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The Impact of COVID-19 on Stock Market Performance: Evidence from the Dhaka Stock Exchange Indices

Nur-E-Jannat[1], Md. Tuhin Ahmed[2], Md Nazmus Sadekin[3], Md. Mahbub Alam[4], & Md Moniruzzaman Muzib[5]

[1]MSS student, Department of Economics, Mawlana Bhashani Science and Technology University, Santosh, Tangail-1902, Bangladesh.

[2]Lecturer, Department of Economics, Mawlana Bhashani Science and Technology University, Santosh, Tangail-1902, Bangladesh.

[3]Professor, Department of Economics, Mawlana Bhashani Science and Technology University, Santosh, Tangail-1902, Bangladesh.

[4]Lecturer, Department of Economics, Stamford University Bangladesh, 51, Siddeswari Road, Dhaka- 1217.

[5]Associate Professor, Department of Economics, Mawlana Bhashani Science and Technology University, Santosh, Tangail-1902, Bangladesh.

***Corresponding Author:** Md. Tuhin Ahmed**, Email:** tuhin.ahmed@mbstu.ac.bd

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ABSTRACT

The COVID-19 pandemic sent shockwaves through capital markets worldwide, and the Dhaka Stock Exchange (DSE) was no exception. This research paper examines the impact of COVID-19 on three of the key indices in the DSE, such as the Broad Index (DSEX), the Sharia Index (DSES), and the blue-chip index (DS30). Exploiting daily price data from January 2015 to December 2021, respectively, and fitting the GJR-GARCH (1,1) model, the paper investigates the effects of the pandemic on market volatility and returns in the special circumstances of the capital market of Bangladesh. Results indicate that (i) the COVID-19 outbreak witnessed a great surge in volatility in all three indices, (ii) DSEX had to witness the highest volatility, and DS30 had the lowest potent impact of volatility, and (iii) there was a positive association between COVID-19 and market returns within the sample period. The heightened volatility may be attributed to pre-existing struggles in the DSE, the initial panic caused by the outbreak, and the subsequent policy responses. Conversely, immediate policy interventions—such as the introduction of floor prices and circuit breakers—appear to have contributed to positive returns. In order to lessen the effects of financial shocks, the study emphasizes the significance of spreading good news and putting in place prompt market-stabilizing measures.

Keywords: COVID-19; DSEX; DSES; DS30; Volatility

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INTRODUCTION

COVID-19 has triggered a global crisis like no other global health crisis that, in addition to an enormous human toll, led to the deepest global recession since the Second World War (World Bank, 2020). The bulk of the equity indices, including those in America, Europe, and Asia, have plummeted due to COVID-19. While many industrialized nations struggled to deal with the COVID-19 catastrophe, Bangladesh, a nation plagued by poverty, experienced enormous hardship (Raihan et al., 2020; Raihan et al., 2021a; Raihan et al., 2021b; Raihan et al., 2022a; Raihan et al., 2022b; Raihan et al., 2022c; Raihan et al., 2022d; Raihan et al., 2023; Raihan et al., 2024; Sayeed Al-Zaman, 2020).

Since 11 February 2023, 755,918,338 confirmed cases of COVID-19 were reported globally, and 6,856,229 people have died (COVID-19 Situation Updates, 2023). However, COVID-19 had severe effects between the years 2020 to 2021. By 26 December 2021, 278,714,484 people were affected, and 5,393,950 people died all over the world due to COVID-19 (WHO Bangladesh COVID-19, 2021).

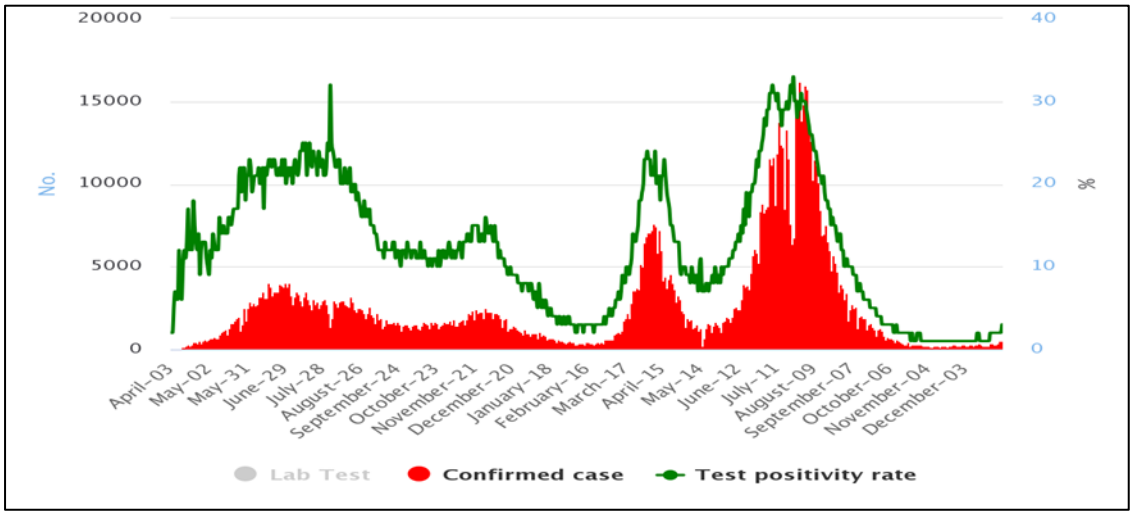

Figure 1: Confirmed Cases in Bangladesh and Number of Lab Tests April 2020 to December 2021 ***Source:*** http://dashboard.dghs.gov.bd/

The discussion of the impact of COVID-19 on the stock market of Bangladesh is a little technical because the situation of the DSE was distinct at various times. Bangladesh's stock market has been struggling since 2010, and Bangladesh's stock market is the only stock market that has been closed for longer than three months (Haque & Chowdhury, 2020). On the other

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hand, with the emergence of COVID-19, the authority of Bangladesh took a floor pricing policy to stop the bleeding of the already wounded market, which resulted in impressive outcomes. Lower points for the indices of Bangladesh's stock market are seen for the first few months after COVID-19 attacked Bangladesh (lower than in 2019), but the points started to grow in the last half of 2020. Even in September 2021, DSEX skyrocketed to 7,052, the highest level since 2013 (DSE Index Crosses, 2021).

To examine the market returns and volatility conditions for the three DSE parameters, the Broad Market Index (DSEX), the Dhaka Stock Exchange Sharia Index (DSES), and the Dhaka Stock Exchange 30 Index, or blue-chip index (DS30), we will use a sample period from 2015 to 2021. We shall divide the sample period into three the pre-pandemic era (January 2015 to February 2020), the early COVID days (March 2020 to June 2020), and the post-peak pandemic times (July 2020 to December 2021).

Figure 2: Daily Points of the Three Indices (2015 - 2021)

Source: Stock Now

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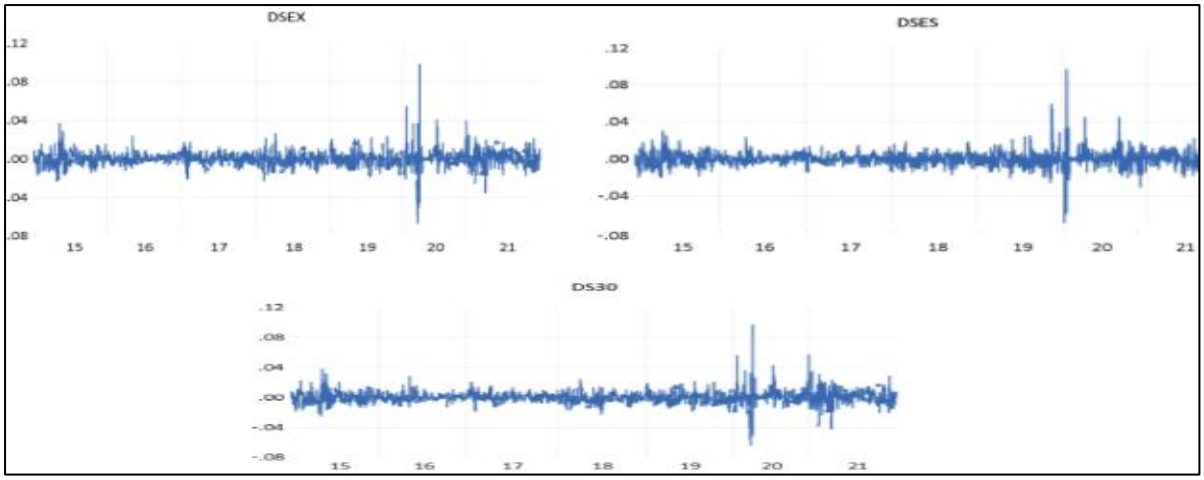

Figure 3: *Daily variations in the Percentages of DS30, DSES, and DSEX (The whole sample period: January 2015 - December 2021)* ***Source:*** Stock Now

Bangladesh's economy began to exhibit cracks before COVID-19 in the form of a financial crisis. Improper banking practices existed even though our nation's GDP has grown annually for the past 10 years (an astounding 8.2 per cent in 2019). Also, we are aware that the stock market suffers if the banking sector is poor. The Dhaka Stock Exchange has had an extremely difficult epoch resuming a sustained upswing after the stock market meltdown of 2010. Between May 2, 2016, and January 3, 2018, the DSEX increased in value from 4171 to 6318 points. However, the DSEX dropped once more from 6318 points on January 3, 2018, to 4768 points on February 17, 2020, as a result of bad financial regulation in listed companies, placement shares, strategies that promote going to invest in undervalued mutual fund schemes, challenging listing methodologies for ethical dealers, absence of an active bond market, and restrictions to capital market by the Bangladesh Bank, and high savings rates offered by Sanchaya Patra/FDRs (which deter relatively hazardous stock market involvement) (Rahman, 2020).

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Figure 4: Daily Points of the Three Indices (January 2015 - February 2020)

Source: Stock Now

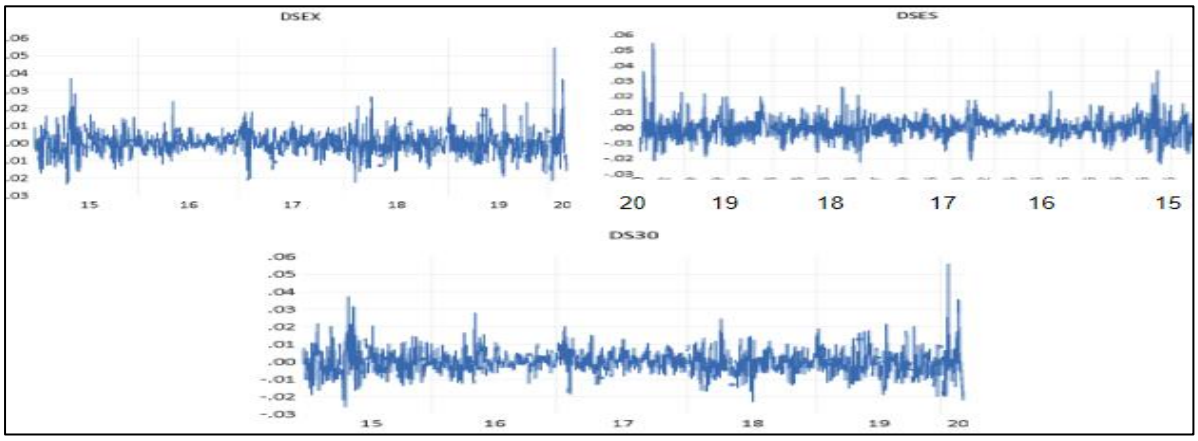

Figure 5: *Daily percentage change of DS30, DSES, and DSEX (January 2015 - February 2020)*

Source: Stock Now

All the cracks that persisted before, later added with COVID-19, made the situation worse. On March 15, 2020, our primary bourse's key index dropped below 4000 points for the first time in the previous five years. Week 1 (March 15 to March 19) brought the stock market an immediate shock when COVID-19 struck Bangladesh for the first time, and a panic run rocked the stability of the capital market. On March 19, 2020, the trading hours were shortened by one hour, beginning at 10:30 am and lasting until 1:30 pm. Week 02 started following the first chaotic week and only lasted four days (March 22 to March 25) (Hamim, 2020). On March 26, 2020, the Dhaka Stock Exchange (DSE) was closed. Because of the contagion, the market was closed for 66 days in FY 2019–20 (Haque & Chowdhury, 2020).

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Figure 6: Daily points of the three indices (March 2020 - June 2020)

Source: Stock Now

Following a nearly four-month break, both stock exchanges of Bangladesh resumed regular business hours on July 8, 2020, from 10:30 am to 2:30 pm. Bangladesh Securities and Exchange Commission (BSEC) implemented the emergency circuit breaker on all listed equities on March 19, 2020. All stocks listed under the new emergency circuit breaker rule had to retain a price that did not drop below the five-day average closing price, and a stock's opening adjusted price had to represent the circuit breaker's floor price for the day (Haque & Chowdhury, 2020). Towards the end of 2020, the DSE Broad Index rose by 21.31% to 5402.07 points from 4452.93 points in 2019. As of December 2020, the DSE's market capitalization has increased by 32% as compared to the same time in 2019 (Ahamed, n.d.). Indeed, on September 5, 2021, the Dhaka Stock Exchange climbed to the top record high, with the index having exceeded 7,000 points (DSE Index Crosses, 2021).

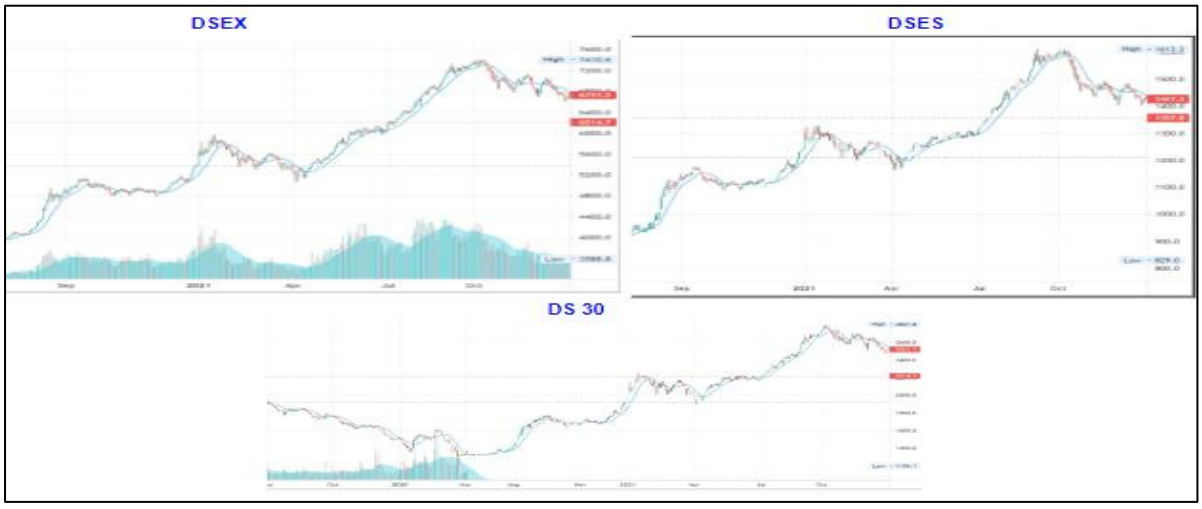

Figure 7: Daily Points of the Three Indices from July 2020 to December 2021

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Source: Stock Now

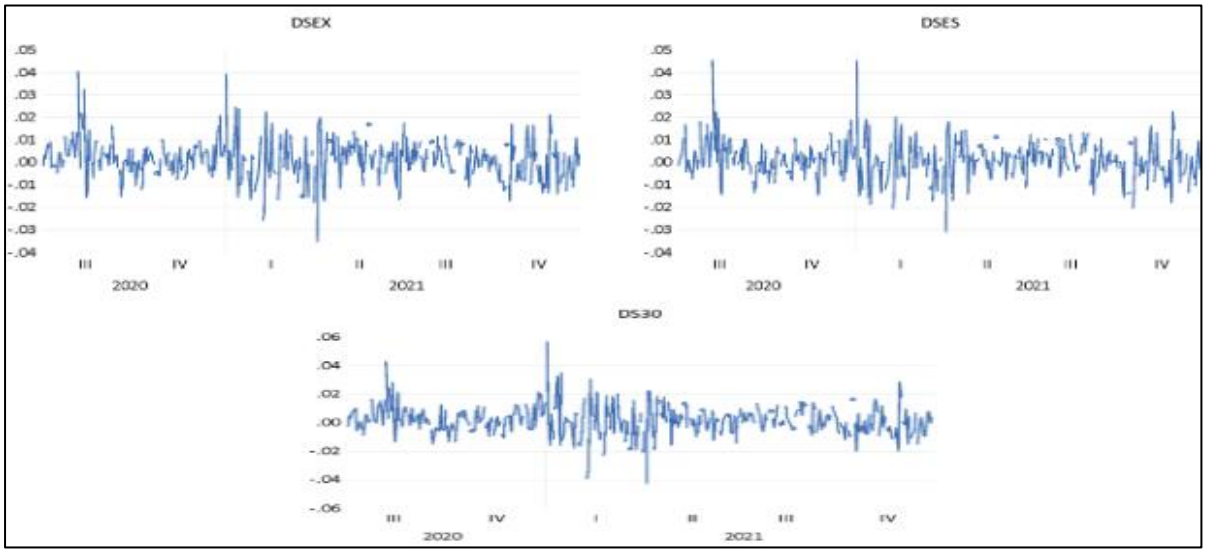

Figure 8: Daily Change in DS30, DSES, and DSEX Percentages for the later COVID period (July 2020- December 2021) ***Source:*** Stock Now

This paper seeks to explore how the Dhaka Stock Exchange (DSE) reacts to the COVID-19 epidemic following the three major indices, which are: the high-cap index of DSE (DS30), the DSE Sharia Index (DSES), and the DSE Broad Index (DSEX). The peculiarities and institutional environment of the Bangladesh stock exchange during the time of the epidemic are being taken into account carefully during the investigation. It also attempts to explore the different impacts of the coronavirus on the three indices, allowing a more refined knowledge of how the market behaves. The study also examines return and volatility trends during the epidemic, providing information that could assist players in the market, investors, and policymakers in becoming ready for future market disruptions of a similar nature.

REVIEW OF LITERATURE

Various stock market literature concerns the influence of the COVID-19 pandemic on the stock markets of the world. Most of these studies imply that the stock market and the coronavirus epidemic are associated in some way. The description of the empirical literature appraisal of the influence of SARS-CoV-2 on the stock market is summarized in Table 1.

Table 1: *An overview of how COVID-19 affects the stock market*

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Contributors (Year)	Regions	Year of Study	Method	Highlights of the Study
Hamim (2020)	Bangladesh	2019-2020	Descriptive studies	COVID-19 affects the DSE & its market participants substantially.
Golder et al. (2022)	Bangladesh	2014-2021	GJR-GARCH (1,1) model	Return and volatility circumstances are significantly improved by the virus outbreak, resulting in sharper volatility in the market across all indices.
Hossain et al. (2021)	Bangladesh	2020-2021	OLS, Descriptive studies	In the analysis, the DSE indexes were affected negatively by the pandemic. Amongst the factors that adversely affected the DSE indices are the number of reported cases on a daily basis, the bank velocity, the rate of inflation, as well as the interest costs.
Adnan et al. (2020)	Bangladesh	2020	Event study approach, AAR, CAARs	The stock exchange returns of all companies and domains, including those in the financial and non-monetary industries, are significantly impacted by the news of the first COVID-19 detection in Bangladesh.
Ahmed (2021)	Bangladesh	1997-2020	ARIMA	Observe the presence of market efficiency anomalies.
Aktar et al. (2020)	Bangladesh	2020	Baseline model estimation & Regression analysis	The surge in the number of confirmed COVID-19 cases also had a negative effect on the amount of the profitability of the shareholders, and the greatest detrimental impact was registered in the first weeks when the cases were verified.
Qamruzzaman et al. (2021)	Bangladesh	2020	ARDL model	COVID-19 has negative implications for both the momentary and prolonged effects on capital market behavior.
Bora and Basistha (2021)	India	2019-2020	GJR GARCH) model	Prior to the virus infection, the trading floor indicators had more profit than they did during the COVID-19 pandemic.
Ozkan (2020)	Turkey	2019-2020	GARCH model	After March 2020, the novel coronavirus's effect on the price swings of the Turkish shares vanished. As the impact of the outbreak subsided after March 2020, the realized volatilities of sector indexes returned to normal.

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Contributors (Year)	Regions	Year of Study	Method	Highlights of the Study
Adenomon et al. (2022)	Nigeria	2015-2020	EGARCH, QGARCH	According to the study, the global contagion caused a detrimental repercussion on the Nigerian trading floor of the Exchange, resulting in lower market returns and increased volatility during the global epidemic.
Fakhfekh et al. (2021)	Tunisia	2016-2020	EGARCH, FIEGARCH, TGARCH	Following the COVID-19 pandemic, volatility was maintained across all categories. Volatilities in different sectors had different degrees of asymmetric impacts during the Covid 19 regime.
Xu (2022)	Canada	2020	REGARCH, VAR	Reveals that COVID-19 has significantly increased fluctuations in markets, a potential stabilization effect from positive government announcements, and the improved accuracy of risk predictions with the proposed model.
Priyono and Kartiko (2021)	Indonesia	2020-2021	ECM, GLS	Following the outbreak, the Indonesian Sharia-compliant Stock Market Index (ISSI) was adversely affected by the daily average report of virus patient cases that were recorded.
Elsayed and Elrhim (2020)	Egypt	2020	Multiple regression analysis	Compared to coronavirus-related daily deaths, the financial sectors are more susceptible to accumulated morbidity indications. Different sectors exhibit varying levels of sensitivity.
Baker et al. (2020)	United States	1918-2020	Descriptive studies	Observe the dominant role of COVID-19 news in stock market moves and the emphasis on business closures and social distancing as key factors.
Yong et al. (2021)	Malaysia, Singapore	2020	EGARCH	Stock market returns in Malaysia and Singapore showed decreased persistence during the calamitous pandemic.
Szczygielski et al. (2021)	Asia, Europe, Africa, Latin America, Arabian Markets	2019-2020	IGARCH	The study emphasizes the diverse consequences of COVID-19 over territories, with negative effects on returns and volatility triggered by global uncertainty, except for Arab markets.

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Contributors (Year)	Regions	Year of Study	Method	Highlights of the Study
Yousef (2020)	G7 countries	2019-2020	GJR-GARCH	The erratic behavior of the G7 stock markets was substantially lowered by COVID-19.
Samitas et al. (2022)	51 stock market	2020	A-DCC	A possible financial contagion risk linked to the pandemic and lockdown measures is indicated by the substantial negative correlation between the daily new COVID infections and several market indices.

The scientific findings regarding the association involving COVID and the trade for stocks have consistently been conflicting. Some studies (Adenomon et al., 2022; Adnan et al., 2020; Aktar et al., 2020; Baker R et al., 2020; Bora & Basistha, 2021; Hossain et al., 2021; Priyono & Kartiko, 2021; Qamruzzaman et al., 2021; Samitas et al., 2022; Szczygielski et al., 2021) find the negative impact of the global health crisis on the share market, while Ahmed (2021) and Golder et al. (2022) show positive portfolio gains during the epidemic. According to a study by Ahmed (2021), the DSEX rose from 4452.93 points in 2019 to 5402.07 points by the very end of 2020, a 21.31% gain. In 2020, the DS30 increased by 36.41% to 2078.95 points. Turkey's stock market suffers for a shorter period due to COVID-19, as per the analysis of Ozkan (2020).

In the case of volatility conditions, few studies (Golder et al., 2022; Szczygielski et al., 2021; Xu, 2022; Yong et al., 2021; Yousef, 2020) give testimony that COVID-19 causes increased volatility, whereas few studies (Ahmed, 2021; Fakhfekh et al., 2021) show persistent volatility during the COVID period. Again, various studies (Adnan et al., 2020; Elsayed & Elrhim, 2020; Fakhfekh et al., 2021; Özkan, 2020) have looked at how the epidemic has affected the securities market by sector.

DATA AND METHODOLOGY

Research Design

Secondary statistics have been adopted for our current study. For the first objective, we have used descriptive analysis, graphs, patterns, and historical information. In case of the 2nd and the 3rd objectives, we have employed the GJR-GARCH model. In this article, the period of study is seven years from January 2015 and December 2021.

Data Analysis and Data Collection

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For the investigation, observations are gathered from investing.com, DSE, Stock Now, OECD, DGHS dashboard, IEDCR, WHO, and various newspapers like The Business Standard, The Daily Ittefaq, etc.

We have analyzed data for three separate indices –the DSEX, the DSES, and the DS30 over several periods: the pre-COVID era from March 2020 to June 2020, and data from July 2020 to December 2021 are analyzed under the later COVID era. Bangladesh's disease surveillance agency identified the pioneer patient of COVID on March 8, 2020; the financial day prior to March 8th is known as the pre-coronavirus phase. The pandemic timeframe is certified later than March 8th, and a dummy is added to the model based on this date.

Model Specification

In 1986, Bollerslev expanded the ARCH model to create the GARCH model, which effectively captures the problem of volatility clusters. This shortcoming of the classical GARCH model, whereby the instability feedback is forced to be symmetric to favorable and unfavorable innovations, is handled in the analysis by the GJR-GARCH model, which investigates the asymmetry response to conditional instability to news (Glosten et al., 1993; Zakoian, 1994).

Steps for the GJR-GARCH Model

The daily pricing data of the three indices of DSE are collected. Then, employing the natural log difference method, the investment gains of all market indexes will be derived (Chaudhary et al., 2020; Duttilo et al., 2021).

$$R_{n,t} = ln \frac{P_{n,t}}{P_{n,t-1}} \quad (1)$$

Where, $R_{n,t}$ is the day-to-day gain on index n at period t,

$P_{n,t}$ is the everyday final value of index n at period t,

$P_{n,t-1}$ is the diurnal final value of index n at period t-1.

The further stages of this inquiry go as follows: Unit root testing is used in the initial phase to ascertain whether a data set is stationary. In this instance, the Augmented Dickey-Fuller (Dickey & Fuller, 1981) and the Phillips-Perron (Phillips & Perron, 1988) unit root tests are applied in confirming stationarity of the data. To obtain volatility in phase 2, the time-series data are tested to establish non-heteroscedasticity and whether there is the presence of an ARCH/GARCH result using the Autoregressive Conditional Heteroscedasticity-Lagrange

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Multiplier test (ARCH-LM) (Engle, 1982). In the third step, the volatility of the Dhaka Stock Exchange index is forecasted employing the GARCH family method.

One can also examine the leverage effect with the help of GJR-GARCH (Duttilo et al., 2021). Thus, this paper modifies the conditional mean and conditional volatility equations of the GJR-GARCH model so as to assess the conditional volatility. There is also such a point that to demonstrate the impacts of the COVID-19 infection, a single arbitrary dummy variable is added to the model. The pre-COVID phase is coded 0, and the COVID cycle is coded 1. This is the model GJR-GARCH (1,1), which has an additional dummy variable. This is the conditional mean equation:

$$R_{n,t} = \rho + \theta_1 R_{n,t-1} + \omega_1 COVID - 19_t + \epsilon_{n,t} \quad (2)$$

The conditional volatility equation is as follows:

$$\sigma_{n,t} = \Phi + \varphi_1 \sigma_{n,t-1} + \upsilon_1 \epsilon_{t-1}^2 + \lambda_1 I_{t-1} \epsilon_{t-1}^2 + \Omega_1 COVID - 19_t \quad (3)$$

Here, $I_{t-1} = \begin{cases} 1 \; if \; \epsilon_{t-1} < 0 \; distressing \; tidings \\ 0 \; if \; \epsilon_{t-1} \geq 0 \; promising \; tidings \end{cases}$

Here, in the conditional mean equation, $R_{n,t,}$ and $\epsilon_{n,t}$ denote the yield and residue of the share benchmark n at span t, respectively. ρ stands for the constant. $R_{n,t-1,}$ and $COVID - 19_t$ is the previous period's profit of the equity benchmark n at span t−1, and the dichotomous variable for the coronavirus outbreak at timeframe t. Moreover, θ_1 and ω_1 are the respective parameters of $R_{n,t-1}$and $COVID - 19_t$.

Again, in the conditional variance expression, $\sigma_{n,t}$ signifies the predicted standard deviation of equity metric n at phase t, Φ is the intercept. $\upsilon_{1,}\, \varphi_1, \lambda_1, and\, \Omega_1$ are parameters of ARCH, GARCH, financial leverage, and a binary variable for the SARS-CoV-2. $\upsilon_{1,}\, and\, \varphi_1\, are$ positive or zero model parameters, which indicate the ARCH and GARCH effects, respectively, and both must be significant. Nonetheless, a greater portion of volatility is indicated if the sum of $(\upsilon_1 + \varphi_1)$ is near 1 (Chaudhary et al., 2020; Rastogi, 2014).

Undesirable breakthroughs have worse consequences than positive shocks, according to the asymmetric or leverage component, λ_1, and λ_1 must be more than zero to reflect the impact of leverage.

The conditional volatility equation is affected by favorable and adverse tidings alike. Although the unfavorable occurrence results from $\upsilon_1 + \lambda_1$, the favorable incidence affects φ_1. When λ_1

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is high it indicating that adverse shocks cause more fluctuation than advantageous ones, and when λ_1 is zero, it indicates a symmetrical effect. Moreover, $\upsilon_1 + \lambda_1 \geq 0$ in the GJR GARCH model.

An increase in market premium is associated with COVID-19 if the conditional mean equation contains a positive and statistically significant coefficient for COVID-19. It would be possible to connect COVID-19 to a rise in market volatility if its coefficient in the conditional volatility equation is positive and statistically credible. There are various diagnostic tests included to confirm the results.

RESULT ANALYSIS AND DISCUSSION

Descriptive Analysis

Table 2: *Descriptive Analysis of the Three Indices*

Periods	Details	DSEX	DSES	DS30
(A) Full sample period (January 2015-December 2021)	Mean	0.000188	0.000113	0.000191
	Median	0.000330	0.000229	0.0000933
	Maximum	0.097984	0.096598	0.096848
	Minimum	-0.067371	-0.072423	-0.063946
	Std. Dev.	0.008391	0.008253	0.008907
	Skewness	0.780390	0.732496	0.798505
	Kurtosis	20.04675	22.43593	17.14455
	Jarque-Bera	20279.95	26229.04	14022.91
	Probability	0.000000	0.000000	0.000000
	Observations	1661	1661	1661
(B)Pre COVID-19 period (January 2015-February 2020)	Mean	-0.0000782	-0.0000758	-0.000168
	Median	0.0000734	0.0000776	-0.000206
	Maximum	0.054454	0.054453	0.55760
	Minimum	-0.023588	-0.023588	-0.025883
	Std. Dev.	0.007062	0.007065	0.007206
	Skewness	0.663955	0.665484	0.713203
	Kurtosis	7.500258	7.510937	7.538018
	Jarque-Bera	1149.401	1154.029	1181.383
	Probability	0.000000	0.000000	0.000000
	Observations	1253	1253	1253

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(C). Initial COVID-19 period (March 2020-June 2020)	Mean	-0.002446	-0.002589	-0.002318
	Median	-0.000141	0.000000	0.0000227
	Maximum	0.097984	0.096598	0.096848
	Minimum	-0.067371	-0.072423	-0.063946
	Std. Dev.	0.024370	0.025145	0.024123
	Skewness	0.954530	0.692738	0.947801
	Kurtosis	9.688809	8.871058	9.557854
	Jarque-Bera	82.65715	62.16432	79.60622
	Probability	0.000000	0.000000	0.000000
	Observations	41	41	41
(D)Later COVID-19 period (July 2020-December 2021)	Mean	0.001445	0.001204	0.001745
	Median	0.001850	0.001180	0.001888
	Maximum	0.040481	0.045625	0.056900
	Minimum	-0.035054	-0.030711	-0.042319
	Std. Dev.	0.008999	0.008773	0.010737
	Skewness	0.216563	0.451526	0.283846
	Kurtosis	5.295942	6.192675	6.365695
	Jarque-Bera	83.02147	167.4237	177.1798
	Probability	0.000000	0.000000	0.000000
	Observations	365	365	365

Every one of the indices means returns (mean values) for the entire testing phase and the subsequent COVID stage are positive, according to our analysis; however, DSEX, DSES, and DS30 display negative mean yields for both the pre-pandemic and the early COVID eras. The DS30 index has the highest mean return throughout all phases (except for the pre-coronavirus stage), whereas the DSES benchmark has the lowest mean return. As a result, a unique market context analysis is found.

During the first COVID era, DSEX had the lowest infimum score of -.067371 and the highest supremum observation of 0.097984. During the first COVID era, DSES had the smallest minimal bound of -0.072423, and the largest supremum point of 0.096598. During the early COVID period, DS30 had the lowest minimal value of 0.096848 and the highest level of 0.096848. Standard deviations in this case are minimal across all indices and periods. The

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initial COVID-19 stage has slightly greater standard deviations for all indicators than at other times. Here, for all indices and all periods, JB Tests are quite large and significant.

Unit Root & ARCH-LM Test

Table 3: *Augmented Dickey-Fuller, Phillips-Perron & ARCH-LM Test Outcomes (January 2015- December 2021)*

Index	**Particulars**	**AD Test statistics**	**PP Test Statistics**	**ARCH-LM Test Statistics (Obs*R-squared)**
DSEX	ADF fl/PP fl	-14.14489***	-34.71192***	120.8471***
	ADF ftl/PP ftl	-14.17117***	-34.70791***	
DSES	ADF fl/ PP fl	-15.12153***	-35.03970***	112.6533***
	ADF ftl/PP ftl	-15.13181***	-35.03723***	
DS30	ADF fl/ PP fl	-13.68030***	-35.14941***	136.3126***
	ADF ftl/PP ftl	-13.71370***	-35.07799***	

A substantial influence at the 1% level is shown by ***. Note that fl = with fixed intercept at level, ftl = with intercept and trend components at level.

The ADF and PP unit root evaluation estimates indicate that the DSEX, DSES, and DS30 indices are all stationary at the level of constant and constant plus trend. By refuting the no-effect hypothesis, proving that an ARCH effect is based on the residuals of the econometric models, the LM statistical results validate the applicability of the GARCH model.

Table 4: Modelling GJR-GARCH (1,1) (January 2015- December 2021)

Particulars	DSEX	DSES	DS30
Section A: Conditional mean regression outcomes			
$\boldsymbol{\rho}$	-0.0000966 (-0.497461)	-0.000171 (-1.109267)	-0.000156 (-0.951818)
$\boldsymbol{\theta_1}$(Previous Period's Yield)	0.204249*** (7.608617)	0.184088*** (7.078220)	0.186300*** (7.209504)
$\boldsymbol{\omega_1}$(COVID-19)	0.001052** (2.064220)	0.000748* (1.636045)	0.001173** (2.514204)
Section B: estimates from the conditional variance equation			
$\boldsymbol{\Phi}$	0.0000025*** (4.842170)	0.00000264*** (6.155757)	0.0000025*** (5.465140)
$\boldsymbol{\nu_1}$(ARCH Effect)	0.138529*** (7.789076)	0.154233*** (7.639488)	0.150494*** (7.867321)

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$\boldsymbol{\varphi_1}$(GARCH Effect)	0.723428*** (35.79470)	0.728557*** (36.80199)	0.766338*** (37.22430)
$\boldsymbol{\lambda_1}$(Leverage Effect)	0.190462*** (4.953607)	0.159727*** (6.344712)	0.108881*** (4.473348)
$\boldsymbol{\Omega_1}$ (COVID-19)	0.00000061** (2.013730)	0.00000319*** (3.508087)	0.000253** (2.228056)
Part C: Model Statistics			
$\boldsymbol{\nu_1 + \varphi_1}$	0.861957	0.88279	0.916832
Schwarz criterion	-7.147877	-7.168924	-6.997849
Akaike information criterion	-7.159378	-7.195070	-7.023943
Hannan-Quinn Criterion	-7.149706	-7.185378	-7.014272

[Note: Records in Table 4's first bracket () indicate the Z score. Significant effects are indicated by ***, **, * at successively 1%, 5%, and 10% levels.]

Three sections of the outcomes derived are presented in Table 4. Section A of Table 4 presents the findings of the conditional mean regression for the three benchmarks. Here, the previous value of returns significantly predicts the current series in all cases, favorably ($\boldsymbol{\theta_1}$). Yet, compared to the other two metrics, namely DSES and DS30, DSEX's historical return values have a greater influence on predicting the current return series. Moreover, COVID-19 affects all of the DSE indices, raising market returns.

The results of the conditional volatility equation are shown in (Part B), and for all the indices, the parameters of the constant, ARCH ($\boldsymbol{\nu_1}$), GARCH ($\boldsymbol{\varphi_1}$), leverage ($\boldsymbol{\lambda_1}$) and COVID-19 are positive and statistically significant. The ARCH concept indicates the latest news, and its statistical meaning shows that fresh news has contributed to the volatility of the share space. Here, the Sharia index (DSES) has the highest significant ARCH effects, with the DSEX having the lowest and the DS30 having the second-smallest. As a result, the DSES is most affected by recent events, followed by the DS30 and DSEX, respectively.

Additionally, the GARCH term has statistical significance, which suggests that market volatility is influenced by past information. A similar conclusion was drawn by Ahmed and Naher (2021). The result indicates that the DSE Broad Index (DSEX), DSES, and DS30 require the longest time to decline due to shocks to conditional variance.

Any shock may still affect the dynamic variance estimates if both of the coefficients of the ARCH and GARCH terms are around 1. As a result, the DS30, followed by the DSES and DSEX, had the longest-lasting effects on conditional volatility, according to Table 4, Part C.

The results of Table 4, section B, show that the DSEX has the lowest asymmetric impact and the DS30 has the highest asymmetric impact (Leverage effect). However, compared to the other two indices that influence the leverage effect, the DSES is in the centre.

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Furthermore, Table 4, section B's results, show that COVID-19 significantly improved the conditional variance for all indices and boosted market instability across the board. DSES, which came in second in terms of market volatility, and the DSEXe were affected the least by the COVID-19 virus. The DS30, on the other hand, is the most impacted by the coronavirus.

Diagnostic Tests

The findings of this GJR-GARCH model's diagnostic test are shown in Table 4 (Part C). The mean-reverting mechanism is shown by the ARCH & GARCH term's value being smaller than one. Once more, the associated three indices' values for the Hannan-Quinn Criterion, Schwarz Information Criterion, and Akaike Information Criterion show a strong fit with the model.

Table 5: *ARCH-LM & Durbin-Watson Diagnostics*

Index	ARCH Effect (Obs*R^2)	Durbin-Watson Test Statistics
DSEX	1.222631	2.051443
DSES	0.762279	2.036603
DS30	1.154908	2.026196

Since all three models are implemented appropriately in this study, the result suggests that the models are homoskedastic. Here, the DW test results for all three indices are around 2. So, we find no autocorrelation in the residuals of the data.

CONCLUSION AND RECOMMENDATION

This research investigates the particular securities exchange conditions in Bangladesh between 2015 and 2021, taking into consideration the influence of SARS-CoV-2 on market returns and price volatility of the DSE's three indexes (DSSEX, DSES, and DS30). This study's analysis of secondary data applying the GJR-GARCH model reveals that coronavirus significantly affects the market return and volatility of the Bangladeshi trading floor (DSE). Accordingly, the outbreak raises the DSE's volatility during the sample period.

When examining market contexts, we discovered that all three indices had positive mean returns for the duration of the sample period, negative mean returns for the pre and early pandemic phases, and a positive mean return for the later COVID-19 period (see Table 2), which suggests a strong positive market reaction for all benchmarks for the later COVID era.

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In addition to having a substantial positive effect on the conditional expectation regressions in all DSE metrics, the novel coronavirus has a considerable uplifting influence on the conditional variance regressions by increasing market instability across all indicators.

Table 4, parts A and B, Policies such as floor pricing, lowering the interest rate of deposits, increased remittances, resumption of exports after lockdown, and the help of large-cap companies may be the reason for positive returns even in periods of high volatility due to COVID-19.

According to the study, the present series is always positively predicted by the historical value of returns. Once more, all indexes have positive and substantial coefficients of ARCH, GARCH, and leverage effects, demonstrating how current events affect volatility and asymmetry. (Table 4, Parts A and B)

The investigation also acquires enough information to compare the effects of the three indices of DSE. We have found that COVID-19 increases volatility ($\boldsymbol{\Omega_1}$) most in DSE-30, the DSES indicator in the second, and volatility in the DSEX due to COVID is the least. (Table 4, Part B). Significant positive repercussion of COVID on trading return ($\boldsymbol{\omega_1}$) is highest for the DS30 index and lowest for the DSES index (Table 4, Part A).

Recent good or bad news affects the stock market substantially. So, authorities should spread some good news to dispel the effects of bad news (outbreak of COVID-19), such as ensuring loans and circuit breakers. Due to several limitations and time constraints, the study is confined to DSE. A researcher can work with both DSE and CSE. Again, the sector-wise impact can be shown by other researchers.

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