMG because it takes both pooling and averaging. PMG allows us to estimate the long-run coefficient without assuming identical dynamics in each group or country.

The PMG estimator has three basic presumptions; first, the independent variables can be treated as exogenous where, the error terms of the model are serially uncorrelated and distributed independently; secondly, there is a long-run relationship between independent and

dependent variables; and finally, the long-run coefficients are the same across groups or countries (Megaravalli and Sampagnaro, 2018).

The motivation behind using the PMG estimator is that it allows us to compute the model’s short-run dynamics specifications to differ from country to country while making long-run coefficients of the model constrained to be the same. Unlike the dynamic ordinary least square model (DOLS) and fully modified ordinary least square model (FMOLS), the pooled mean group estimator also highlights the adjustment dynamics among the long-run and short-run. Our analysis is based on investigating the impact of governments’ economic relief and stringent COVID-19 policies on the stock returns of the GREF countries (Pakistan, China, Russia, Iran, and Turkey). The PMG estimator is a more suitable technique to capture the long-run and short-run dynamics of the individual countries. Using the PMG estimator, we can provide the multiplicity between stock returns and governments’ stringent COVID-19 policy variables and economic relief variables of GREF countries. Equation 3 describes the empirical model used in this study for panel estimations.

4. Results and discussion

4.1. Results of descriptive statistics and correlation matrix

This section presents country-wise summary statistics and a correlation matrix of all variables used in the study. Tables 2 and 3 show the results of descriptive statistics and correlation matrix of the Pakistan sample. Table 2 describes the results of the descriptive statistics in which the mean of STOCK_R is 0.022 with a standard deviation of 0.001, having 485 observations overall. The average confirmed COVID cases of the Pakistan sample is 401808.900 with a standard deviation of

Table 14
Panel short-run results of pooled mean group estimation.

| Short-run results of Pooled Mean Group estimation | | | | |
|---|-------------|------------|-------------|---------|
| Dependent variable: LN_STOCK_R | | | | |
| Variables | Coefficient | Std. Error | T-Statistic | P-value |
| Error correction | -0.064 | 0.036 | -1.799 | 0.072* |
| Constant | 1.420 | 1.197 | 1.186 | 0.236 |
| LN_STOCK_R (-1) | 0.009 | 0.036 | 0.252 | 0.801 |
| INCOME_S | 0.038 | 0.044 | 0.863 | 0.388 |
| INCOME_S (-1) | -0.010 | 0.013 | -0.753 | 0.452 |
| INCOME_S (-2) | -0.026 | 0.019 | -1.367 | 0.172 |
| DEBT_R | 0.018 | 0.026 | 0.697 | 0.486 |
| DEBT_R (-1) | -0.044 | 0.039 | -1.123 | 0.262 |
| DEBT_R (-2) | 0.002 | 0.007 | 0.322 | 0.747 |
| WORK | -0.014 | 0.016 | -0.879 | 0.379 |
| WORK (-1) | 0.024 | 0.018 | 1.329 | 0.184 |
| WORK (-2) | 0.022 | 0.025 | 0.889 | 0.374 |
| TEST | -0.022 | 0.032 | -0.684 | 0.494 |
| TEST (-1) | 0.055 | 0.057 | 0.968 | 0.333 |
| TEST (-2) | 0.077 | 0.072 | 1.071 | 0.284 |
| STI | 0.002 | 0.002 | 0.984 | 0.025** |
| STI (-1) | 0.001 | 0.002 | 0.717 | 0.473 |
| STI (-2) | 0.001 | 0.001 | 0.640 | 0.522 |
| SCHOOL | 0.036 | 0.032 | 1.117 | 0.264 |
| SCHOOL (-1) | 0.006 | 0.004 | 1.359 | 0.174 |
| SCHOOL (-2) | 0.026 | 0.024 | 1.053 | 0.293 |
| RES_PU_GA | 0.030 | 0.026 | 1.146 | 0.252 |
| RES_PU_GA (-1) | -0.061 | 0.063 | -0.961 | 0.337 |
| RES_PU_GA (-2) | -0.041 | 0.042 | -0.977 | 0.329 |
| INT_TR | 0.003 | 0.009 | 0.324 | 0.746 |
| INT_TR (-1) | 0.032 | 0.032 | 1.012 | 0.312 |
| INT_TR (-2) | -0.039 | 0.046 | -0.860 | 0.390 |
| HEALTH | -0.001 | 0.001 | -0.953 | 0.341 |
| HEALTH (-1) | -0.001 | 0.001 | -1.506 | 0.132 |
| HEALTH (-2) | -0.007 | 0.007 | -0.969 | 0.333 |
| FACE | -0.013 | 0.013 | -1.047 | 0.295 |
| FACE (-1) | 0.010 | 0.013 | -0.756 | 0.044** |
| FACE (-2) | 0.008 | 0.004 | -1.688 | 0.091* |
| COVID | -0.034 | 0.005 | -0.681 | 0.496 |
| COVID (-1) | 0.039 | 0.010 | 0.396 | 0.692 |
| COVID (-2) | -0.010 | 0.006 | -1.644 | 0.100 |
| C_PUB_EVN | 0.242 | 0.246 | 0.984 | 0.325 |
| C_PUB_EVN (-1) | -0.190 | 0.182 | -1.040 | 0.299 |
| C_PUB_EVN (-2) | 0.107 | 0.122 | 0.882 | 0.378 |
| Observations | 2425 | | | |
| AIC | -3.907 | | | |
| HQC | -3.726 | | | |
| SC | -3.411 | | | |

284338.400. The maximum number of COVID cases in Pakistan is 957371, and the minimum COVID cases are 5.

Similarly, all other variables show the normality of the data and provide an overall look. Table 3 provides the correlation matrix results, which show the correlation among all variables included in the study. We can see that all variables show weak correlation except HEALTH and WORK, COVID and TEST, RES_PU_GA, C_PUB_EVN, and HEALTH. Tables 4 and 5 show the results of descriptive statistics and correlation matrix of the China sample. In Table 3, the mean of STOCK_R of China is 0.034, with a standard deviation of 0.002. The average COVID case of China is 86465.430, with maximum cases 91846 and minimum cases 80036. The correlation matrix results of China reported a weak correlation among variables and confirmed no multicollinearity among Table 5.

Tables 6 and 7 show the results of the Russian sample's descriptive statistics and correlation matrix. In Table 6, the mean of STOCK_R of Russia is 0.068 with a standard deviation of 0.002. The average COVID case of Russia is 2230203, with maximum cases 5367317 and minimum cases 3. Table 7 reported correlation matrix results of Russia in which, majority of variables do not correlate DEBT_R, HEALTH, C_PUB_EVN, WORK, and STI. Tables 8 and 9 show the results of the Iran sample's descriptive statistics and correlation matrix. In Table 8, the mean of STOCK_R of Iran is 0.011, with a standard deviation of 0.017. The

Table 15
Short-run results of pooled mean group estimation Pakistan sample.

| Variables | Coefficient | Std. Error | T-Statistic | P-value |
|------------------|-------------|------------|-------------|----------|
| Error correction | 0.022 | 0.025 | 8.577 | 0.003*** |
| Constant | -0.002 | 0.003 | -0.718 | 0.525 |
| LN_STOCK_R (-1) | 0.106 | 0.002 | 50.818 | 0.000*** |
| INCOME_S | -0.003 | 0.016 | -17.370 | 0.000*** |
| INCOME_S (-1) | -0.006 | 0.016 | -35.525 | 0.000*** |
| INCOME_S (-2) | -0.012 | 0.032 | -37.625 | 0.000*** |
| DEBT_R | 0.001 | 0.009 | 15.424 | 0.000*** |
| DEBT_R (-1) | -0.011 | 0.009 | -126.129 | 0.000*** |
| DEBT_R (-2) | 0.009 | 0.009 | 96.680 | 0.000*** |
| WORK | 0.002 | 0.001 | 139.011 | 0.000*** |
| WORK (-1) | -0.003 | 0.001 | -211.692 | 0.000*** |
| WORK (-2) | -0.004 | 0.001 | -311.797 | 0.000*** |
| TEST | 0.002 | 0.016 | 9.976 | 0.002*** |
| TEST (-1) | 0.002 | 0.008 | 26.915 | 0.000*** |
| TEST (-2) | -0.006 | 0.008 | -69.934 | 0.000*** |
| STI | 0.047 | 0.006 | 74.680 | 0.000*** |
| STI (-1) | 0.021 | 0.004 | 49.770 | 0.000*** |
| STI (-2) | -0.008 | 0.004 | -17.633 | 0.000*** |
| SCHOOL | 0.004 | 0.014 | 32.476 | 0.000*** |
| SCHOOL (-1) | 0.003 | 0.140 | 21.886 | 0.000*** |
| SCHOOL (-2) | 0.003 | 0.014 | 23.620 | 0.000*** |
| RES_PU_GA | -0.002 | 0.018 | -13.572 | 0.000*** |
| RES_PU_GA (-1) | 0.001 | 0.002 | 78.367 | 0.000*** |
| RES_PU_GA (-2) | 0.002 | 0.002 | 119.432 | 0.000*** |
| INT_TR | -0.021 | 0.003 | -63.721 | 0.000*** |
| INT_TR (-1) | 0.004 | 0.003 | 10.671 | 0.000*** |
| INT_TR (-2) | -0.007 | 0.036 | -186.480 | 0.000*** |
| HEALTH | 0.001 | 0.002 | 25.960 | 0.000*** |
| HEALTH (-1) | -0.001 | 0.002 | -23.450 | 0.000*** |
| HEALTH (-2) | 0.031 | 0.021 | 15.042 | 0.000*** |
| FACE | 0.007 | 0.015 | 48.249 | 0.000*** |
| FACE (-1) | 0.001 | 0.016 | 72.946 | 0.000*** |
| FACE (-2) | -0.009 | 0.016 | -5.373 | 0.000*** |
| COVID | 0.009 | 0.005 | 21.600 | 0.000*** |
| COVID (-1) | -0.004 | 0.006 | -74.800 | 0.000*** |
| COVID (-2) | -0.029 | 0.046 | 63.400 | 0.000*** |
| C_PUB_EVN | -0.005 | 0.096 | -57.086 | 0.000*** |
| C_PUB_EVN (-1) | -0.007 | 0.096 | -71.482 | 0.000*** |
| C_PUB_EVN (-2) | -0.004 | 0.095 | -47.205 | 0.000*** |

average COVID case of Iran is 1025604, with maximum cases 3204557 and minimum cases 1501. Table 9 reported correlation matrix results of Iran in which, majority of variables have no correlation except HEALTH, FACE, and RES_PU_GA. Tables 10 and 11 show the results of the Turkey sample's descriptive statistics and correlation matrix. In Table 10, the mean of STOCK_R of Turkey is 0.009 with a standard deviation of 0.003. The average COVID case of Iran is 1737166, with a maximum of 5472127 and a minimum of 1. Table 11 reported Turkey's correlation matrix results in which most variables do not correlate HEALTH and C_PUB_EVN.

4.2. Results of panel unit root test

Table 12 shows the panel unit root test results to determine the stationarity level among variables included in the model. This study includes two types of panel unit root tests, i.e., Levin, Lin & Chu, and Breitung panel unit root test. In Table 12, the panel unit root test is divided into two sections, i.e., at the level and at the first difference. We can see that the test statistics of INCOME_S, DEBT_R, STI, TEST, HEALTH, COVID, and C_PUB_EVN are high, confirming the stationarity at the level. While testing the unit root at the first difference, we also found that the test statistics of all variables are high, which confirms the stationarity at the first difference. It means the series has a mixture of stationary levels, such as some stationary variables at the level and some are at first difference. According to (Pesaran and Shin, 1995), Autoregressive Distributed Lag (ARDL) is a more suitable technique for finding the long-run and short-run dynamics of the data when mixed stationarity levels exist.

Table 16
Short-run results of pooled mean group estimation China sample.

| Variables | Coefficient | Std. Error | T-Statistic | P-value |
|------------------|-------------|------------|-------------|----------|
| Error correction | -0.007 | 0.002 | -335.693 | 0.000*** |
| Constant | 0.067 | 0.180 | 37.044 | 0.000*** |
| LN_STOCK_R (-1) | 0.071 | 0.021 | 34.386 | 0.000*** |
| INCOME_S | 0.001 | 0.023 | 6.077 | 0.008*** |
| INCOME_S (-1) | 0.020 | 0.230 | 85.089 | 0.000*** |
| INCOME_S (-2) | 0.016 | 0.023 | 68.176 | 0.000*** |
| DEBT_R | -0.001 | 0.012 | -4.679 | 0.018** |
| DEBT_R (-1) | -0.003 | 0.124 | -25.675 | 0.000*** |
| DEBT_R (-2) | -0.009 | 0.024 | -72.541 | 0.000*** |
| WORK | 0.004 | 0.052 | 123.378 | 0.000*** |
| WORK (-1) | 0.006 | 0.033 | 172.932 | 0.000*** |
| WORK (-2) | 0.002 | 0.043 | 65.595 | 0.000*** |
| TEST | 0.025 | 0.226 | 112.343 | 0.000*** |
| TEST (-1) | -0.005 | 0.270 | -20.212 | 0.000*** |
| TEST (-2) | 0.004 | 0.023 | 19.795 | 0.000*** |
| STI | -0.094 | 0.060 | -15.437 | 0.000*** |
| STI (-1) | -0.029 | 0.605 | -48.267 | 0.000*** |
| STI (-2) | 0.001 | 0.564 | 88.951 | 0.000*** |
| SCHOOL | 0.013 | 0.091 | 13.463 | 0.000*** |
| SCHOOL (-1) | -0.001 | 0.095 | -11.621 | 0.000*** |
| SCHOOL (-2) | -0.003 | 0.087 | -33.786 | 0.000*** |
| RES_PU_GA | 0.001 | 0.016 | 42.786 | 0.000*** |
| RES_PU_GA (-1) | 0.016 | 0.163 | 9.605 | 0.002*** |
| RES_PU_GA (-2) | -0.040 | 0.017 | -23.103 | 0.000*** |
| INT_TR | 0.006 | 0.010 | 58.534 | 0.000*** |
| INT_TR (-1) | 0.003 | 0.104 | 33.149 | 0.000*** |
| INT_TR (-2) | -0.006 | 0.096 | -57.624 | 0.000*** |
| HEALTH | -0.037 | 0.038 | -99.482 | 0.000*** |
| HEALTH (-1) | -0.001 | 0.034 | -33.901 | 0.000*** |
| HEALTH (-2) | 0.040 | 0.033 | 10.997 | 0.000*** |
| FACE | -0.007 | 0.003 | -22.605 | 0.000*** |
| FACE (-1) | 0.010 | 0.003 | 32.216 | 0.000*** |
| FACE (-2) | -0.013 | 0.003 | -39.697 | 0.000*** |
| COVID | 0.055 | 0.108 | 67.069 | 0.000*** |
| COVID (-1) | -0.021 | 0.012 | -18.620 | 0.000*** |
| COVID (-2) | -0.025 | 0.100 | -25.560 | 0.000*** |
| C_PUB_EVN | -0.001 | 0.016 | -5.909 | 0.009*** |
| C_PUB_EVN (-1) | -0.003 | 0.168 | -18.481 | 0.000*** |
| C_PUB_EVN (-2) | -0.031 | 0.017 | -17.329 | 0.000*** |

4.3. Results of pooled mean group estimation

Tables 13–19 presents the results of the panel ARDL/pooled mean group estimation model developed by (Pesaran et al., 1999) to find the long-run and short-run dynamics of variables for GREF countries. Table 13 reported the findings of PMG in the long run. The model has 2425 observations consisting of five panels, with AIC -3.907, HQC -3.726, and SC value of -3.411. Results suggest that governments' economic relief policies of GREF countries positively affect stock returns in the long run. For governments' stringent COVID-19 policies, WORK, STI, and C_PUB_EVN show a significant positive relationship with the stock returns of GREF. Whereas DEBT_R, TEST, HEALTH, FACE, and COVID, does not have any relation with stock returns of GREF in the long run.

Table 14 presents the short-run results of PMG estimation with 2425 observations containing five panels. The results show that the coefficient of error correction term is -0.064, which is negative and significant at a 90% confidence interval, confirming the long-run relationship between governments' economic and stringent COVID-19 policies of GREF countries. The short-run results suggest that only government stringency index (STI) and face-covering policies during COVID-19 are significant and positively associated with the stock returns of GREF countries, whereas all other independent variables show insignificant results in the short run.

(Pesaran and Shin, 1995) have proposed a PMG estimator that combines both pooling and averaging. This intermediate estimator allows the intercept, short-run coefficients, and error variances to differ across the groups but constrains the long-run coefficients to be equal

Table 17
Short-run results of pooled mean group estimation Russia sample.

| Variables | Coefficient | Std. Error | T-Statistic | P-value |
|------------------|-------------|------------|-------------|----------|
| Error correction | -0.043 | 0.093 | -46.603 | 0.000*** |
| Constant | 0.337 | 0.006 | 58.642 | 0.000*** |
| LN_STOCK_R (-1) | -0.035 | 0.002 | -22.667 | 0.000*** |
| INCOME_S | -0.022 | 0.015 | -15.573 | 0.000*** |
| INCOME_S (-1) | -0.006 | 0.015 | -40.389 | 0.000*** |
| INCOME_S (-2) | -0.093 | 0.015 | -6.893 | 0.000*** |
| DEBT_R | -0.033 | 0.722 | -45.026 | 0.000*** |
| DEBT_R (-1) | -0.002 | 0.067 | -29.530 | 0.000*** |
| DEBT_R (-2) | 0.025 | 0.056 | 44.523 | 0.000*** |
| WORK | 0.009 | 0.047 | 18.585 | 0.000*** |
| WORK (-1) | 0.012 | 0.047 | 24.265 | 0.000*** |
| WORK (-2) | -0.010 | 0.045 | -23.340 | 0.000*** |
| TEST | 0.010 | 0.060 | 17.480 | 0.000*** |
| TEST (-1) | -0.003 | 0.059 | -0.519 | 0.640 |
| TEST (-2) | 0.014 | 0.090 | 23.542 | 0.000*** |
| STI | -0.001 | 0.005 | -21.113 | 0.000*** |
| STI (-1) | -0.002 | 0.054 | -38.808 | 0.000*** |
| STI (-2) | -0.023 | 0.050 | -40.820 | 0.000*** |
| SCHOOL | 0.005 | 0.267 | 19.512 | 0.000*** |
| SCHOOL (-1) | 0.008 | 0.027 | 27.134 | 0.000*** |
| SCHOOL (-2) | -0.007 | 0.028 | -23.702 | 0.000*** |
| RES_PU_GA | 0.012 | 0.018 | 68.796 | 0.000*** |
| RES_PU_GA (-1) | 0.007 | 0.018 | 37.246 | 0.000*** |
| RES_PU_GA (-2) | -0.003 | 0.076 | -11.946 | 0.000*** |
| INT_TR | 0.002 | 0.566 | 0.004 | 0.997 |
| INT_TR (-1) | 0.004 | 0.556 | 78.354 | 0.000*** |
| INT_TR (-2) | 0.020 | 0.604 | 32.145 | 0.000*** |
| HEALTH | -0.001 | 0.249 | -22.599 | 0.000*** |
| HEALTH (-1) | -0.050 | 0.025 | -15.746 | 0.000*** |
| HEALTH (-2) | -0.024 | 0.252 | -95.131 | 0.000*** |
| FACE | -0.026 | 0.021 | -20.379 | 0.000*** |
| FACE (-1) | -0.002 | 0.214 | -83.940 | 0.000*** |
| FACE (-2) | -0.017 | 0.022 | -88.356 | 0.000*** |
| COVID | 0.026 | 0.015 | 17.200 | 0.000*** |
| COVID (-1) | 0.059 | 0.283 | 20.100 | 0.000*** |
| COVID (-2) | -0.050 | 0.148 | -33.500 | 0.000*** |
| C_PUB_EVN | -0.007 | 0.910 | -15.449 | 0.000*** |
| C_PUB_EVN (-1) | -0.013 | 0.090 | -19.532 | 0.000*** |
| C_PUB_EVN (-2) | -0.012 | 0.069 | -17.457 | 0.000*** |

across groups. Maximum likelihood estimators referred as PMG estimators, in order to highlight pooling implied by the homogeneity restrictions on long-run coefficients and the averaging across groups used to obtain means of the estimated error-correction coefficient and the other short-run parameters of model (Pesaran et al., 1999). Table 15 to Table 19 presents country-wise short-run results of the PMG estimator. The PMG takes the co-integration form of the simple ARDL model and adapts it for a panel setting by allowing the intercepts, short-run coefficients and co-integrating terms to differ across cross-sections. In Table 15, which contains the short-run results of Pakistan, the error correction term is significant at a 99% confidence interval. However, its coefficient is 0.022, which is not negative, meaning that there is no long-run relationship between governments' economic and stringent COVID-19 policies and stock returns of the Pakistan sample. On the other hand, in the short run, all variables of governments' economic and stringent COVID-19 policies significantly impact the stock returns of Pakistan; however, the direction of the relationship is different. For example, in the short-run, DEBT_R, WORK, TEST, STI, SCHOOL, HEALTH, FACE, and COVID case of the previous day with one lag have a significant positive relation with stock returns of Pakistan. Similarly, INCOME_S, RES_PU_GA, INT_TR, C_PUB_EVN, and COVID with two and three-day lag have a significant negative impact on the stock returns of Pakistan in short-run.

Table 16 describes the short-run results of PMG for the China sample. The results show that the error correction term is significant at a 99% confidence interval, and its coefficient is -0.007, meaning that there is a long-run relationship between governments' economic and stringent COVID-19 policies and stock returns of the China sample. On the other

Table 18
Short-run results of pooled mean group estimation Iran sample.

| Variables | Coefficient | Std. Error | T-Statistic | P-value |
|------------------|-------------|------------|-------------|----------|
| Error correction | -0.197 | 0.001 | -21.866 | 0.000*** |
| Constant | 6.194 | 0.906 | 6.835 | 0.006*** |
| LN_STOCK_R (-1) | -0.091 | 0.002 | -43.578 | 0.000*** |
| INCOME_S | 0.214 | 0.132 | 1.627 | 0.202 |
| INCOME_S (-1) | -0.058 | 0.132 | -0.439 | 0.691 |
| INCOME_S (-2) | -0.040 | 0.132 | -0.307 | 0.779 |
| DEBT_R | 0.121 | 0.048 | 2.512 | 0.086* |
| DEBT_R (-1) | -0.199 | 0.048 | -4.153 | 0.025** |
| DEBT_R (-2) | -0.015 | 0.048 | -0.310 | 0.777 |
| WORK | -0.075 | 0.017 | -4.483 | 0.020** |
| WORK (-1) | 0.097 | 0.018 | 5.402 | 0.012** |
| WORK (-2) | 0.120 | 0.018 | 6.756 | 0.006*** |
| TEST | -0.149 | 0.067 | -2.221 | 0.113 |
| TEST (-1) | 0.284 | 0.069 | 4.124 | 0.025** |
| TEST (-2) | 0.365 | 0.067 | 5.407 | 0.012** |
| STI | 0.012 | 0.032 | 38.598 | 0.000*** |
| STI (-1) | 0.009 | 0.031 | 28.294 | 0.000*** |
| STI (-2) | 0.005 | 0.027 | 19.247 | 0.000*** |
| SCHOOL | 0.166 | 0.083 | 1.987 | 0.141 |
| SCHOOL (-1) | 0.021 | 0.074 | 0.282 | 0.796 |
| SCHOOL (-2) | 0.122 | 0.073 | 1.671 | 0.193 |
| RES_PU_GA | 0.132 | 0.026 | 5.128 | 0.014** |
| RES_PU_GA (-1) | -0.313 | 0.026 | -12.152 | 0.001*** |
| RES_PU_GA (-2) | -0.209 | 0.026 | -8.160 | 0.003*** |
| INT_TR | 0.034 | 0.040 | 0.848 | 0.459 |
| INT_TR (-1) | 0.158 | 0.039 | 4.004 | 0.027** |
| INT_TR (-2) | -0.220 | 0.072 | -3.079 | 0.054* |
| HEALTH | -0.006 | 0.048 | -12.154 | 0.001*** |
| HEALTH (-1) | -0.004 | 0.001 | -7.593 | 0.004*** |
| HEALTH (-2) | -0.036 | 0.001 | -67.881 | 0.000*** |
| FACE | -0.062 | 0.022 | -2.841 | 0.065* |
| FACE (-1) | -0.060 | 0.022 | -2.747 | 0.070* |
| FACE (-2) | 0.009 | 0.022 | 0.415 | 0.706 |
| COVID | -0.023 | 0.069 | -32.360 | 0.000*** |
| COVID (-1) | 0.040 | 0.017 | 22.010 | 0.000*** |
| COVID (-2) | -0.024 | 0.071 | -33.370 | 0.000*** |
| C_PUB_EVN | 1.225 | 0.286 | 4.284 | 0.023** |
| C_PUB_EVN (-1) | -0.919 | 0.138 | -6.652 | 0.000*** |
| C_PUB_EVN (-2) | 0.593 | 0.157 | 3.770 | 0.032** |

hand, in the short-run, INCOME_S, WORK, TEST, SCHOOL, RES_PU_GA, INT_TR, and COVID with a one-day lag have significant positives, while DEBT_R, HEALTH, FACE, C_PUB_EVN, and COVID with two and three-day lag have a significant negative relationship with stock returns of China.

Table 17 shows the PMG short-run results of Russia, which suggests that the error correction term is significant at 99% confidence interval and its coefficient is -0.043, meaning that there is a long-run relationship between governments' economic and stringent COVID-19 policies and stock returns of Russia sample. In the short-run, WORK, TEST, SCHOOL, RES_PU_GA, INT_TR, and COVID with level and one-day lag have significant positive and INCOME_S, DEBT_R, STI, HEALTH, FACE, C_PUB_EVN, and COVID with two-day lag have a significant negative relationship with the stock returns of Russia.

Table 18 shows the PMG short-run results of Iran, which suggests that the error correction term is significant at 99% confidence interval and its coefficient is -0.197, meaning that there is a long-run relationship between governments' economic and stringent COVID-19 policies and stock returns of Iran sample. In the short run, DEBT_R, STI, RES_PU_GA, and C_PUB_EVN have significant positive and WORK, HEALTH, FACE, and COVID have a significant negative relationship with the stock returns of Iran. Whereas INCOME, SCHOOL, INT_TR, and TEST have no relation with the stock returns of Iran in the short run.

Table 19 shows the PMG short-run results of Turkey, which suggests that the error correction term is significant at 99% confidence interval and its coefficient is -0.075, meaning that there is a long-run relationship between governments' economic and stringent COVID-19 policies and stock returns of Iran sample. In the short run, INCOME_S, DEBT_R,

Table 19
Short-run results of pooled mean group estimation Turkey sample.

| Variables | Coefficient | Std. Error | T-Statistic | P-value |
|------------------|-------------|------------|-------------|----------|
| Error correction | -0.075 | 0.240 | -31.207 | 0.000*** |
| Constant | 0.505 | 0.011 | 44.286 | 0.000*** |
| LN_STOCK_R (-1) | -0.007 | 0.002 | -3.322 | 0.045** |
| INCOME_S | 0.037 | 0.195 | 18.820 | 0.000*** |
| INCOME_S (-1) | 0.001 | 0.019 | 69.235 | 0.000*** |
| INCOME_S (-2) | -0.038 | 0.019 | -19.938 | 0.000*** |
| DEBT_R | 0.003 | 0.060 | 57.441 | 0.000*** |
| DEBT_R (-1) | -0.003 | 0.036 | -47.489 | 0.000*** |
| DEBT_R (-2) | 0.002 | 0.058 | 26.713 | 0.000*** |
| WORK | -0.008 | 0.886 | -93.258 | 0.000*** |
| WORK (-1) | 0.010 | 0.078 | 11.900 | 0.000*** |
| WORK (-2) | 0.001 | 0.740 | 14.721 | 0.000*** |
| TEST | 0.002 | 0.097 | 9.447 | 0.002*** |
| TEST (-1) | -0.005 | 0.020 | -25.150 | 0.000*** |
| TEST (-2) | 0.008 | 0.196 | 41.265 | 0.000*** |
| STI | 0.001 | 0.033 | 19.939 | 0.000*** |
| STI (-1) | 0.017 | 0.003 | 53.348 | 0.000*** |
| STI (-2) | -0.002 | 0.050 | -51.935 | 0.000*** |
| SCHOOL | -0.006 | 0.070 | -92.674 | 0.000*** |
| SCHOOL (-1) | -0.002 | 0.069 | -30.709 | 0.000*** |
| SCHOOL (-2) | 0.012 | 0.081 | 18.693 | 0.000*** |
| RES_PU_GA | 0.006 | 0.027 | 21.277 | 0.000*** |
| RES_PU_GA (-1) | 0.002 | 0.024 | 66.577 | 0.000*** |
| RES_PU_GA (-2) | 0.005 | 0.024 | 21.123 | 0.000*** |
| INT_TR | -0.004 | 0.690 | -62.081 | 0.000*** |
| INT_TR (-1) | -0.010 | 0.071 | -13.658 | 0.000*** |
| INT_TR (-2) | 0.017 | 0.072 | 23.081 | 0.000*** |
| HEALTH | 0.001 | 0.040 | 12.491 | 0.000*** |
| HEALTH (-1) | 0.045 | 0.404 | 11.943 | 0.000*** |
| HEALTH (-2) | 0.042 | 0.004 | 9.383 | 0.000*** |
| FACE | 0.002 | 0.024 | 74.154 | 0.000*** |
| FACE (-1) | 0.002 | 0.066 | 91.820 | 0.000*** |
| FACE (-2) | -0.008 | 0.039 | -32.736 | 0.000*** |
| COVID | 0.017 | 0.056 | 30.883 | 0.000*** |
| COVID (-1) | 0.023 | 0.050 | 42.612 | 0.000*** |
| COVID (-2) | -0.059 | 0.054 | -10.421 | 0.000*** |
| C_PUB_EVN | -0.002 | 0.987 | -19.512 | 0.000*** |
| C_PUB_EVN (-1) | -0.006 | 0.100 | -57.155 | 0.000*** |
| C_PUB_EVN (-2) | -0.010 | 0.010 | -98.813 | 0.000*** |

TEST, STI, RES_PU_GA, HEALTH, FACE, and COVID at the level and with one-day lag have significant positive and WORK, SCHOOL, INT_TR, C_PUB_EVN and COVID with two-day lag, have a significant negative relationship with the stock returns of Turkey.

5. Conclusion and recommendations

In this research study, we analyze the government relief economic policies and COVID control more stringent policies and their impact on stock return for the GREF countries include (Pakistan, Turkey, Iran, Russia, and China). In this research economic relief policies, we analyze are Debt or contract relief and, income support and more stringent COVID control policies we analyze are containment and health index, cancellation of public events, COVID testing policies, total COVID cases face-covering policies travel control restrictions of internal movements, restrictions on public gatherings, school closure, stringency index, workplace closure index. For empirical analysis, daily stock market returns data is used over the period March 1, 2020–June 30, 2021. Panel ARDL model results demonstrate that income support, workplace closure, stringency index, and cancellation of public events significantly positively impact the stock index returns over the long run. In contrast, school closure, restriction on public gatherings, and international travel control policies negatively impact stock returns. Our analysis and findings contribute to the literature on understanding the diminishing effects of the COVID -19 pandemic via government relief policies and more stringent pandemic control policies.

Our findings suggest that stringent government action to control pandemic and economic relief policies led to better economic outcomes

in the short run. As the upcoming delta wave can be wilder, stringent government measures' net economic impact can help design better government responses for upcoming waves. We believe this work will help the policymakers gain insights into the troubled COVID-19 times ahead, and based on the estimates, they can frame policies to navigate these wild waves in the best possible way.

Author statement

Jianqiang Gu: Conceptualization, Visualization, Methodology, Project administration, Writing-review & editing.

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