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# Reaction of Stock Market to Covid-19: A South Asian Perspective

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## Abstract

The arrival of unexpected guest Coronavirus disease 2019 popularly known as Covid-19 has created a lot of problems in our life. Though it was a health-hazard initially, later on it became a financial and social threat to our life. This study has been initiated to examine the behavior of stock markets in selected South Asian countries amid the pandemic. The research outcomes indicate the outpouring of market return volatilities due to rapid spread of the coronavirus in all the markets. The markets are adversely influenced by Covid-19 confirmed cases, deaths, volatility index, changes in oil price, exchange rate, inflation rate and interest rate.

**Keywords:** Covid-19; South Asia; stock return; volatility

## Introduction

Coronavirus pandemic, popularly known as COVID-19, has stunned the whole world since 2020 (Cardona-Arenas & Serna-Gomez, 2020; Li et al., 2020). Wuhan, the city in China where the first coronavirus victim was identified in December 2019 (WHO, 2020). As of 6<sup>th</sup> April, 2022, it has infected 494,305,558 people and took away 6,184,531 lives across the world<sup>1</sup>. The death toll touched 1.2 million by 11 November 2020 and continues to rise. Apart from the health issues, the economic impact of the outbreak of COVID-19 has also had melodramatic effects on the lifestyle of people. For helpless families, lost income due to an outbreak has increased the poverty, resulted in food crisis and reduced access to healthcare facilities. The epidemic has also ignited severe global socioeconomic imbalance. It has literally paralyzed the celebration of sporting, religious, political, and cultural events (Here Comes the Coronavirus Pandemic, 2020; Chowdhury, 2013) and disrupted international trade due to shortage of supplies, lockdown and restrictions imposed by different governments across the world (Scipioni, 2020). Moreover, statistics have shown sharp declines in the agriculture, trade, tourism, and travel sectors due to the COVID-19 outbreak<sup>2</sup>. Experts have suggested that the ongoing novel coronavirus outbreak will have a significant impact on developing countries, with a particularly large influence on South Asian economies<sup>3</sup>.

Stock market indices respond quickly to new events. Previous studies have identified few significant events for which stock market returns have responded, including news announcements (Hussain and Ben Omrane, 2020), natural disasters (Lee & Chen, 2020; Chowdhury, 2012), major sporting events (Curatola et al., 2016), environmental events (Guo et al., 2020), unexpected political shocks (Hillier & Loncan, 2019), and terrorist attacks (Goel et al., 2017). Stock market indices may also react to pandemic diseases, such as inter alia, the Ebola outbreak (Ichev & Marinč, 2018), and the Severe Acute Respiratory Syndrome outbreak (Chen et al., 2007).

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<sup>1</sup> <https://www.worldometers.info/coronavirus/>

<sup>2</sup> <https://data.adb.org/dataset/covid-19-economic-impact-assessment-template>

<sup>3</sup> <https://data.adb.org/dataset/covid-19-economic-impact-assessment-template>

### **Immediate impact of pandemic on South Asian countries**

The world's biggest oil industry is coping with the dramatic decrease in crude-oil price in Afghanistan, while being the largest country in South Asia, India had to announced an economic stimulus package worth 1.7 trillion rupees (\$22.5 billion), aimed to assist low-income families. Bhutan's economy has incurred an estimated loss of \$2.2 million since the COVID-19 pandemic started. In Pakistan, ten million jobs in the informal sector, which is a cash-based sector, is about to disappear. Therefore, Pakistan government has no other option but to help people to have access to food and shelter. The pandemic arrived in Bangladesh with a significant negative impact on the economy because it came to Bangladesh in such a bad time when a few important indicators of the economy were in down trend. Economists estimate a 40.0% decline in its \$310.0 billion economy, with 0.89 million jobs at risk due to the pandemic in Bangladesh (Atlantic Council, 2020). According to the Central Bank of Sri Lanka, if the pandemic was contained by mid-2020, the economic recovery would only start in the latter part of the year, and real gross domestic product (GDP) growth would be less than 2%. The Nepali economy is likely to see an overspread effect mainly on the three fronts of remittance inflow, the tourism industry, and international trade (Jagadish Prasad Bist, 2020). As the economy in the Maldives is reliant on tourism, the restrictions on travel have dropped the economy sharply (Chowdhury, 2014; Nikkei Asian Review, 2020).

Table 1 exhibits the timing of first confirmed cases and the confirmed death cases of the selected countries.

Table 1. First confirmed and death cases of sample countries

Country	First confirmed case	First confirmed death
Bangladesh	8 March 2020	18 March 2020
India	30 January 2020	11 March 2020
Pakistan	25 February 2020	18 March 2020
Sri Lanka	27 January 2020	28 March 2020

To measure the possible impact of pandemic infectious disease outbreaks on the economy, there are different options. Literature has revealed that economic welfare and growth are positively related to life expectancy but depressingly linked to child mortality and maternal mortality rate (Bhargava, 2001). It is predicted that the global economy will contract by 4.9% in 2020 due to the spread of COVID-19 worldwide. Although this rate way higher than that of the 2008–2009 global financial recession (IMF, 2020). Moreover, a breakdown situation is expected in the supply chains among various interconnected parties such as firms, employees, consumers, suppliers, and financial intermediaries will have a gushing effect on the market economy (Gourinchas et al., 2020). A recent survey identified that lockdown restrictions were the primary cause of drops in consumption, employment, lower inflationary expectations, and lower mortgage payments in the United States (US) households (Chowdhury, 2014; Coibion et al., 2020). The multiple-period exogenous shocks due to COVID-19 led to a 12.75% and 17.0% fall in the industrial production and service employment sector of the US, respectively (Ludvigson et al., 2020). A recent study also investigated how COVID-19 cases affected Indian energy consumption in different regions (Aruga et al., 2020; Chowdhury and Chowdhury, 2022). Social distancing, self-isolation, and travel restrictions have led to a reduced workforce across all economic sectors (Chowdhury, 2017; Nicola et al., 2020). A study on seven scenarios of how COVID-19 might evolve in the coming year using global hybrid dynamic stochastic and computable general equilibrium

models has demonstrated the scale of costs that might be avoided by greater investment in public health systems in all developed economies (McKibbin, W.; Fernando, 2020; Chowdhury, 2018). However, another study suggested that the costs could be lower for less developed economies where health care systems are less developed with high population density (Lee & McKibbin, 2004). From the aforementioned background, the following research hypothesis has been set

H<sub>1</sub>: Covid-19 factors are responsible.

This paper will also focus on the necessary policy formulations for the concerned governments to overcome the crisis.

### **Review of Previous Studies**

Originating from the Wuhan, China, the new type of coronavirus (SARS-CoV-2) has caused significant havoc in the world. It has triggered serious damage to the world economy including the stock market (Chowdhury et al., 2021). Ashraf (2020) observed the reaction of stock markets taking data from 64 countries toward COVID-19 pandemic. He noticed negative and proactive response of stock market toward COVID-19. Stock market returns decrease with a greater number of new cases. Al-Awadhi et al., (2020) applied panel data to verify the impact of contagious infectious diseases on Chinese stock market. They found significant negative reaction of Chinese stock market toward new cases and death cases (Dhar, 2020). The current studies describe the ongoing COVID-19 pandemic as a severe public health crisis which has reached in every corner of the globe (Wang et al., 2020), and about thirty three percent of World's population has experienced the so-called lockdown (Hoof, 2020) to restrict the rapid spread of the human-to-human infection. Such lockdown in most of the countries, has generated demand- and supply-side shocks causing global economic slumps (Eichenbaum, Rebelo, & Trabandt, 2020; Fetzer, Hensel, Hermle, & Roth, 2020; Gormsen & Koijen, 2020; Malden & Stephens, 2020). The economic slumps due to pandemic have influenced both real and financial sectors in COVID-19 affected countries (Banco de 2020; IMF, 2020; Maliszewska, Matto, Mensbrugge, & Van Der, 2020; Pak et al., 2020; World Bank, 2020; WTO, 2020). Precisely, in the financial sector, the stock markets demonstrated a high degree of volatility and downturn amid the pandemic both in developed and developing countries (Anh & Gan, 2020; Boissay & Rungcharoenkitkul, 2020; Khan et al., 2020; Narayan, Devpura, & Hua, 2020; Prabheesh et al., 2020; Rabhi, 2020; Zhang, Hu, & Ji, 2020). The stock market debacles in affected countries are assumed to be instigated by fear and negative sentiments of investors and other market participants amid the pandemic (Liu, Manzoor, et al., 2020; Mishra & Mishra, 2020; Mishra, Rath, & Dash, 2020; Chowdhury, 2019; Shanaev, Shuraeva, & Ghimire, 2020). Recently the stock markets have been alleviated though not returned to the pre-pandemic level due to the execution of fiscal and monetary policies (McKibbin & Fernando, 2020). The global financial risk has increased amid the pandemic which triggered individual market downturns (Zhang et al., 2020). It has been noticed that the financial market effect of the pandemic in China is mixed though the country is the source of the global spread of the COVID-19 infection (Albulescu, 2020; Khan et al., 2020). Huo and Qiu (2020) found that U-turns in stock prices of China both at the firm and industry levels have decreased due to investors overreactions to the declaration of pandemic lockdown. It has also been observed that the stock market investors did not react to media announcements at the initial stages of the pandemic, but adversely reacted when the spread of virus was intensified (Corbet, Hou, Yang, Lucey, & Les, 2021; Haroon & Rizvi,

2020a; Khan et al., 2020) hence instigating return volatilities and market drops. The increasing tendencies in COVID-19 confirmed cases were found to be reversely associated with the financial market liquidity (Haroon & Rizvi, 2020b) and positive correlated to market volatility (Al-Awadhi, Al-Saifi, Al-Awadhi, & Alhamadi, 2020; Christensen, 2020; Piksina & Vernholmen, 2020; Mishra et al., 2020). As far as the concentration of stock market volatilities is concern, the COVID-19 pandemic, Ali, Alam, and Rizvi (2020) noticed that such impacts were relatively low in China in comparison to U.S, U.K, Germany and South Korea. Liu, Manzoor, et al. (2020) in a study found that the stock markets in major affected countries fell quickly after the virus outbreak while countries in Asia experienced more negative abnormal returns as compared to other countries. The recent literature highlights the reasons behind the pandemic-led stock market plunges in affected countries. The prominent reasons include government-imposed restrictions on trade & commerce and practices of physical/social distancing by people (Baker et al., 2020a), the surge in the number of COVID-19 positive cases and death cases (Anh & Gan, 2020; Khan et al., 2020; Rabhi, 2020), and reduction in trade interconnectedness (Vidya & Prabheesh, 2020). It is also believed that an oil price slump amid the pandemic is responsible for stock market downturns and increase in return volatilities (Apergis & Apergis, 2020; Gil-Alana & Monge, 2020; Liu, Manzoor, et al., 2020; Qin, Zhang, & Su, 2020; Narayan, 2020; Prabheesh et al., 2020; Sharif, Aloui, & Yarovaya, 2020). In addition, the oil price slump also caused exchange rate volatilities which are believed to negatively affect the stock market returns (Cardona-Arenas & Serna-Gomez, 2020; Rabhi, 2020). Moreover, the surge in the number of COVID-19 death cases have been observed to spike the fear index, VIX, which in turn adversely affected the stock market returns particularly in U.S. (Onali, 2020) and Asian countries (Rabhi, 2020; Chowdhury, 2020). Although empirical studies are lacking, Tokic (2020) hints that the long-run consequence of the COVID-19 pandemic is due to accelerations in inflation and interest rates. Here, we argue that the inflation risk can be a determining factor of stock market performance amid the pandemic due to following reasons. First, since the pandemic has resulted in the discontinuation in the supply chain (Usman, Ali, Riaz, Riaz, & Zubair, 2020), the spirals of uncertainties that generated in the goods market can adversely influence the stock market performance. Second, since expansionary monetary and fiscal measures of governments are inflationary and affect the financial sector through liquidity channels, the impact of inflation on stock market performance cannot be ignored entirely. The associated interest rate consequences of monetary easing measures of monetary authorities for stock market performance through the credit channels amid the pandemic also cannot be ignored.

From the above review, it is assumed that the sudden outbreak of COVID 19 pandemic has seriously affected the stock markets across the world. Though, the existing literature is strong enough neither to measure the scope of volatility of stock market returns during the pandemic nor fully helpful to realize the impact of the announcement on stock market movements.

### **Research Methodology**

To measure the impact of Covid-19 coronavirus and media announcements on the volatility of selected stock markets in South Asia, this study applies event study and the generalized autoregressive conditional heteroskedasticity (GARCH) models.

The event study approach observes the effect of a crucial media announcement of pandemic-related information on stock market abnormal returns while the GARCH (1,1) model captures the likely presence of volatility clustering.

This study has taken the cases of four South Asian stock markets depending on the availability of data and degree of the spread of COVID-19 infections till 4 April 2022. The sample countries are Bangladesh, India, Pakistan and Sri Lanka. Table 2 shows the countries and corresponding stock indices.

Table 2. List of Asian Countries and stock market indices

Country	Index
Bangladesh	Dhaka Stock Exchange Board (DSEX)
India	S&P BSE 500
Pakistan	Karachi 100
Sri Lanka	CSE All Share

The daily closing indices of selected stock markets have been collected from the website of Investing.Com and daily Covid-19 confirmed cases and confirmed deaths have been collected from the website of Covid-19 government response tracker. The macroeconomic factors such as inflation rate, interest rate, exchange rate and oil price have been collected from yahoo finance, investing.com, the world bank and the macrotrends. The reason for selecting the macro factors data and the probable impact have been described in brief below:

*Exchange rate:* It is the logarithm of the USD based exchange rate of the domestic currency in a country. An increase in exchange rate enhances exports and reduces imports and vice-versa. The pandemic has disturbed the entire global supply-chain of exports and imports thereby creating market uncertainties. Thus, the change in exchange rate is expected to have positive or negative consequences for abnormal stock returns depending on the market expectations.

*Oil price:* It is the logarithm of the Brent crude oil price which is the leading global price benchmark used to set prices of 2/3rd of the world's internationally traded crude oil supplies. Thus, it is used for major worldwide oil trading and serves as a benchmark for purchases on global financial markets. Since fluctuations in this benchmark price exerts a supply-side shock, it is perceived to have positive or negative effects on stock market performances depending on oil demands across the globe. During the pandemic the country-wide shutdowns and lockdowns have resulted in a substantial decline in oil demand which is expected to have negative impact of abnormal returns.

*Inflation rate:* It is the CPI-based rate of inflation in a country. Since the pandemic containment measures disturbed the supply-chain, and the consequential fiscal and monetary measures changed the market liquidity, rate of inflation can influence the stock market performance positively or negatively depending on the market expectations.

*Interest rate:* It is the interest rate in a country. Since the governments tried to control the volume of money supply amid corona pandemic by manipulating their policy rates, interest rate is expected to exert an effect on the stock market through cash and credit channels. Particularly, the quantitative easing by governments generated market optimism and boosts investments thereby favorably influencing the abnormal returns. Thus, interest rate is expected to have a negative sign.

The data analysis of this study has been done in three following steps:

*Step 1:*

The event study has been conducted taking the announcement date of Covid-19 as the event.

*Step 2:*

In order to measure the return volatility of the selected stock market indices GARCH (1,1) model has been applied for the COVID-19 period. For this purpose, the period from 1 January, 2020 to July 31, 2020 is considered as the COVID-19 pandemic era. This is based on the logic that on 20 January 2020, the coronavirus was announced as pandemic and immediately the global stock markets started to experience the free fall.

*Step 3:*

By applying regression model, the impact of confirmed cases, deaths, and volatility on the abnormal returns has been measured.

***Event Study Method***

Event study is a research approach in finance widely used to examine the effects of an incident such as merger, dividend announcement, financial or health crisis, change of key personnel by verifying the responses of the stock price around the occurring of the event (Chen et al., 2007). This process is based on the finance theory, of efficient capital market, that the capital market reflects all the information about an event on the stock prices (Chowdhury et al., 2021; Schimmer, 2012). The COVID-19 is such an event that has created panic among the people across the world and influence the capital market instantaneously. Being a highly sensitive market, employment of an event study will give a genuine scenario of the Covid-19's impact on the US stock market. This study analyses the impact of Covid-19 focusing on three major incidents, such as first confirmation case, first death case and the first news of financial bailout.

*Pre-event window:* This covers the normal period prior to the event day. Based on the data of this period, both intercept and slope of the asset valuation model have been computed to estimate abnormal returns after the event day. Based on the availability of COVID-19 data, the pre-event period starts from 1st January 2020.

*Event window:* The day when an event took place. In this study, three events have been considered. The first event is the detection of first Covid-19 case on 21 January, 2020. The second event is the day when the first Covid-19 patient died on 1 March, 2020 and the third event is the day when US government announced financial bailout on 6 March, 2020.

*Post-event window:* The period starts right after the event day. For this study, the post-event ranges between the following day event day to the 30 June, 2020.

This study employs the following regression models to determine the normal return.

$$R_{i,t} = \alpha + \beta R_{m,t} + \varepsilon_{i,t} \quad (1)$$

Where,  $R_{i,t}$  is the expected return of  $i$ th stock on day  $t$ ,  $\beta$  measures systematic risk and  $R_{m,t}$  is the market return on day  $t$ .  $\varepsilon_{i,t}$  is the statistic disturbance. The intercept ( $\alpha$ ) and beta ( $\beta$ ) have been

computed based on the data of pre-event period. Putting the value of  $\alpha$  and  $\beta$  on Eq. (1), we calculate the abnormal return (AR).

$$E(R_{i,t}) = \alpha_t + \beta R_{m,t} \quad (2)$$

$$AR_{i,t} = R_{i,t} - E(R_{i,t}) \quad (3)$$

$E(R_{i,t})$ ,  $R_{i,t}$  and  $AR_{i,t}$  refer to expected return, real return and abnormal return of index I on t day within post-event window. When abnormal returns are added over the time, we find cumulative abnormal returns (CAR) as per following equations:

$$CAR_t(t_0, t_1) = \sum_{i=t_0}^{t_1} AR_{i,t} \quad (4)$$

Here, t refers to 0, 1, 2, 3, 4.....28, 29, and 30.

### ***The Generalized Autoregressive Conditional Heteroskedasticity (GARCH)***

The GARCH (1,1) framework is specified using the conditional mean and variance equations as in (1) and (2) below:

$$\text{Conditional mean: } R_{j,t} = \gamma_1 Covid_{i,t} + \gamma_2 VIX_{i,t} + \omega_{i,t} \quad (5)$$

$$\text{Conditional variance: } \sigma_{i,t}^2 = \theta_0 + \theta_1 \omega_{i,t-1}^2 + \theta_2 \sigma_{i,t-1}^2 \quad (6)$$

In the specification (5),  $R_{i,t}$  is the first log difference of the stock market index, generally interpreted as the stock market return, in the stock market i at time t.  $Covid_{i,t}$  is the percentage change in the COVID-19 confirmed cases and deaths in the selected countries i at time t.  $Volatility_{i,t}$  is the return based on CBOE volatility index, popularly called ‘fear index’ which is a measure of investors’ pessimistic sentiments, fear and uncertain behavior and market risks.  $\omega_{i,t}$  is the residual. In the specification (6),  $\sigma_{i,t}^2$  is the one period ahead forecast variance based on the past information flow;  $\theta_0$  is the intercept;  $\omega_{i,t-1}^2$  is the ARCH term which reflects the information on volatility from the last period (one period lag of the squared residuals from the mean equation), and  $\sigma_{i,t-1}^2$  is the GARCH term which reflects the previous period forecast variance.

### ***Regression model***

The regression model is based on the following specification:

$$AR_{i,t} = \alpha_i + \beta_1 Infection_{i,t} + \beta_2 Death_{i,t} + \beta_3 VIX_{i,t} \quad (7)$$

Where,  $AR_{i,t}$  is the abnormal stock market returns,  $Case_{i,t}$  indicates confirmed cases,  $Death_{i,t}$  represents confirmed deaths and  $VIX_{i,t}$  is the volatility index.  $\alpha_i$  is the constant and  $\beta_1$  to  $\beta_3$  are the coefficients.

### **Empirical Findings**

The confirmed cases and confirmed deaths of selected countries are shown in figure 1. Though the confirmed cases of India and Sri Lanka look steeper, the death cases of India and Pakistan is less



flat. The descriptive statistics pertaining to the selected stock market indices in Asia are examined for the pre and post-event periods, the event date is January 20, 2020 (see Table 3).

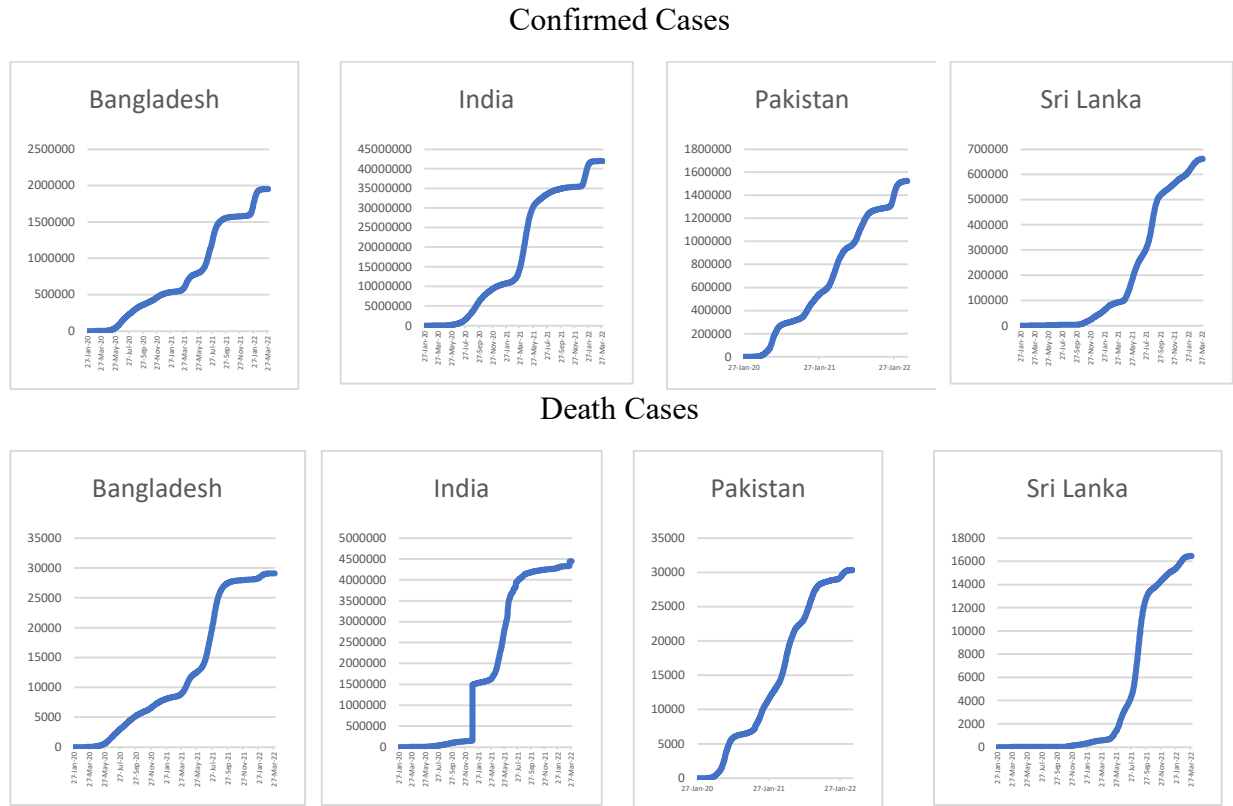


Figure 1. Confirmed and death cases of sample countries. Source: OxCGRT Covid Policy Tracker<sup>4</sup>

It is observed from Table 3 that the average stock market returns are negative in the post-event era in all the selected four stock markets, though that of Bangladesh and Sri Lanka was negative even during pre-event period. The post-event standard deviations in the distribution of stock market returns have become larger than that in the pre-event era

Table 3. Pre- and post-event stock market returns in Asia

	Bangladesh	India	Pakistan	Sri Lanka
Index	DSEX	S&P BSE 500	Karachi 100	CSE All Share
Pre-event				
Mean return	-0.0002	0.0008	0.0028	-0.003
Std. dev	0.0054	0.0096	0.0133	0.0058
Post-event				

<sup>4</sup> file:///C:/Users/User/Downloads/OxCGRT\_latest.htm

Mean return	-0.0001	-0.0014	-0.0014	-0.0009
Std. dev	0.0158	0.0284	0.0197	0.0187

Note: The event has been considered as the first official announcement of Coronavirus on 20 January, 2020. Source: Author's calculations.

This is an indication of an increase in the stock market return volatility in the COVID-19 era in the selected markets. For better understanding, the time-series plots of the stock market indices and stock returns in these countries have been depicted in figure 2.

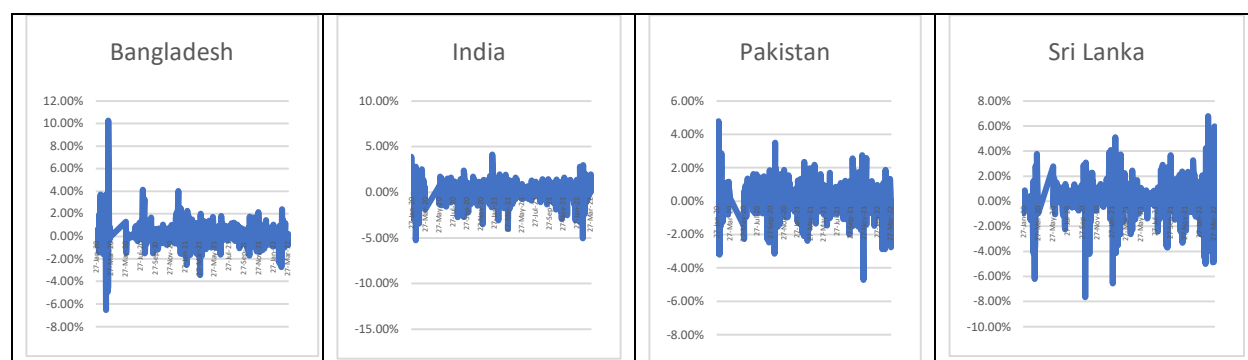


Figure 2. Stock indices of sample countries. Source: Investing.com<sup>5</sup>

A superficial view at these plots reveals the presence of volatility clustering in the stock market return patterns in the COVID-19 era during February and March 2020. From the September 2021 onwards, the stock return volatility pattern depicts a trend reversal to the pre-event levels. Such recovery trends in the stock market returns might be due to gain in investors' confidence consequent upon the implementation of pro-active fiscal and monetary interventions by governments in South Asian countries. This sort of optimism in investors' behavior might have generated forces to put the economies of selected four countries in the growth phase of the business cycle. However, for statistical conformity of the presence of volatility clustering in the stock return series in the COVID-19 era, the GARCH (1,1) model as specified in (5) and (6) have been estimated and the results are presented in Table 4.

Table 4. Stock Market Return Volatility

	Bangladesh	India	Pakistan	Sri Lanka
Mean equation				
Covid	--0.000069 (3.46E-06)**	-0.0007 (2.42E-06)*	-0.000069 (4/65E-04)	-0.00029 (5.18E-07)*
VIX	-0.0148 (0.006)**	-0.0501 (0.0012)	0.00078 (0.0079)	-0.0425 (0.0078)*
Constant	-0.0004 (0.0012)	0.00089 (0.0018)	0.0029 (0.001)*	0.0015 (0.0009)
Variance equation				
ARCH effect	0.1408 (0.088)***	0.38189 (0.0105)*	0.2257 (0.0079)*	0.3102 (0.095)*

<sup>5</sup> <https://www.investing.com/>

GARCH effect	0.8169 (0.125)*	0.3099 (0.112)*	0.7952 (0.065)*	0.5268 (0.13)*
Constant	0.00001 (7.31E-08)	0.000011 (9.46E-05)	0.000006 (4.078E-07)*	0.0000048 (1.89E-05)**

\*p<0.01; \*\*p<0.05; \*\*\*p<0.10. Source: Author's calculations.

The upper panel of left side of Table 4 indicates the results concerning the conditional mean equation. It is revealed that the coefficient of the percentage change in COVID-19 confirmed cases (Covid) is negative for all selected markets. The investors' fear index – CBOE Volatility Index – has been used in the conditional mean equation to judge the investors' behavior. It is revealed from Table 4 that the coefficient of the VIX is negative and statistically significant in all the selected markets except for Pakistan. Such an observation lends to support the common understanding that the corona pandemic has generated pessimism and uncertainties in the stock markets to negatively guide the investors. The lower panel of the left side of the Table 4 shows the results of the conditional variance equation. It is observed that the GARCH effect is positive and statistically significant in this equation for all the four stock markets in South Asia. This confirms the presence of volatility clustering in the stock return series in the COVID-19 era. Precisely, a bulk of pessimistic information flows from the previous day's forecast to the market which makes the stock returns volatile. Such information flow is around 81.69% for Bangladesh, 30.99% for India, 79.52% for Pakistan and 52.68% for Sri Lanka. All these results satisfy the stability condition of the GARCH (1,1) model, i.e., the sum of ARCH effect and GARCH effect is one. However, these many volumes of information flow from the past period forecasts need not necessarily due to the uncertainties created in the post-event period. And, to this extent the above results can be misinterpreted albeit Figure 2 confirming maximum volatility in the post-event period. Hence, the event study method has been employed to examine the stock market behavior in the post event period.

Table 5. Abnormal stock market returns

	Bangladesh	India	Pakistan	Sri Lanka
Estimation Window (-1, -90)				
Event day	-0.0043	-0.0123	-0.0129	0.00009
The following day	-0.00018	-0.0048	-0.00398	0.0099
Estimation Window (-1, -120)				
Event day	-0.0041	-0.01078	-0.0129	0.000081
The following day	0.00029	-0.0042	-0.0031	0.00879

The abnormal stock market returns for the event day and for the immediate next day have been estimated using the specifications (1), (2), (3) and (4) for both the estimation windows, and the results are summarized in Table 5. It is noticed that the abnormal returns are negative on the immediate next trading day in all the stock markets except for Sri Lanka in both the estimation windows. This is a primary indication of the beginning of the flow of pessimism among the market participants in response to the global news of the sudden outbreak of COVID-19 pandemic. Now, the question arises whether such negative effect persists, if yes, for how long. To reveal this matter, the cumulative abnormal returns have been estimated over eight different short-length event windows covering 120 trading days using two different estimation windows, and the results are

summarized in Table 6. It is revealed that the negative effects of the sudden outbreak of COVID-19 pandemic in Bangladesh, India, Pakistan and Sri Lanka up to 59<sup>th</sup> day. The results are statistically significant. This is the indication of the strong resilience of the South Asian stock markets towards the abrupt flow of global public health shocks. The negative shocks of all the countries persisted up to 59 trading days and reappeared between 60 to 120 trading days in both the estimation windows, and these results are statistically significant in all the countries except Pakistan.

Table 6. CAR in the stock markets

CAR	Bangladesh	India	Pakistan	Sri Lanka
0,29	-0.0278 (-5.53)*	-0.0363 (-5.28)*	-0.01.1352 (-11.55)*	-0.0366 (-7.09)*
30,59	-0.0827 (-16.46)*	-0.1652 (-24.71)*	-0.2646 (-22.62)*	-0.1823 (-35.38)*
60,89	0.0227 (4.51)*	-0.0135 (-2.02)**	0.0314 (2.68)*	0.1115 (21.64)*
90,120	0.0005 (0.11)	0.0183 (2.73)*	-0.0651 (-5.56)*	0.0242 (4.70)*

t-stat within parentheses, \*p<0.01; \*\*<0.05; \*\*\*p<0.10. Source: Author's calculation.

This indicates the persistence of stock market volatility and the subsequent market downturn in these countries. It is evident from the above discussion that the unexpected outbreak of corona pandemic caused downturns in all the four countries. Now, it is relevant to explore the probable factors which might have transmitted the uncertainties and pessimism associated with the ongoing global public health crisis to cause such market downturns. To understand the impact, random effects panel regression equations (6) and (7) have been estimated for both the estimation windows, i.e., (-1,-90) and (-1,-120), the results of which are presented in Table 7. It is observed that the COVID-19 confirmed cases are significant but COVID 19 reported death cases are insignificant but negative in the estimation window (-1,-90). It indicates the adverse effects of the pandemic on the investors' sentiments and hence, on abnormal stock market returns. However, in the estimation window (-1,-120), the negative effects of COVID-19 confirmed cases and COVID-19 reported death cases on the abnormal returns in the selected stock markets during the post-event period are statistically significant. The stock index return representing wealth effects on the households and firms is positive and statistically significant in both the models and in both the estimation windows. Given that investors include the consideration of the wealth effect in their investment analyses of predicting stock market returns.

Table 7. Factors influencing abnormal returns in the stock markets

	Estimation window (-1, -90)	Estimation window (-1, -120)
	Model 1	Model 2
Infections	-0.00000485 (-1.547)*	-0.0000465 (-1.758)***
Deaths	-0.00000542 (-1.689)	-0.0000574 (95.125)**

VIX	0.0418 (22.169)*	0.0415 (25.391)*
Exchange Rate	0.00001992 (0.215)***	0.0000032 (0.045)
Oil Price	-0.00129 (-0.3.002)*	-0.00119 (-3.156)*
Inflation Rate	0.0000428 (3.712)*	0.0000342 (3.172)*
Interest Rate	-0.000139 (-1.8128)***	-0.00011 (-1.8253)***
Constant	0.0052 (2.865)*	0.0054 (3.049)*
Obs	480	480
F-Stat (p-value)	1103.75 (0.000)	1322.87 (0.000)
R-square	0.82	0.84
Adj. R-square	0.82	0.84
Husman Test Stat (p-value)	11.712 (0.125)	13.532 (0.064)

Source: Authors' Estimation. \*p<0.01; \*\*p<0.05; \*\*\*p<0.10.

It is noticed that, stock market return is a determining factor of the abnormal stock return in the post-event period. The observation that the volatility index has a significant positive impact on the abnormal stock market returns in both cases. It is an unusual trend in the stock market behavior that 'fear factor' is moving in cycle with the stock prices. Market analysts predict that investors' greed and exclusion of some key risks are responsible for this situation (Chowdhury et al., 2023; Li, 2020). It can also be the indication of least pessimism among investors amid the pandemic which perhaps became catalysts for a positive association between market volatility and stock market returns. Table 7 indicates that the exchange rate has positive and significant coefficients in both the cases which indicate no importance of exchange rate risk in South Asian markets. The oil price effect on abnormal stock returns is significantly negative. Their observation is crucial when country-wide lockdowns and restrictions of travels and transports were implemented in the four countries resulting in substantial fall in oil demands and its transactions in the future markets in the post-event period. So, investors might have diverted their portfolios from investments on oil stocks for higher stock returns on other stocks. This interpretation is similar to the Cash Flow Hypothesis of Williams (1938) that stock returns are negatively correlated with the oil price changes. It is noticed that the inflation rate has a significantly positive impact on abnormal stock market returns in the post-event period. This finding resembles the observation of Fisher, popularly known as Fisher effect (Fisher, 1930) that stock market returns can compensate investors for an increase in expected and unexpected rates of inflation (Chowdhury et al., 2022). Moreover, the interest rate has a significant negative impact on abnormal stock market returns in the post-event period. The monetary authorities in South Asia reduced the policy rates amid the pandemic which by discouraging investments on fixed-income assets induce the investors to make investments on equities for higher yields. This finding supports the Proxy Effect (Fama, 1981) that stock market returns are negatively correlated with expected inflation which is often proxied by the short-term interest rate. Another interpretation may be that fall in interest rates amid the pandemic by boosting investment demands in the goods market might

have worked to activate the trade and business causing increased stock market returns in the post-event period thereby explaining a quick recovery of South Asian capital markets. Thus, this study empirically substantiates the influence of the number of COVID-19 confirmed cases, COVID-19 reported death cases, stock index returns, market volatility, oil prices, inflation rate and interest rates in determining abnormal stock returns in South Asian markets amid the COVID-19 pandemic. The findings of this study may be summarized below:

- a) Covid-19 has negative impact on the stock market returns;
- b) Stock market return and stock market performance are positively correlated;
- c) Impact of volatility on stock market performance is positive;
- d) The impact of oil price on the stock market performance is negative;
- e) Changes in inflation rate may have positive effects on stock market performances and
- f) Interest rate has adverse effects on stock market performances.

## **Conclusion**

This study has been attempted to measure the impact of Covid-19 on the stock markets in selected South Asian countries viz., Bangladesh, India, Pakistan and Sri Lanka. The empirical findings of the study indicate that the pandemic has adversely influenced the sentiment of investors. It has created severe panic among the investors which resulted in a pessimism toward investment. It has further created market uncertainties and thus caused serious market volatilities. The study observed the presence of the announcement effect in the selected stock markets. The global announcement of the deadly spread of the pandemic exerted negative effects on stock market returns while significantly working through the changes in the number of Covid-19 confirmed cases, death cases, stock index returns, market volatility, oil prices, inflation rate and interest rates in the South Asian markets. Specifically, the percentage change in Covid-19 confirmed cases and death cases have been observed to adversely influence the abnormal stock markets in this region. Hence, it is important to protect the interests of investors to ensure liquidity of assets and return on investment. To restore the confidence of investors, governments of respective countries should frame necessary policies to ensure the full-fledged functioning of services, construction, manufacturing, international trade, travel and tourism in a befitting but quick manner. Governments are also expected to continue the expansionary fiscal and monetary policies to uphold the confidence level of investors.

### *Guideline for future research*

This study has not considered other important socio-economic-political, demographic, technological and other relevant policy variables. Researchers may also focus on the impact of Covid-19 on the returns of individual stocks in the South Asian market.

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