EURASIAN JOURNAL *OF* HIGHER EDUCATION

The impact of COVID-19 on stock market returns: Empirical evidence from Nigeria

Mela Yila Dogo [ID]
Nile University of Nigeria, Abuja, Nigeria
dogomy674@gmail.com

Osman Nuri Aras [ID]
Tishk International University, Iraq
osman.aras@tiu.edu.iq

Abstract

The study investigates the causal relationship between COVID-19 and changes in the prices and volume of stocks in the Nigerian stock market, to identify whether there is a short and or long-run relationship between changes in the Nigerian Stock Exchange All Share Index 30 (NSE ASI 30) and NSE 30 traceable to the outbreak and continued presence of the coronavirus-19 diseases (COVID-19) during the period 31 December 2019 to June 30, 2020.

The paper seeks to estimate the effect of the COVID-19 shocks on the volatilities of returns in the NSE30 and ASI 30 stocks. After a property check on the times series data, a correlation matrix was drawn to understand the relationship between stock returns in NSE30 and ASI30 with total cases, test units, new cases, female and male smokers, and COVID-9 deaths. The ADF results helped us in selecting what the use in the representative model.

We then applied the Lagrange Multiplier (LM) test on the residuals of both the mean and the variance equations of the NSE30 and the Generalized Autoregressive Conditional Heteroscedastic (GARCH) to estimate the short and long-run return spillovers and conditional correlations between the shock from COVID-19 and stock market returns.

Generally, the results indicated a weak impact of COVID-19 on the returns and volume of both the NSE30 and NSE ASI 30 stocks. This is so because of some data issues and issues relating to empirics. More data will be sought, and a proper review of the paper undertaken, to ascertain its usefulness for policy.

The study concludes that to spur economic growth in COVID-19, Nigeria's economic managers, particularly, the monetary, fiscal, and capital market regulators must learn to work as a team, to ensure complementarity in their policies and thus, propel the economy out of a likely recession.

Keywords: Stock returns, COVID-19, ASI, NSE30, Nigeria.

JEL Classification Codes: *G10, G12, G13.*

1. Introduction

On December 31, 2019, the World Health Organization (WHO) office in China announced the first reported Coronavirus (COVID-19)[1] pandemic which started behind several pneumonia cases in Wuhan[2], in mainland China. Although symptoms of COVID-19 are often mild[3], in some cases they lead to more serious respiratory tract illness that can be particularly dangerous in older patients, or people who have existing health conditions. The COVID-19 outbreak was severe and recorded high mortality rates with regards to the number of human cases and fatalities and created both public health and economic consequences in countries. Apart from the direct health hazards, the virus affected the global economy especially in its impact on world output and prices, manufacturing, supply chain, the financial stability of firms, the banking system, household demand, international trade, and the global stock market.

1.1. Global Output and Prices

Globally, countries like Italy, South Korea, Iran, France, Spain, Germany, the United States of America (USA) and Japan have become the hardest hit of the virus in terms of the number of confirmed cases and deaths, while a host of more than 182 countries all over the globe have confirmed cases but with minimal death rate. The ravaging COVID-19 has disrupted global economic activity output contractions in China are being felt around the world, reflecting the key and rising role of China in global supply chains, travel, and commodity markets. This has forced the International Monetary Fund (IMF) to review its global growth projections from 3.5 percent to 3.40 percent on account of the outbreak. The Chinese economy is predicted to still meet its economic growth target for 2020 despite the pandemic, even though a small reduction in the growth is envisaged unless a protracted outbreak worsens the slowdown. Nigeria's growth projections were also reviewed downward by the IMF citing reasons for an impending fall in oil prices and domestic production as a result of low demand caused by COVID-19.

1.2. Manufacturing

The virus is snarling supply chains and disrupting companies. For instance, car plants in China have been ordered to remain closed following the Lunar New Year holiday and the immediate outbreak of the virus in mainland China, preventing global automakers located in China from resuming operations in the world's largest car market. According to S&P Global Ratings, the outbreak will force carmakers in China to slash production by about 15 percent in the first quarter. In addition, luxury goods makers, which rely on Chinese consumers who spend big at home and while on vacation, have also been hit. United Nations Conference on Trade and Development (UNCTAD), a United Nations Agency, stated (UNCTAD 2020a, UNCTAD, 2020b) that apart from the tragic human consequences of the COVID-19 epidemic, the economic uncertainty it has sparked will likely cost the global economy US$2 trillion in 2020.

---

[1] The virus according to the World Health Organization (WHO), is a large family of viruses that cause illness ranging from the common cold to more severe diseases such as Middle East Respiratory Syndrome (MERS-CoV) and severe acute respiratory syndrome (SARS-CoV). The novel coronavirus (nCoV) is a new strain that has not been previously identified in humans. Mortality and survival rates have important implications for every economy, as high mortality rate could lead to loss in productivity, thus culminating into real cost to the economy (WHO, 2021).

[2] A city in Eastern China with a population of over 11 million people.

[3] Including runny noses, headaches, coughs and fevers.

1.3. Global Stock Market

Global stocks have also nosedived since the spread of the deadly disease across the world. Investors' appetite has been dampened following the firm's negative outlook as well as adverse global output and financial markets projections for 2020. Adding to the episode of the global stock market plunge is the fall in oil prices which jolted investors who were already on the edge about the surging costs of the virus outbreak.

1.4. Developments in the Nigerian Economy

1.4.1. Impact on Crude Oil Prices and Federal Government Budget

The Nigerian economy doubles as an oil-exporting and refined crude oil importing economy, with high economic interaction with the rest of the world. Revenues from oil sales have contributed an average of about 70 percent of total government revenue in the last 10 years to 2018. Most of Nigeria's trading partners form the hardest hit the coronavirus outbreak, exposing the country to a twofold predicament of serious economic implications and an impending health crisis to manage. Since the outbreak of the coronavirus in late 2019, oil prices have continued to plummet on account of decreasing demand by affected countries, particularly China. On this note, the IMF decided to cut its economic growth forecast for Nigeria to 2.0 percent from 2.5 percent, highlighting the need for a major policy overhaul to reduce vulnerabilities including widening current-account and budget deficits that jeopardize the economy. Oil prices went down to as low as US$37.22 on March 9, 2020. This is against the backdrop of the US$57.0 per barrel crude oil benchmark in the 2020 fiscal budget.

In addition, developments in the Nigerian economy are also linked with Chinese production for both consumer and capital goods. As of end-2018, Nigeria's import from China accounts for 19.41% of its total import, followed by Netherlands (11.41%), Korea Republic (10.83%), Belgium (8.45%), and USA (7.35%). Conversely, Nigeria's crude export destinations are mainly in India, Netherlands, Spain, France, and South Africa. The COVID-19 epidemic has significantly slowed down production activities in affected countries all over the world.

1.4.2. Impact on the Stock Market

Activities at the Nigeria Stock Exchange have nosedived since the emergence of the COVID-19 corona virus in early January 2020. Investors embarked on profit-taking activities as crude oil prices tumbled by as much as 47.25% to US$37.22 per barrel after Saudi Arabia launched a price war with Russia, sending investors already panicked by the coronavirus fleeing for the safety of bonds and gold. The market also reacted negatively following the confirmation of the virus in Nigeria through an Italian investor. The All-Share Index and Market Capitalization have lost about 15.99% since the global prevalence rate of the corona outbreak peaked at the end of January 2020. A continued decline of the stock exchange is an indication of loss of confidence in the economy as well as an impending slip of the economy into recession.

Since, Nigeria is vulnerable to the economic shocks arising from the COVID-19 disease, most of the country's trading partners are severely hit by the virus. Production cut and subsequent lowered crude oil demand from these trading partners will continue to affect Nigeria's the trade and investment, with grave consequences on the country's external positions. Of importance is the possibility of a further deterioration of an already current account deficit and unfavorable balance of trade.

1.5. Purpose and Objectives of Study

The paper investigates, how COVID-19 is impacting the Nigerian economy, and whether there a short and long-run relationship between COVID-19 and returns in the Nigerian Stock Market. Second, it seeks to find out, whether there were investor portfolio adjustments in response to shocks from CIVID-19 cases and mortalities. Finally, how were the changes captured in the volatilities of returns (prices) and volumes of stocks during the review period?

Accordingly, the research Objective is, to investigate the relationship between COVID-19 and stock returns from Nigeria's stocks market during the period December 31, 2019, to October 2020. Secondly, to analyze the impact of COVID-19 related cases and deaths on returns in the Nigerian Stock Market, and third, examine spillover effects in the returns and volumes of the All Share Index and NSE 30, arising from shocks from the COVID-19

Based on economic theory and the review of literature, the ordinary least squares (OLS) with the Generalized Autoregressive Conditional Heteroscedastic (GARCH) methods, daily stock market, and COVID-19 data from the Nigerian Stock Exchange (NSE), Central Bank of Nigeria, National Centre for Disease Control (NCDC), the World Development Indicators, World Bank and the International Monetary Fund. The daily and monthly data were downloaded from www.keoma.com, www.ourworlddata.com, and https://www.worldometers.info/ for the period December 31, 2019, to June 12, 2021.

Following this introduction, the rest of the paper is divided into four. The literature review is presented in section two, while section three presents the methodology, section four, the results and section five summarizes the preliminary conclusions and policy recommendations.

2. Literature Review

There has been a growing body of literature on the novel coronavirus (COVID-19) with some of these studies moving out of the traditional public health and other health-related areas into the more global macroeconomic and sector-specific areas like energy, oil, foreign trade and investments, and domestic stock markets. This growing interest is linked to the critical role public health plays in the life of an individual, human society, and the economy at large. This lends credence to the saying that, "health is wealth".

Some of the studies that highlighted the global economic impact of the pandemic included UNCTAD (2020a), UNCTAD (2020b), OECD (2020), Ruiz Estrada & Khan (2020), Normuradova (2020), Maital & Barzani (2020), Jackson, Weiss, Schwarzenberg & Nelson (2020), Eren & Hizarci (2020), and McKibbin & Fernando (2021). Others with a review of the lessons from previous pandemics are also highlighted in Barro, Ursúa and Weng (2020) and Adekoya (2020). There are some studies that outline policy suggestions that can be used during these uncertain times as a guide included Aktar, Alam & Al-Amin (2020) and Song & Zhou (2020).

In the sections that follow, we review some of these studies to identify the problem investigated, the method used to carry out the study, main findings and recommendations, and the gaps. These studies cut across advanced and developing economies.

2.1. COVID-19, Trade and Globalization

A number of studies focuses on the relationship between globalization, trade and COVID-19 and these included Mas-Coma et al. (2020), Qadri (2020), Sforza & Steininger (2020), Shrestha et al. (2020), Song & Zhou (2020), Farzanegan, Feizi & Gholipour (2021). For example, in a study by Mas-Coma et al. (2020), they noted that the COVID-19 pandemic is, "unprecedented in its capacity to take advantage of modern globalization allowing for the massive transborder spread at a surprising speed". As of June 12, 2021, the COVID-19 pandemic has reached 222 countries, recorded total cases of 175,995,189 with 159, 885,334 recoveries leaving 12,310,522 as active cases but 3,799,313 deaths. Since the outbreak of the pandemic, Nigeria has recorded a total of 167,051 COVID-19 cases with 163,430 recoveries, 1,504 active cases, and 2,117 deaths. The COVID-19 pandemic that started in Wuhan, China, has with aid of globalization spread to 221 other countries including Nigeria. Economists have argued that the corona repercussions were going to be worse than the global financial crisis of 2008 and empirical studies indicate that coronavirus disease 2019 (COVID-19) has had an increasing trend and has made the world enter a more thoughtful and regulated phase.

In a review of different authors on "Globalization and COVID-19 Nexus: Lessons from the Rational Expectations Model", Qadri (2020) stated that "repercussions of COVID-19 were going to be worse than the global financial crisis of 2008" and that the trend has been increasing making the "world more regulated, and a gated and gauged globe". Using information from Health and economic reports on the COVID-19, Qadri (2020) noted that, the COVID-19 has "created barriers to check the free movement of people, trade, and money". He indicated that the reports revealed that, the pandemic was deeply rooting globalization and argued for "proper interaction between globalization and COVID-19". Qadri (2020) then concluded that "every affected country must forecast the costs and benefits of this interaction between COVID-19 and globalization" and the attendant spillover effects on its economy.

The author also stated that Globalization and COVID-19 were adding to rising economic inequalities in countries due to "our failure to manage the nexus between them". Those countries must rise to "these global challenges in a general and sustainable path" based on rational expectations. From these analyses, it is evident that the pandemic has created ripple effects on the economies of countries as well as causing recessions and depressions in more dependent economies. That effort is geared towards lessening the spillover effects of the pandemic through comprehensive health and economic stimulus packages, and the prioritization and sequencing of health care expenditures to address the multiplier and spillover effects of COVID-19.

Sforza and Steininger (2020) use a model in their study to measure the welfare impact of production disruption that started in China and then spread rapidly around the world. They find that the COVID-19 shock has a significant impact on most economies around the world, especially when some of the labor force is quarantined.

Shrestha et al. (2020) investigates the potential impact of COVID-19 on globalization and global health in terms of mobility, trade, travel, and countries most impacted. They found that the pandemic has placed an unprecedented burden on the world economy, healthcare, and globalization through travel, events cancellation, employment workforce, food chain, academia, and healthcare capacity.

Song & Zhou (2020) examine how COVID-19 would likely deepen an existing depression in the global economy and what can be done to address these issues while managing the economic recovery. They discuss that the three key factors that could lead to a robust recovery in the post-pandemic era are structural reform, new technology and reintegration. These three factors, supported by strong public policies at all levels, especially at the national level, can recover or re-emerge the global economy from the pandemic crisis.

Farzanegan, Feizi & Gholipour (2021) analyze the relationship between the spread of globalization and the COVID-19 case fatality rate in more than 150 countries. Their analysis reveals that countries with a higher level of socio-economic globalization experience higher case fatality rates.

2.2. COVID-19 and the Stock Market

Among the small but quickly growing literature on the impact of Covid-19 on stock markets are, Onali (2020), Gormsen and Koijen (2020), Yilmazkuday (2020), Sansa (2020), Baker et al. (2020), Al-Awadhi, Alsaifi, Al-Awadhi & Alhammadi (2020), Mazur, Dang & Vega (2021), Fernandez-Perez, Gilbert, Indriawan & Nguyen (2021).

In a study by Yilmazkuday (2020) on the impact of deaths related to COVID-19 on the S&P500 returns and by Baker et al. (2020) on the impact of news related deaths to COVID-19 on stock market volatility, both authors agree that deaths from the COVID-19, had a much larger impact on stock market returns and volatility when compared with the impact of other passed diseases or pandemics like Ebola or the Flu. However, another study by Onali (2020), on the impact of COVID-19 cases and related deaths on stock market returns in the US noted that "changes in the number of cases and deaths in the US and six other countries majorly affected by the COVID-19 crisis did not have a major impact on the US stock market returns, except for news of the number of reported cases and the COVID-19 deaths for China".

It is important to note that, Onali (2020) also found that, "there is evidence of a positive impact, for some countries, on the conditional heteroscedasticity of the Dow Jones Industrial Average (DJIA) and the S&P500 returns" suggesting that, "the number of reported deaths in Italy and France adversely impacted on stock market returns", but "a positive impact on the volatility of returns".

In related work, Gormsen and Koijen (2020) used data from the aggregate stock market and dividend futures to quantify how investors' expectations about economic growth across horizons evolved in response to the COVID-19 outbreak and the subsequent policy responses from Government and agencies in those countries. The authors found that "As of May 12, 2020, their forecast of the annual growth in dividends futures had gone down by 16% in the US and 23% in the European Union when compared with their initial forecast on January 1, 2020. This represented a GDP growth decline of 3.6% in the United States and 5.0% in the European Union. The lower bound of the change in expected dividends was -29% in the United States and -38% in the European Union at the 2-year horizon". The authors further stated that "News about fiscal stimulus around March 24, 2020, boosted activities in the stock market and its long-term growth, although it did little to increase short-term growth expectations. This was said to have caused some improvements in the expected dividend growth in both countries. They then concluded that data on dividend futures can be used to understand why returns from stock markets do fall sharply initially, well beyond their changes in growth expectations.

In separate studies, Baker et al. (2020), used textual methods to analyze the unprecedented reaction of the stock market to COVID-19 in the United States, China, Italy, and others. They said the reaction was unprecedented because no previous infectious disease outbreaks, including the Spanish Flu, had impacted the stock market as powerfully as the COVID-19 pandemic. In their opinion, the development could be associated with the large daily stock market moves in the 1990s and overall stock market volatility from 1985. They also argued that numerous policy responses to the COVID-19 pandemic provided by governments and agencies were the most compelling explanations for the unprecedented impact of the pandemic on returns in the stock market and the global economy.

Al-Awadhi, Alsaifi, Al-Awadhi & Alhammadi (2020) investigates whether contagious infectious diseases affect stock market outcomes. According to the findings of this study both the daily growth in total COVID-19 cases both confirmed and death cases have significant negative effects on stock returns across all companies.

Mazur, Dang & Vega (2021) investigates the US stock market performance during the crash of March 2020 triggered by COVID-19. They find that some sectors such as natural gas, food, healthcare, and software stocks earn high positive returns, whereas equity values in some sectors such as petroleum, real estate, entertainment, and hospitality fall dramatically.

Fernandez-Perez, Gilbert, Indriawan & Nguyen (2021) examine the effect of national culture on stock market responses to a global health disaster. According to this study there is larger declines and greater volatilities for stock markets in countries with lower individualism and higher uncertainty avoidance during the first three weeks after a country's first COVID-19 case announcement.

2.3. COVID-19 and Nigerian Stock Market

There are few studies on relationship between and stock market returns in Nigeria included Jelilov, Iorember, Usman, & Yua (2020), Alade, Adeusi & Alade (2020), Adenomon & Maijamaa (2020), Abu, Gamal, Sakanko, Mateen, Joseph, & Amaechi (2021).

Jelilov, Iorember, Usman, & Yua (2020) they examine the stock market returns–inflation nexus by controlling for the effect of COVID-19 in Nigeria. Their results reveal that COVID-19 increases volatility and distorts the positive relationship between inflation and stock market returns.

Alade, Adeusi & Alade (2020) assesses the link between COVID-19 confirmed cases and Nigerian stock market capitalization. The results of the study reveal that confirmed cases of COVID-19 have a mixed relationship with Nigerian stock market equity capitalization, while confirmed cases announced globally are inversely related to market capitalisation, but both are statistically insignificant at 0.05 level.

Abu, Gamal, Sakanko, Mateen, Joseph, & Amaechi (2021) explore the effect of COVID-19 proxied by the number of confirmed cases of the infection and deaths on Nigeria's stock market. The result of the study shows that a long period relationship exists between COVID-19 and Nigeria's stock market. The results of the various estimations demonstrate that COVID-19 has a negative and significant impact on stock market performance, while the number deaths has a positive and significant impact on the market in the long period.

Adenomon & Maijamaa (2020) assesses the impact of the COVID-19 outbreak on the performance of the Nigerian stock market. The results reveal a loss in stock returns and high volatility in stock returns during the COVID-19 period in Nigeria compared to the normal period studied. Stock returns show that COVID-19 has negatively impacted stock returns in Nigeria. The study suggests the implementation of political and economic policies such as stable political environment, incentives for domestic companies, diversification of the economy, flexible exchange rate regime to improve the financial market and attract more and new investors to the Nigerian Stock Exchange.

2.4. The Expectations from the Study

Although there appears to little or few such empirical policy studies on Nigeria, that directly sought to examine the impact of COVID-19 cases and deaths on both the conditional mean and conditional volatility of returns in the stock market, this preliminary investigation seek to contribute to this area. This is likely one of the few empirical studies on the impact of COVID-19 cases and deaths on both the conditional mean and the conditional volatility of returns in the Nigerian stock market.

We have seen that, for nearly twelve months, the global economy is still battling with the impact of the COVID-19 pandemic, and with no clear sight of a vaccine to treat it, the wait could be a very long one. In two separate studies, Alam (2020) and Ruiz Estrada, Koutronas & Lee (2020) discussed how the pandemic has continued to spread and penetrate more and more countries with the global economy suffering under its impact, and economists, governments, and other policymakers engaging themselves in everyday soul-searching activities to unveil the ravaging impact of the COVID-19 and how best to handle it with minimum impact on their economies.

For the Nigerian economy, COVID-19 is impacting adversely on the price of Brent, which has declining substantially and creating huge fiscal deficits for the Federal Government. This development is in addition to the continued decline in the performances on the Nigerian stock market. It is important to note that, since the Nigerian Stock market stimulates investment opportunities through the financing of productive projects that contributes to real output, mobilizing domestic savings, allocating capital proficiency, and helping in diversifying risks, and facilitating the exchange of goods and services, an investigation of the impact of the COVID-19 on the returns and volume of stocks in Nigeria, will help establish whether such an impact will be temporary or permanent and recommend on how best to handle them.

3. Methodology

In line with the stated purpose and objectives, appropriate dynamic least squares (Pierce, 1972) and GARCH models (Lamoureux & Lastrapes, 1990) were specified and coefficients of the parameters were estimated to verify the relationship between the dependent and independent variables. Daily data for the period December 2019 to October 2020 was used. The EViews 11 software was used to run the data.

The variables included in the Models were the COVID-19 data set, Crude Oil Brent Prices, Nigerian Stock Exchange (NSE) aggregate index for Banking, Insurance, Consumer Goods, Oil and Gas, Industrial Output, Pension, ASEM, Lotus, and NSE Premium. like the NSE-Banking, The Data sources websites of the World Health Organization, National Centre for Diseases

Control, the Central Bank of Nigeria, International Financial Statistics, World Development Indicators, and International Energy Association, and the World Trade Organization.

The general form of the model used is: $y_{it} = \alpha_0 + \beta X_{it} + e_{it}$ (1)

where y_{it} is the COVID-19 index in period t, X_{it} is a vector of the explanatory variables for the stock market in period t, and it is the error in period t. u_{it} is the individual effect of shocks in stock returns. There will be pre and post-analysis of the data.

A priori, the α_t, and β_t are expected to be less than zero, meaning the COVID-19 is bad news and so impacts adversely the prices of Brent oil and the stock market. Their sign could either be positive or negative, depending on the degree of impact of the shock on volatility

To estimate the effect of shocks from the COVID-19 on volatilities on returns in the Stock Market, a generalized Autoregressive (AR) representation of the squared residuals given by:

$U_t^2 = b_0 + b_1 U_{t-1}^2 + b_2 U_{t-2}^2 + b_3 U_{t-3}^2 \ldots \ldots b_q U_{t-q}^2 + e_t$.

Note that the significance of the parameters, b_0, b_1, b_2, b_3 indicates the presence of conditional volatility (Arch effects) under the null hypothesis of No Arch effects.

$$b_0 = b_1 = b_2 = b_3$$

Therefore testing for Arch(1) effect, $U_t^2 = b_0 + b_1 U_{t-1}^2 + e_t$.

Null Hypothesis: $b_1 = 0$ (homoscedastic, no Arch effect).

Alt. Hypothesis: b_1 N 0 (heteroscedastic, there is Arch effect).

Where our objective is to forecast the volatility of returns of the NSE30 and ASI 30 Stock returns.

The GARCH model is specified as:

$R_t = \log (P_t - P_{t-1})*100$

change in stock returns or $R_t = b_1 + b_2$ COVID-19t for R_t is NSE30 & NSE ASI 30

After applying the times series property checks, we carry out the LM test on both the Mean and the Constant Varian Equations of the residuals of the NSE30 and ASI 30

The Generalized Autoregressive Conditional Heteroscedastic (GARCH) model, which has proofed to be good in estimating return spillovers, long-run, and short-run persistence, and conditional correlations between the oil (COVID-19) and stock markets.

The GARCH group of models has two general equations:

- mean equation used to measure the mean return and return spillover in each market and,
- variance equation used to measure own market shock and shock spillovers across markets.

A priori, an increase in the sad news (i.e. cases and deaths from the pandemic) impacts adversely on stock market returns[4]. The expected impact of a shock from COVID-19 cases and deaths on NSE 30 and NSE ASI 30 stock market returns and volumes were computed and presented in tabular form. These results are carefully analyzed and evaluated within the context of the model and its limitations on reality.

The ARCH and GARCH spillover effects of COVID-19 from the stock market the conditional mean, conditional variance equations, and standardized residual diagnostics will be analyzed.

4. The Analysis of the Results

The results of the ARCH (1) and GARCH (1,1) model, reveals how the COVID-19 cases and deaths impacted the returns of daily trading activities in the NSE30 and the NSE ASI30 on the floors of the Nigerian Stock Exchange from January 1, 2020, to June 30, 2020, are presented and discussed in the following sections.

The first of the discussion covered the impact of the pandemic on the volume and volatility of returns in the NSE30. From the daily plots of the line diagram and histogram[5] of NSE30 (Dec 31, 2019–June 30, 2020), can conclude that, the series has established the presence of time-varying conditional volatility of returns of the NSE30 stock. There we see periods when large changes are followed by further large changes and when small changes are followed by smaller changes. Looking at the histogram, we also notice that it has fat tails, or it is leptokurtic.

- That the model took 48 iterations to converge after 117 adjustments.

To know the volatility estimates in returns of the NSE30 stock, we look at the results of the mean and variance equations as summarized below: The results of the NSE30 Stock returns:

Table 1: NSE 30 Returns		
	Mean Equation	Variance Equation
1	NSE30t = -0.0321+0.109NSE30 t-1	Garch = 0.0008+ 0.729Resid (-1)2 + 0.525Garch (-1) (0.0005)[1] (0.187) (0.09) R2 = 44 D-W= 1.4

Table2: NSE 30 Volume		
	Mean Equation	Variance Equation
1	NSE ASI 30t = 7840+0.634NSE ASI 30 t-1	Garch = 1.05E+ 0.721Resid (-1)2 + 0.771Garch (-1) (0.7.52E)[6] (0.059) (0.104) R2 = 40 D-W= 2.2

---

[4] Note that, at the background of the analysis, we had made an in-sample and out -of sample forecast to know the likely impact of a shock from COVID-19 cases and deaths on returns and volumes of stocks in the Nigerian stock market.

[5] See Appendices

[6] The Figures in bracket are standard errors.

Table 3: NSE ASI 30 Returns		
	Mean Equation	Variance Equation
1	NSE ASI 30t = 0.0134+0.726NSE ASI 30 t-1	Garch = 0.0004+ 0.619Resid (-1)2 + 0.513Garch (-1) (0.0002)[7] (0.211) (0.144) R2 = 27 D-W = 1.3

Table 4: NSE ASI 30 Volume		
	Mean Equation	Variance Equation
1	NSE 30t = -0.0321+0.109NSE30 t-1	Garch = 0.0008+ 0.729Resid (-1)2 + 0.525Garch (-1) (0.0005)[8] (0.187) (0.09) R2 = 427 D-W = 1.5

From the mean equations for both NSE ASI 30 returns and volume, we observe the since the coefficients are positive and statistically significant, we can say that the average returns on the stock are 0.0134 for the ASI returns and 0.0321 for the ASI volume. In addition, that, the past values of the ASI return can predict the current series by 0.72 and 0.11 for the ASI volume.

From the constant variance equations, we can say that from the positive coefficients of the constant variance term, the ARCH and GARCH parameters are positive and statistically significant, reveals the impact of shocks on the volatilities of the two stocks. The sum of the coefficients in both cases did not satisfy the stability condition because they are greater than one. These results raise a few empirical questions that need to be re=examined. It is for this reason that we are not including in the discussion the results of the impact of the COVID-19 indices like total deaths, total cases, new cases, and test units. This will be done when a proper review of the work is done later.

5. Conclusion and Recommendations

The paper attempted to empirically estimate the impact of the COVID-19 shocks on volatilities of returns in the NSE30 and ASI 30 stocks in Nigeria, using daily data from December 31, 2019, to June 30, 2020.

The study used the Generalized Autoregressive Conditional Heteroscedastic (GARCH) to estimate the short and long run return spillovers and conditional correlations between the shock from COVID-19 and stock market returns Generally, the results indicated that a weak impact of COVID-19 on the returns and volume of both the NSE30 and NSE ASI 30 stocks. This is so because of some data issues and issues relating to empirics. More data will be sought, and a proper review of the paper undertaken, to ascertain its usefulness for policy.

---

[7] The Figures in bracket are standard errors.
[8] The Figures in bracket are standard errors.

The tentative results from this study, reveals that to spur economic growth in the COVID-19, Nigeria's economic managers, particularly, the monetary, fiscal, and capital market regulators should work as a team, to ensure complementary in their policies and thus, propel the economy out of a likely recession.

References

Abu, N., Gamal, A. A. M., Sakanko, M. A., Mateen, A., Joseph, D., & Amaechi, B. O. O. (2021). How have COVID-19 confirmed cases and deaths affected stock markets? Evidence from Nigeria. *Contemporary Economics*, 15(1), 76-100.

Adekoya, E. (2020), Coronavirus and the lessons we can learn from the 1918-1920 Great Influenza Pandemic, University of Lagos, Nigeria. Retrieved from https://www.academia.edu/42710600/Corona_virus_and_the_lessons_we_can_learn_from_the_1918_1920_Great_Influenza_Pandemic

Adenomon, M. O., & Maijamaa, B. (2020). On the Effects of COVID-19 outbreak on the Nigerian Stock Exchange performance: Evidence from GARCH Models. Preprints 2020, 2020040444. DOI:10.20944/preprints202004.0444.v1

Aktar, M. A., Alam, M. M., & Al-Amin, A. Q. (2020). Global economic crisis, energy use, CO2 emissions, and policy roadmap amid COVID-19. *Sustainable Production and Consumption*, 26, 770-781. https://doi.org/10.1016/j.spc.2020.12.029

Alade, M. E., Adeusi, S. A., & Alade, F. O. (2020). COVID-19 pandemic and Nigerian stock market capitalization. *Ilorin Journal of Economic Policy*, 7(3), 12-23.

Alam, A. (2020). COVID-19 economic impact. *Point in Focus*, Special Edition. Retrieved from https://www.academia.edu/42603533/COVID_19_Economic_Impact

Al-Awadhi, A. M., Alsaifi, K., Al-Awadhi, A., & Alhammadi, S. (2020). Death and contagious infectious diseases: Impact of the COVID-19 virus on stock market returns. *Journal of Behavioral and Experimental Finance*, 27, 100326. https://doi.org/10.1016/j.jbef.2020.100326

Baker, S. R., Bloom, N., Davis, S. J., Kost, K., Sammon, M., & Viratyosin, T. (2020). The unprecedented stock market reaction to COVID-19. *The Review of Asset Pricing Studies*, 10(4), 742-758. https://doi.org/10.1093/rapstu/raaa008

Barro, R. J., Ursúa, J. F., & Weng, J. (2020). The coronavirus and the great influenza pandemic: Lessons from the "spanish flu" for the coronavirus's potential effects on mortality and economic activity. *Working Paper, No. w26866*. National Bureau of Economic Research. DOI: 10.3386/w26866

Eren, F. and Hizarci, A. E. (2020). The impact of COVID-19 coronavirus on stock markets: Evidence from selected countries. *Muhasebe Finans İncelemeleri Dergisi*, 3(1), 78- 84, DOI: 10.32951/mufider.706159

Farzanegan, M. R., Feizi, M., & Gholipour, H. F. (2021). Globalization and the outbreak of COVID-19: An empirical analysis. *Journal of Risk and Financial Management*, 14(3), 105. https://doi.org/10.3390/jrfm14030105

Fernandez-Perez, A., Gilbert, A., Indriawan, I., & Nguyen, N. H. (2021). COVID-19 pandemic and stock market response: A culture effect. *Journal of Behavioral and Experimental Finance*, 29, 100454. https://doi.org/10.1016/j.jbef.2020.100454
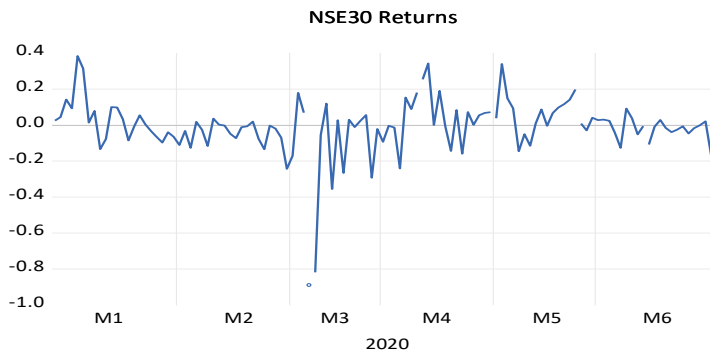
Gormsen, N. J., & Koijen, R. S. (2020). Coronavirus: Impact on stock prices and growth expectations. *The Review of Asset Pricing Studies*, 10(4), 574-597. https://doi.org/10.1093/rapstu/raaa013

Jackson, J. K., Weiss, M. A., Schwarzenberg, A. B., & Nelson, R. M. (2020). Global economic effects of COVID-19. World Health Organization, COVID-19 Global Literature on Coronavirus Disease.

Jelilov, G., Iorember, P. T., Usman, O., & Yua, P. M. (2020). Testing the nexus between stock market returns and inflation in Nigeria: Does the effect of COVID-19 pandemic matter?, *Journal of Public Affairs*, 20(4), e2289. https://doi.org/10.1002/pa.2289

Lamoureux, C. G., & Lastrapes, W. D. (1990). Persistence in variance, structural change, and the GARCH model. *Journal of Business and Economic Statistics*, *8*(2), 225-234. https://doi.org/10.1080/07350015.1990.10509794

McKibbin, W., & Fernando, R. (2021). The global macroeconomic impacts of COVID-19: Seven scenarios. *Asian Economic Papers*, 20(2), 1-30. https://doi.org/10.1162/asep_a_00796

Mas-Coma, S., Jones, M. K., & Marty, A. M. (2020). COVID-19 and globalization. *One Health*, 9. https://doi.org/10.1016/j.onehlt.2020.100132

Maital, S., & Barzani, E. (2020). The global economic impact of COVID-19: A summary of research. *Samuel Neaman Institute for National Policy Research, 2020*, 1-12.

Mazur, M., Dang, M., & Vega, M. (2021). COVID-19 and the march 2020 stock market crash. Evidence from S&P1500. *Finance Research Letters*, 38, 101690. https://doi.org/10.1016/j.frl.2020.101690

Normuradova, A. (2020). The Impact of Coronavirus (COVID-19) on Macroeconomic Stability. Westminster International University, Tashkent, Uzbekistan. Retrieved from https://www.academia.edu/42913076/The_Impact_of_Coronavirus_COVID_19_on_Macroeconomic_Stability

OECD (2020). Coronavirus: The world economy at risk. OECD Interim Economic Assessment. https://www.oecd.org/berlin/publikationen/Interim-Economic-Assessment-2-March-2020.pdf

Onali, E. (2020). COVID-19 and stock market volatility. Available at SSRN 3571453. https://ssrn.com/abstract=3571453 or http://dx.doi.org/10.2139/ssrn.3571453

Pierce, D. A. (1972). Least squares estimation in dynamic-disturbance time series models. *Biometrika*, 59(1), 73-78. https://doi.org/10.1093/biomet/59.1.73

Qadri, B. (2020). Globalization and COVID-19 nexus: Lessons from the rational expectations model, *The Great Kashmir Today*, Issue of April 8, 2020.

Ruiz Estrada, M. A., Koutronas, E., & Lee, M. (2020). Stagpression: The economic and financial impact of COVID-19 Pandemic. *Contemporary Economics*, 15(1), 19-33. DOI: 10.2139/ssrn.3578436

Ruiz Estrada, M. A., & Khan, A. (2020). Globalization and pandemics: The case of COVID-19. (March 25 2020). Available at SSRN 3560681. http://dx.doi.org/10.2139/ssrn.3560681

Sansa, N. A. (2020). The impact of the COVID-19 on the financial markets: Evidence from China and USA. *Electronic Research Journal of Social Sciences and Humanities*, 2(2). Available at SSRN: https://ssrn.com/abstract=3567901 or http://dx.doi.org/10.2139/ssrn.3567901

Sforza, A., & Steininger, M. (2020). Globalization in the time of COVID-19. *CESifo Working Paper No.8184*, Available at SSRN: https://ssrn.com/abstract=3567558

Shrestha et al. (2020). The impact of COVID-19 on globalization. *One Health*, 11, 100180. https://doi.org/10.1016/j.onehlt.2020.100180

Song, L., & Zhou, Y. (2020). The COVID-19 Pandemic and its impact on the global economy: What does it take to turn crisis into opportunity?. *China & World Economy*, 28(4), 1-25. https://doi.org/10.1111/cwe.12349

UNCTAD (2020a). Impact of the Coronavirus outbreak on global FDI. *Investment Trends Monitor*, Special Issue. https://unctad.org/system/files/information-document/diae_gitm34_coronavirus_8march2020.pdf

UNCTAD (2020b). Technical note global trade impact of the Coronavirus (COVID-19) epidemic. Trade and Development Report Update. United Nations Conference on Trade and Development. https://unctad.org/system/files/official-document/ditcinf2020d1.pdf

Yilmazkuday, H. (2021). COVID-19 effects on the S&P 500 index. *Applied Economics Letters*, 1-7. https://doi.org/10.1080/13504851.2021.1971607

World Health Organization (WHO). Various Publications. https://www.who.int/publications

Appendices

Selected EVIEWS Output: Visualization of the Data through Graphs

1) Graphs on the NSE30 Returns

NSE30 Returns

Histograh for NSE30, 31 Dec 2019 - June 30, 2020

Series: NSE30_RETURNS	
Sample 1/02/2020 6/30/2020	
Observations 117	
Mean	-0.009362
Median	-0.002635
Maximum	0.384002
Minimum	-0.891579
Std. Dev.	0.163688
Skewness	-2.154127
Kurtosis	13.92697
Jarque-Bera	672.5536
Probability	0.000000
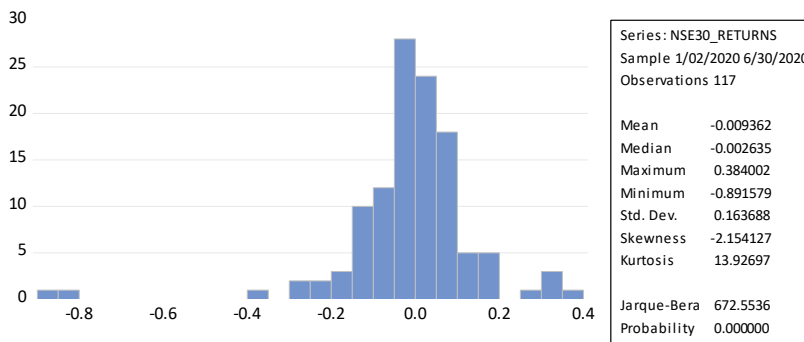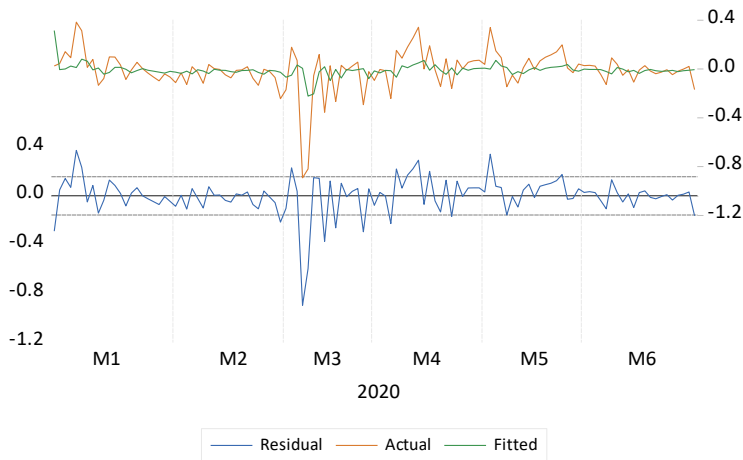
1 Residual Plots for the NSE30 Returns

Method: ML ARCH - Normal distribution (Marquardt / EViews legacy)
Date: 10/20/20   Time: 20:32
Sample (adjusted): 1/02/2020 6/30/2020
Included observations: 117 after adjustments
Convergence achieved after 48 iterations
Presample variance: backcast (parameter = 0.7)
GARCH = C(3) + C(4)*RESID(-1)^2 + C(5)*GARCH(-1)

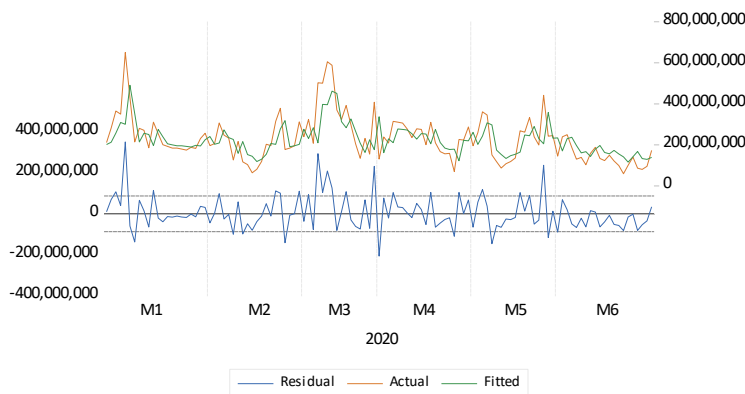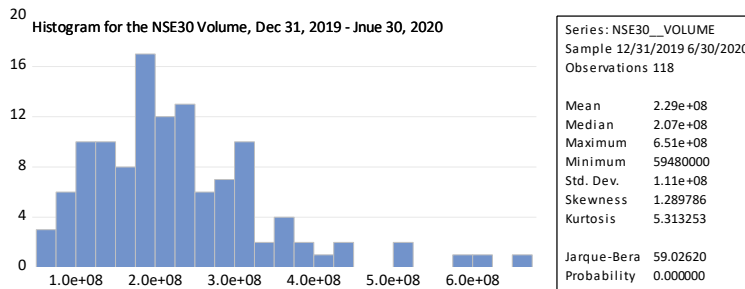| Variable	Coefficient	Std. Error	z-Statistic	Prob.
C	-0.032206	0.008545	-3.769058	0.0002
NSE30_RETURNS(-1)	0.108715	0.099010	1.098017	0.2722

Variance Equation				
C	0.000767	0.000526	1.459514	0.1444
RESID(-1)^2	0.729363	0.186849	3.903499	0.0001
GARCH(-1)	0.524599	0.090031	5.826844	0.0000

R-squared	0.044558	Mean dependent var		-0.009362
Adjusted R-squared	0.036249	S.D. dependent var		0.163688
S.E. of regression	0.160694	Akaike info criterion		-1.162184
Sum squared resid	2.969594	Schwarz criterion		-1.044142
Log likelihood	72.98774	Hannan-Quinn criter.		-1.114260
Durbin-Watson stat	1.420574			

2)   Graphs on the NSE 30 Volume

NSE30 Volume

Histogram for the NSE30 Volume, Dec 31, 2019 - Jnue 30, 2020

Series: NSE30__VOLUME	
Sample 12/31/2019 6/30/2020	
Observations 118	
Mean	2.29e+08
Median	2.07e+08
Maximum	6.51e+08
Minimum	59480000
Std. Dev.	1.11e+08
Skewness	1.289786
Kurtosis	5.313253
Jarque-Bera	59.02620
Probability	0.000000

Residual —— Actual —— Fitted

3) Graphs on NSE ASI 30

NSE ASI Volume

Series: NSE_ASI__VOLUME	
Sample 12/31/2019 6/30/2020	
Observations 118	
Mean	3.13e+08
Median	2.79e+08
Maximum	7.42e+08
Minimum	1.06e+08
Std. Dev.	1.33e+08
Skewness	1.113946
Kurtosis	4.189974
Jarque-Bera	31.36609
Probability	0.000000

EVIEWS OUTPUT on the GARCH Analysis of:
NSE30   VOLUME & NSE ASI 30 VOLUME
Method: ML ARCH - Normal distribution (Marquardt / EViews legacy)
Date: 10/20/20   Time: 22:48
Sample (adjusted): 1/02/2020 6/30/2020
Included observations: 117 after adjustments
Convergence achieved after 74 iterations
Presample variance: backcast (parameter = 0.7)
$GARCH = C(3) + C(4)*RESID(-1)^2 + C(5)*GARCH(-1)$

Variable	Coefficient	Std. Error	z-Statistic	Prob.
C	78409390	21536913	3.640698	0.0003
NSE30__VOLUME(-1)	0.634019	0.082279	7.705710	0.0000

Variance Equation				
C	1.05E+15	7.52E+14	1.390304	0.1644
RESID(-1)^2	0.072192	0.059714	1.208965	0.2267
GARCH(-1)	0.771359	0.104035	7.414440	0.0000

R-squared	0.398583	Mean dependent var	2.30E+08
Adjusted R-squared	0.393353	S.D. dependent var	1.12E+08
S.E. of regression	86994559	Akaike info criterion	39.42731

Sum squared resid	8.70E+17	Schwarz criterion		39.54535
Log likelihood	-2301.498	Hannan-Quinn criter.		39.47523
Durbin-Watson stat	2.210553			

Eviews Output on Returns on NSE ASI 30 Stocks

Dependent Variable: NSE_ASI__RETURNS
Method: ML ARCH - Normal distribution (Marquardt / EViews legacy)
Date: 10/20/20   Time: 23:59
Sample (adjusted): 1/02/2020 6/30/2020
Included observations: 117 after adjustments
Convergence achieved after 57 iterations
Presample variance: backcast (parameter = 0.7)
GARCH = C(3) + C(4)*RESID(-1)^2 + C(5)*GARCH(-1)

Variable	Coefficient	Std. Error	z-Statistic	Prob.
C	-0.013475	0.005850	-2.303400	0.0213
NSE_ASI__RETURNS(-1)	0.072598	0.084889	0.855202	0.3924
Variance Equation				
C	0.000388	0.000217	1.786660	0.0740
RESID(-1)^2	0.619434	0.211995	2.921929	0.0035
GARCH(-1)	0.513111	0.144267	3.556686	0.0004

R-squared	0.027206	Mean dependent var	-0.003619
Adjusted R-squared	0.018747	S.D. dependent var	0.074937
S.E. of regression	0.074231	Akaike info criterion	-2.617503
Sum squared resid	0.633678	Schwarz criterion	-2.499461
Log-likelihood	158.1239	Hannan-Quinn criter.	-2.569579
Durbin-Watson stat	1.354762		