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# Impact of Covid-19 on stock market volatility-A Bangladesh Perspective

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## Abstract

This study aims to measure the impact of Covid-19 on the volatility of stock market in Bangladesh. It considers daily data of Dhaka Stock Exchange Broad Index (DSEX) as dependent variable and growth rate of exchange rate and Brent oil price as independent variables while death case due to coronavirus as Covid-19 proxy. This study observes significantly negative impact of Covid-19 on the volatility. It is expected that the recommendations of this study may ensure a stable and vibrant capital market to enhance the economic progress of Bangladesh.

**Keywords:** Covid-19, volatility, stock market, GARCH

## Introduction

Originating from Wuhan, Hubei in China, the coronavirus (Covid-19) has spread 216 countries infecting 3,81,82,652 people and taking 10,38,810<sup>1</sup> lives across the world (WHO, 2020). This pandemic has seriously damaged the world economy including international supply chain, labor market, consumption behavior and the global stock markets (A-Awadhi et al., 2020; Chowdhury, 2018). The restrictions on mobility, commercial activities, and supply chains of governments in different countries at the early stage to combat the spread of coronavirus has impeded the economic activities across the world (Elgin et al., 2020). This restriction very quickly affected the financial markets ((Zhang et al., 2020; Chowdhury, 2017). This type attack on a stock market of a developing country like Bangladesh is the worst as the economy grows slowly and lacks sufficient capital supply. Although almost all the bourses around the world encountered this unexpected guest, the severe impact was observed from January to March in 2020 (Ramelli and Wagner, 2020; Chowdhury et al., 2023). Zhang et al. (2020) noticed that the risk level of all the countries reached at the highest point due to the quick spread of coronavirus in more than 200 destinations. However, due to the quick and timely policies taken by governments and central banks of different countries,

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

the situation has started to improve globally (Nicola et al., 2020). As the world is passing through the second wave of Covid-19, the probable impact is still beyond the imagination. At this backdrop, this study aims to investigate the impact of Covid-19 on the volatility of stock market in a developing country like Bangladesh (Chowdhury et al., 2022).

The remaining sections are as follows: Section 2 covers the data and methodology. Section 3 presents the empirical results and discussion, section 4 focuses on the policy implications and section 5 concludes the paper.

### **Data and Methodology**

This study measures the impact of covid-19 on the stock market volatility in Bangladesh using the autoregressive conditional heteroskedasticity (ARCH) and generalized ARCH (GARCH) models. Daily data of Dhaka Stock Exchange Broad Index (DSEX) has been used as dependent variable, daily growth rate of Brent oil prices and exchange rates have been used as independent variables while the daily death cases due to coronavirus has been used as covid-19 proxy. The data have been collected from investing<sup>2</sup>, yahoo finance<sup>3</sup> and worldometer.com<sup>4</sup> from 1 February to 30 September 2020. Since the first death case in Bangladesh was reported on 18 March, 2020<sup>5</sup>, this study measures the volatility from February to September period. Topcu and Gulal (2020) and Chowdhury et al., (2021) also applied the same procedure. The ARCH and GARCH models can be applied subject to fulfillment of the following conditions:

- a) residuals have clustering volatility and
- b) there is presence of ARCH effect.

Clustering volatility occurs when periods of high volatility are followed by periods of high volatility and vice versa for prolong period. The presence of ARCH effect is measured by LM ARCH test.

The following mean equation (eq.1) and variance equation (eq.2) have been applied to know the impact of Covid-19 on the stock market volatility:

$$\text{Stock index} = C_1 + C_2 \times \text{Covid-19} + e \quad (1)$$

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<sup>2</sup> <https://www.investing.com/indices/dhaka-stock-exchange-broad-historical-data>

<sup>3</sup> <https://finance.yahoo.com/quote/BZ=F?p=BZ=F&.tsrc=fin-srch>

<sup>4</sup> <https://www.worldometers.info/coronavirus/country/bangladesh/>

<sup>5</sup> [https://en.wikipedia.org/wiki/COVID-19\\_pandemic\\_in\\_Bangladesh#cite\\_note-coronagov-2](https://en.wikipedia.org/wiki/COVID-19_pandemic_in_Bangladesh#cite_note-coronagov-2)

Where, C is the constant, and e is the residual.

$$H_t = C_3 + C_4 \times \text{Exchange rate} + C_5 \times \text{Oil price} + C_6 \times H_{t-1} + C_7 \times e_{2t-1} \quad (2)$$

Where,  $H_t$  is the variance of the residuals derived from equation (1), this is also known as current day's variance.  $H_{t-1}$  is the previous day's residual variance, also known as GARCH.  $e_{2t-1}$  is the previous period's squared residual derived from equation (1) and known as ARCH term. Both ARCH and GARCH are the internal shocks that influence stock volatility.

### Empirical Findings

The predicted residuals in figure 1 indicates low volatility is followed by periods of low volatility, from day 1 to 90 and high volatility is followed by another period of high volatility, from day 91 to 102 for a prolonged period.

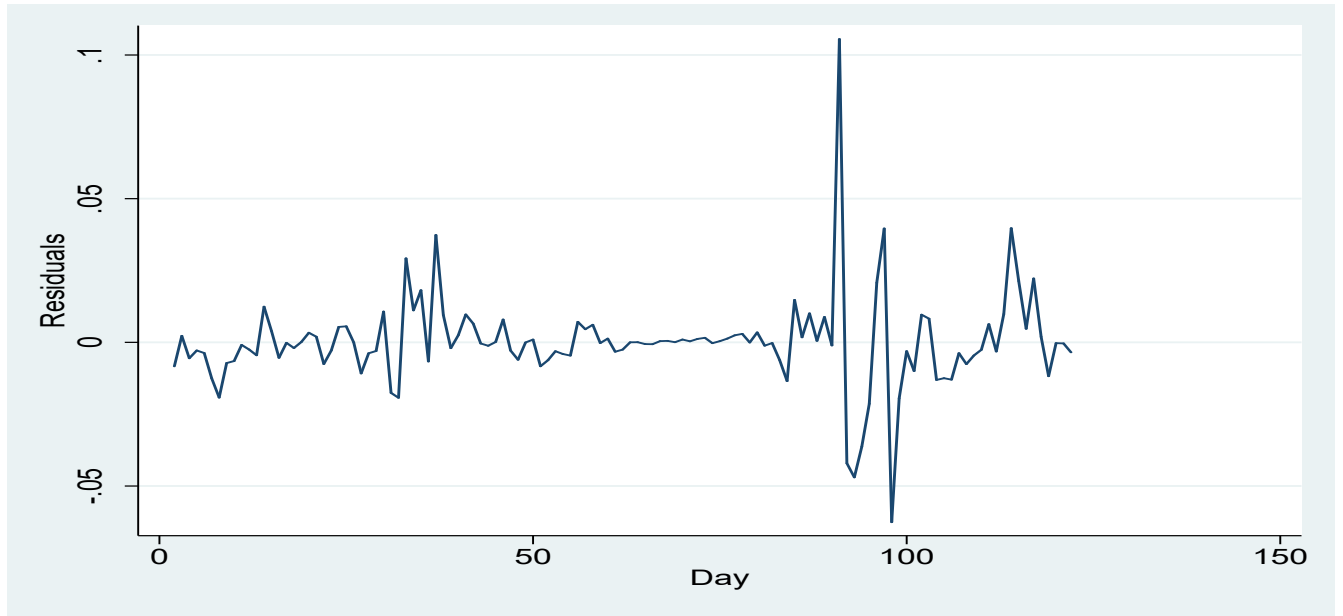


Figure 1: Predicted residuals

Therefore, it confirms the presence of clustering volatility. On the other hand, LM test for ARCH in table 1 indicates that there is ARCH effect as p-value is less than 5%.

Table 1. LM test for autoregressive conditional heteroskedasticity (ARCH)

| Lags (p) | Chi2  | df | Prob.  |
|----------|-------|----|--------|
| 1        | 4.375 | 1  | 0.0365 |

Since both the pre-conditions are fulfilled, this study can apply GARCH (1,1) model. Here, (1,1) indicates, one ARCH term and one GARCH term.

To apply the model, the stationarity of the data has been verified by Augmented Dickey Fuller (ADF) unit root test. Table 2 shows all the variables have been found stationary at level I(0) while the Covid-19 variable has been found stationary at first difference I(1). Therefore, Covid-19 data has been transformed to first difference for the suitability of the data.

Table 2. ADF unit root test

|               | Stock index  | Exchange rate | Oil Price    | Covid-19    |
|---------------|--------------|---------------|--------------|-------------|
| Stat(p-value) | -8.95(0.000) | -8.68(0.000)  | -9.99(0.000) | 0.95(0.000) |
| Integrated at | I(0)         | I(0)          | I(0)         | I(1)        |

The results in Table 3 indicate, covid-19 death case significantly influence the volatility of stock index and it is reflected in the significant ARCH and GARCH results.

Table 3. GARCH (1,1) results

| Index | HET                    |                      |                       | ARCH                  |                       |                    |                   |
|-------|------------------------|----------------------|-----------------------|-----------------------|-----------------------|--------------------|-------------------|
|       | Constant               | Covid-19             | Constant              | Exchange rate         | Oil price             | L1. Garch          | L1. Arch          |
|       | -0.00125***<br>(-1.10) | -0.001***<br>(-2.93) | -10.61***<br>(-55.94) | -1712.6***<br>(-8.14) | -41.63***<br>(-11.00) | 0.0651**<br>(2.78) | 0.656**<br>(3.21) |

t statistics in parentheses, \* p<0.05, \*\* p<0.01, \*\*\* p<0.001

Therefore, it indicates previous day's volatility can influence next day's volatility. This result is similar to the findings of Eichenbaum et al., (2020) and Chowdhury, (2020). To test the serial correlation, this study assumes the null hypothesis that there is no serial correlation. The result of time series specification tests after regress confirms that this model is free from serial correlation as all the p values of 40 lags are more than 5%. Again, to test the normality of residuals, this study assumes the null hypothesis that the residuals are normally distributed. After applying the Shapiro-Wilk W test, it is observed that the p-value is 0.000 which is less than 5% and thus indicates that the residuals are normally distributed. The test results have not been shown here. As residuals are not serially correlated and normally distributed, this model is perfect in explaining the significant impact of Covid-19 on the volatility of Bangladesh stock market (Chowdhury et al., 2019).

## **Brief Discussion**

Bangladesh stock market witnessed the free fall of stock prices from mid-February to mid-March till the Bangladesh Security and Exchange Commission (BSEC) imposed floor price mechanism (Chowdhury et al., 2020). Had the BSEC not imposed the floor price in time, thousands of investors would have lost their money within a week as most of them were in margin calls. Due to this imposition, stock market has experienced severe liquidity crisis as at the floor prices there were hardly any buyers except for few scripts. From the first quarter of 2019, the stock market was in bearish trend as foreign institutional investors were in selling mode due to their liquidity crisis and the arrival of Covid-19 has just accelerated the free fall. Investors, who are on margin account are the worst sufferers as they neither get desired prices nor are in position to repay their loans (Chowdhury and Chowdhury, 2022).

## **Policy implications**

To ensure a vibrant capital market, market participants need to be well educated and trained on the stock market mechanism, modern tools and prevailing rules and regulations. Different parties namely BSEC, Bangladesh Bank, Dhaka and Chittagong Stock Exchanges, Central Depository Bangladesh Limited, National Board of Revenue, Security houses, investors, financial institutions and other concerned parties should work together to ensure the harmony and to protect the interest of each party leading to improve the overall image of the capital market in the long-run. BSEC should take necessary steps to encourage reputed and financially sound companies to be listed eliminating all sorts of bottlenecks at different levels. This will not only ensure stability of the market, but also safeguard the interest of common investors. To ensure true and fair view of the listed companies, there should have transparency in preparing the financial statements. Auditors, top management and relevant regulatory bodies combinedly can make this possible by following the financial reporting requirements strictly. To reduce the transaction and processing costs, ensure security, rapid flow of information and quick settlement of transactions, blockchain technology may be adopted like NASDAQ (Chowdhury, 2022). Government and regulatory bodies should improve the monitoring and surveillance mechanism by employing more manpower and installing modern technology to prevent suspicious transactions. Although, all over the world, mutual fund is very popular, in Bangladesh, this sector is lagging behind. The commission needs to take come forward to make this sector popular by offering attractive returns to the unit holders at affordable risks. In case of non-compliances of regulatory requirements, companies should be

brought to the justice immediately to restore and enhance the lost confidence of general investors on the capital market. Monetary policies, interest and tax rates should be company friendly so that they can earn satisfactory return and thus can induce potential investors to park their savings in the capital market. Tax benefits may be expanded in terms of amount and time to attract more companies to be listed. The underprivileged bond market should be revitalized by introducing variety of products. This will certainly get popularity as it offers fixed returns. Current market is bank-dominated (Chowdhury, 2021). Other sectors should also be given equal attention to ensure diversity and to give investors various investment options.

### **Conclusion**

This study has attempted to measure the impact of Covid-19 on the volatility of stock market in Bangladesh considering DSEX as dependent variable, growth in exchange rate and oil prices as independent variables and death case as Covid-19 proxy. The result clearly indicates significant negative impact of Covid-19 on the stock market volatility in Bangladesh. It is also observed that the volatility of previous day spillovers to the next day as both ARCH and GARCH found to be significant. Subsequent stability tests ensure the acceptability and applicability of the model. A well-structured capital market is the pre-condition of economic growth of a nation. Bank loan-centric investment platform like Bangladesh will not serve this purpose. If required changes are made as mentioned in the above section, this highly potential market may turn in to a vibrant market and thus can enhance the economic progress of Bangladesh by ensuring transparency and governance at every level. This study has measured the impact of Covid-19 on volatility for a short period February to September 2020. Future researches may consider long period covering other Covid-19 factors namely confirmed case, monetary measures, and restrictions on movement to sketch an improved scenario.

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