Effect of Covid-19's Second Wave on the Nigerian Stock Market

Anthony Olugbenga Adaramola
PhD (Finance), Associate Professor, Department of Finance, Faculty of Management Sciences, Ekiti State University, Ado-Ekiti, Ekiti State, Nigeria

Peter Akinyemi Kayode
PhD (Finance), Lecturer 2, Department of Finance, Faculty of Administration and Management Sciences, Adekunle Ajasin University, Akungba-Akoko, Ondo State, Nigeria

Vincent Adewale Omotayo
PhD (Banking & Finance), Lecturer 1, Department of Banking and Finance, Faculty of Management Sciences, Osun State University, Osogbo, Nigeria

Omoruyi Fidelis Ogiamien
Department of Finance, Faculty of Management Sciences, Ekiti State University, Ado-Ekiti, Ekiti State, Nigeria

Original Research
Received 6 Oct 2022
Revised 28 Dec 2022
Accepted 29 Dec 2022
Additional information at the end of the article

Abstract: This study examined the effect of the second wave of the Covid-19 pandemic from early December 2020 to March end, 2021 on the performance of the Nigeria Stock Exchange (NSE). We examined the effect from two perspectives: stock price and trade volume. On one side, the study investigated how the pandemic affected the aggregate stock price and volume of stocks traded on the other. The study used Autoregressive Distributed Lag (ARDL) technique to analyze the data of second-wave Covid-19 confirmed cases, number of related deaths versus All Share Index, and volume of stocks traded on both short and long-runs. Results showed that with respect to stock prices, in the short run, Covid-19 second wave confirmed cases and number of deaths have a positive but insignificant effect on stock prices. In the long run, the effect of confirmed cases on stock price was negative and insignificant, that of the number of deaths was positive but significant. With respect to the volume of trade on the NSE, in the short run, while the number of confirmed cases has a positive and significant effect on the volume of trade, the number of recorded deaths has a positive but insignificant effect. In the long run, however, the effect of both confirmed cases and the number of deaths is positive but statistically insignificant. We conclude that the Covid-19 second wave only significantly affects the volume of trade on the NSE and that the effect is positive but that the pandemic did not significantly affect stock prices.
Keywords: Covid-19; confirmed cases; second wave; stock price; stock volume

Abstrak: Penelitian ini mengkaji pengaruh gelombang kedua pandemi Covid-19 dari awal Desember 2020 hingga akhir Maret 2021 terhadap kinerja Bursa Efek Nigeria. Kami menguji pengaruhnya dari dua perspektif: harga saham dan volume perdagangan. Di satu sisi, studi tersebut menyelidiki bagaimana pandemi memengaruhi harga saham agregat, dan di sisi lain, volume saham yang diperdagangkan. Studi ini menggunakan teknik Autoregressive Distributed Lag (ARDL) untuk menganalisis data kasus terkonfirmasi Covid-19 gelombang kedua, jumlah kematian terkait versus *All Share Index* (Indeks Semua Saham), dan volume saham yang diperdagangkan dalam jangka pendek dan jangka panjang. Hasil menunjukkan bahwa sehubungan dengan harga saham, dalam jangka pendek, kasus terkonfirmasi gelombang kedua Covid-19 dan jumlah kematian berpengaruh positif tetapi tidak signifikan terhadap harga saham. Dalam jangka panjang, pengaruh kasus terkonfirmasi terhadap harga saham adalah negatif dan tidak signifikan, sedangkan jumlah kematian adalah positif tetapi signifikan. Sehubungan dengan volume perdagangan di Bursa Efek Nigeria, dalam jangka pendek, sementara

jumlah kasus yang dikonfirmasi berpengaruh positif dan signifikan terhadap volume perdagangan, jumlah kematian yang tercatat memiliki pengaruh positif tetapi tidak signifikan terhadapnya. Namun, dalam jangka panjang, efek dari kasus yang dikonfirmasi dan jumlah kematian adalah positif tetapi secara statistik tidak signifikan. Kami menyimpulkan bahwa gelombang kedua Covid-19 hanya berpengaruh signifikan terhadap volume perdagangan di NSE dan efeknya positif tetapi pandemi tidak berpengaruh signifikan terhadap harga saham.
Kata Kunci: Covid-19; kasus terkonfirmasi; gelombang kedua; harga saham; volume saham

INTRODUCTION

Usually, pandemics are expected to have undesirable effects on the economic, health, social and cultural lives of the people. However, these effects are not limited to individuals as most businesses are at the receiving end of the health crises that accompany each pandemic. The advent of coronavirus around November/December 2019 marked the beginning of a highly devastating pandemic that brought the entire globe to its knees with its attendant economic and humanitarian crises. Abul et al. (2021) asserted that the Covid-19 was declared as a pandemic by the World Health Organization (WHO) on March 11, 2020. As cases of infection from the virus continue to increase, about 3 million deaths have been recorded globally as of March 2021 and the figure keeps rising (Nigerian Centre for Disease Control, 2021). As a result of the spread of Covid-19 infection, trade shrink, job cuts/loss, reduced foreign direct investment, dwindling stock market prices and volume of trades have been predicted by international economic bodies and researchers.

The Gross Domestic Product of most countries severely affected are expected to fall drastically as the disease continues to ravage the globe. Majority of industries in the productive sector have been shut down owning to the lockdown policy across the globe (Hanspal et al., 2020); ILO, 2020), while investment in the stock market has been hampered by uncertainties occasioned by the outbreak of the virus. For example, the global industrial output and the stock market indices plummeted in the first three months of 2020, The United Nations Industrial Development Organization (UNIDO, 2020) stated that global production index slumped by 6.0% in the first three months of year 2020 while the International Labour Organization (ILO, 2020) reported that aggregate working hours dropped by 4.5% in first quarter of 2020 when compared to the previous quarter (2019).

In the United States, Alfaro et al. (2020) reported that the stock market lost as much as a third of its value between February and March 2020 alone due to the corona virus scourge. The story is not significantly different in the stock markets across Europe where the negative effect of the pandemic was also heavily felt. Ding et al. (2020) found that while the Standard and Poors declined by as much as 34% in value, stock markets in Italy, Brazil, Hong Kong and Japan also fell as much as 42%, 46%, 25% and 31% in value, respectively. In Nigeria, Osagie et al. (2020) asserted that the stock market capitalization fell from about N13.5 trillion in the first week of March to about N10.8 trillion a month later (April 2020)

Towards the end of 2020, a sharp decrease was noticed in the reported cases of daily infection of the virus only for a second wave of the virus to cause a spike in this number from late December 2020 till date. More contagious mutations of the virus were noticed first in Asia and Europe and lately Africa. This poses a fresh task for health researchers and the WHO. Singh and Shaik (2021) reported that the latest strains of the virus were first discovered in South Africa in the African continent signaling the advent of the second wave of the viral infection in Africa. Olakojo et al. (2021) asserted that Covid-19 has greatly adversely affected the global financial market, including the Nigeria Stock Exchange. Decline in stock prices, volume of trade, stock returns and number of traded securities have been recorded by the NSE. In fact, Feinstein (2020) asserted that if the effect of Covid-19 on the activities of the Nigerian stock market continued, the market as well as the entire financial system may be heading for a doom. This is, however, subject to empirical validation as the present study reveals.

The present study is motivated by the need to examine the effect of Covid-19 second wave on the performance of the Nigerian stock market. Empirical literature on the effect of Covid-19 on stock market performance in Nigeria have so far concentrated on the first wave of the pandemic, the period

that falls between February 2020 to December 2020. Globally, the second wave of Covid-19 was as rampaging as the first wave and a study that examines the effect of such fresh sporadic outbreak on the stock market is important. Our study achieves two objectives: To examine the effect of Covid-19 second wave on stock prices of firms listed on the Nigerian Stock Exchange, on one hand, and to examine the effect of Covid-19 second wave on stock market performance (measured by the volume of trade in the market) between December 1st, 2020, and March 31st, 2021.

LITERATURE REVIEW

The general business world is adversely affected by the Covid-19 pandemic for obvious reasons. Olakojo et al. (2021) posited that there exists a link between the pandemic and the business cycles. Weitemeyer (2021), for example stated that the Covid-19 pandemic has caused a disruption in the supply chains as well as flow of goods and services globally. The author observed that worldwide uncertainties due the pandemic accentuated destabilizing effects on the global financial market' It could bring a country's economy from boom to recession and can worsen recession because of its effects on the productive sector (Morley, 2019). In the words of Olakojo et al. (2021), "Pandemics cause disruption to global value chains, stock markets, industrial production and accumulation of inventory is more relevant to the supply side of business cycles. While some business cycles may be symmetric, having a cycle with zero mean (that is, the period of business cycles collapse is equal to the period of business cycles boom), some may actually be asymmetric characterized with a longer boom or a longer doom."

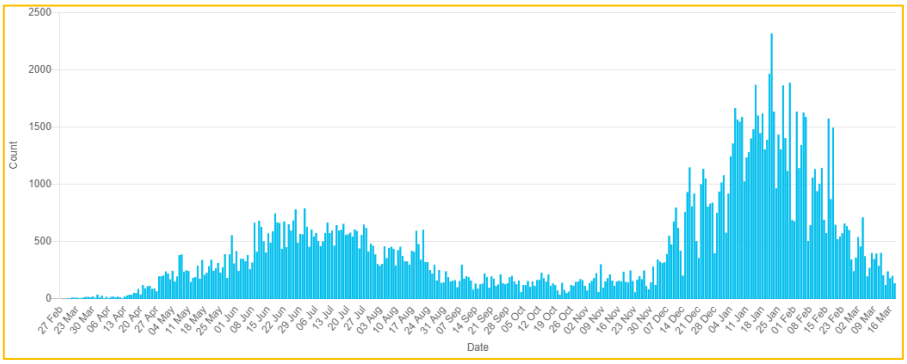

Figure 1. Nigeria's Confirmed Covid-19 Cases (2020-2021)

From a flat graph at the commencement of the pandemic in 2019, there was a steady increase in the number of confirmed Covid-19 cases in Nigeria until late July/early August 2020 when it started to decline. The period of this decline (September to November 2020) is seen as the end of the first wave of the pandemic (see Figure 1). The second wave which commenced around mid-December 2020 till date (March 2021), is seen as more spiky. Figure 2 reveals the trend of deaths for some specific dates due to the pandemic in Nigeria. Notice the spike in the number of deaths recorded during the second wave of the pandemic around late January and early February 2021. However, the trend reduced thereafter getting to the minimum around February 28, 2021. Unlike stock prices which decreased sharply after a spike around January 12, volume of trade on the Nigerian Stock Exchange did not exhibit sharp decrease throughout the period under study. From about N35 billion on December 1 and N34 billion on December 10, 2020, it hovers around N39 to N42 billion throughout the period (Figures 3 and 4).

Some Underlining Theories

The effect of diseases such as Covid-19 on stock price or stock market development is yet to be addressed in theoretical literature. However, there exists some theories on how infectious diseases affect economic activities. No doubt, the resultant immediate effect of pandemics is death which in itself has some economic implications. Laxminarayan and Malani (2011) stated that infectious diseases cause as

much as a quarter of world's deaths annually. Apart from deaths, pandemics have direct micro and macroeconomic impact Lopez et al. (2006) posited that infectious diseases impair the general and households' income levels. The theory of general equilibrium/disequilibrium can be applied to discuss the probable effect of pandemics on economic activities.

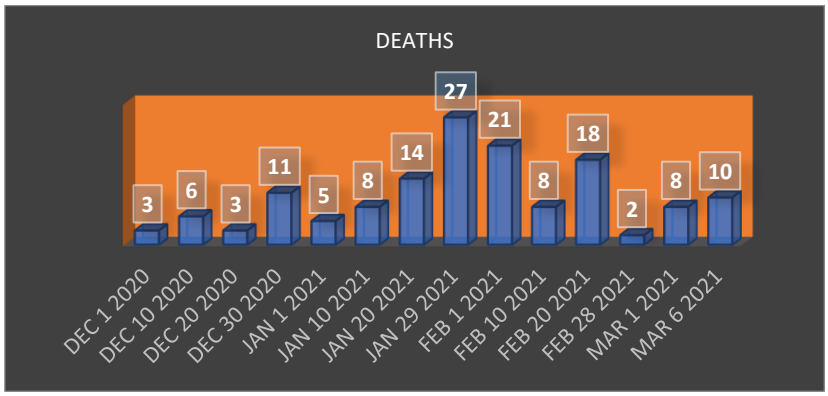

Figure 2. Second-wave Covid-19 Deaths in Nigeria (December 2020-March 2021)

Bleakley (2010) presented a theoretical framework that assessed the partial equilibrium effect of diseases on income using the lifetime income model. The author's position revealed that productivity directly increases when people have the age and health advantage to work leading to indirect positive effect on investment and income. When more workers become older or sickly, productivity, investment and income are all adversely affected. According to Bleakley (2010), while previous authors such as Miguel and Kremer (2004) and Bobonis et al. (2006) attempted to study the impact of infectious diseases and intervention costs on the human side of enterprise, the effect would most be on a second order level because it appeared ambiguous. Bleakley and Lange (2009) had earlier posited that if there are improvements in ageing and longevity which reduces the number of years that people work, adult health status will have a diminishing effect on human capital. In their "fixed factor theory," the authors argued that notwithstanding that human capital investment can react to improvements in health indicators, land in developing countries, in particular is a fixed resource may be adversely affected as the number of workers per land will shrink since labour supply will increase. This is to say that improved health indices can also improve productivity.

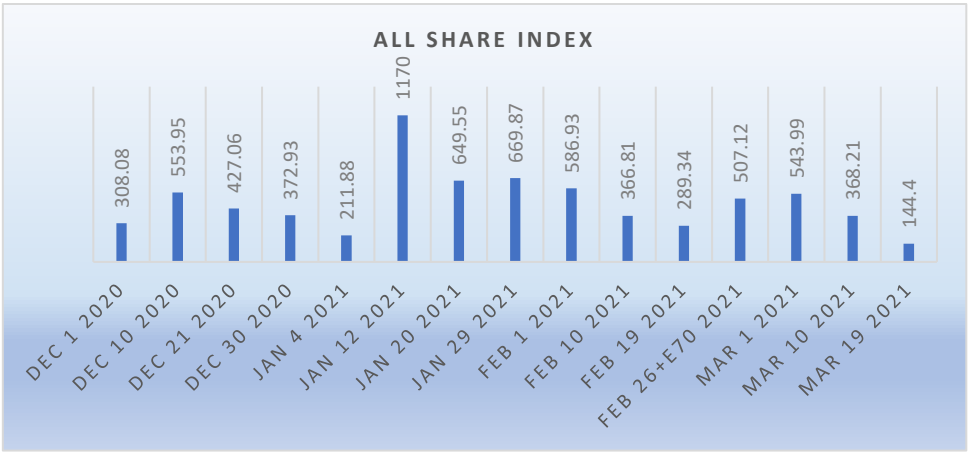

Figure 3. All Share Index for December 2020 – March 2021

Based on the works of Lucas (2010) and Cutler et al. (2007), Laxminarayan and Malani (2011) explained what is termed the "envelope theory" which posits that a person will prefer to invest his human capital to the extent where the marginal satisfaction derived from it equals its marginal cost. In essence, due to the health crises from diseases, the marginal cost most times outweigh the marginal return from diseases because income is largely dependent on the state of one's health.

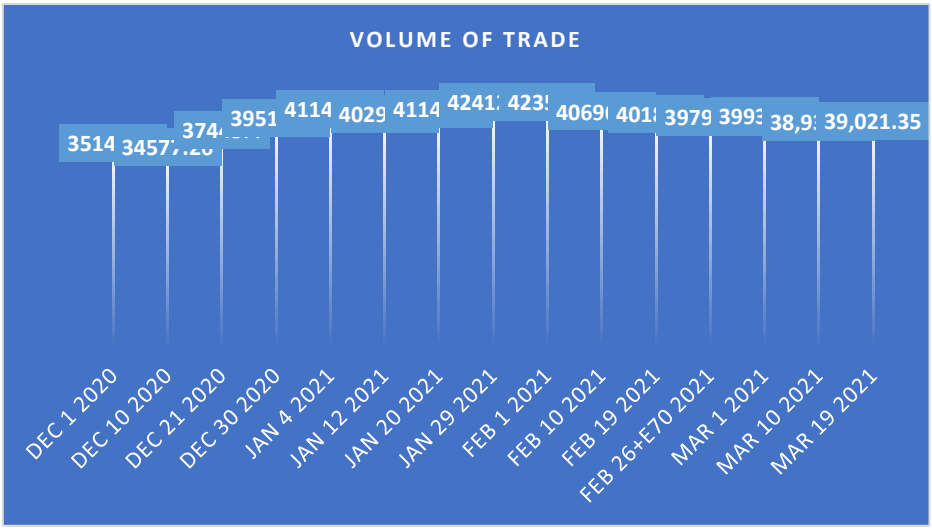

Figure 4. Volume of Traded Stocks in Nigeria for December 2020 – March 2021

Diseases can also affect a nation's economy through the effect of subsidy payments for anti-infectious drugs on government resources. According to Laxminarayan and Malami (2011), with a dynamic and efficient disease modelling, optimal subsidy can be achieved, and this is only possible through optimal allocation of available resources by the government. The issue of optimal resource allocation for disease control was addressed by ReVelle et al. (1967), Sanders (1971), as well as Sethi (1974) where the authors agreed that optimality in disease management is possible when a linear cost treatment is assumed.

Pandemic such as Covid-19 is characterized by uncertainties that threaten business operations, investments and research and development. Baker et al. (2020) posited that such pandemics reduce production, turnover and revenue. It is also envisaged that this decline in industrial production and services will have its toll on the stocks of firms listed on the stock exchange market. People become more interested in survival for now than investing for a future uncertain return.

Empirical Literature

Covid-19 is a new pandemic that currently ravages the world for which much existing empirical literature may not be readily available. From its inception late 2019, the pandemic has taken its toll on the health and business life of countries around the world, though we are yet to see the climax of its adverse effects Liu et al. (2020) analyzed the effect of the Covid-19 pandemic on the performance of 21 indices of 6 most affected countries in the world including Germany, Japan, the United States of America, Singapore, Korea, Italy and the United Kingdom using panel data analytical technique of fixed effect regression. The authors discovered that Asian countries stock return indices were more negatively affected when put side-by-side with other countries in the study group. According to the study, the negative effect was prompted by the pessimistic disposition and sentiments of investors to uncertainties attached to expected returns on stock. Similarly, in China, Italy, South Korea, Spain, France, Germany, Japan and the USA, He et al. (2020) examined how the Covid-19 pandemic affected the daily stock returns. Their analysis showed that Covid-19 exerted a bidirectional spill-over effects on stock returns of European, Asian and the USA.

A study by Baker et al. (2020) showed that the negative effect of Covid-19 on the United States' stock market was unprecedented, and it far outweighs the adverse effect of other previous pandemics such as the SARS, H2N2 and H3N2 on the market. Still in the USA, Baker et al. (2020) attempted to provide answers to the reason why the US stock market reacted so negatively to the Covid-19 outbreak more than other pandemics and submitted that the protocols churned out by the government (restricted movements and economic activities), social distancing and working from home were the reasons. In a tow-economy study, Sansa (2020) examine the effect of Covid-19 on the financial markets of China and the USA for March 2020 using simple regression. Unexpectedly, the author found that the effect of Covid-19 on financial market was not only positive, but significant in both countries Stock Exchanges. The justification for this conclusion will be the focus of another research.

Singh and Shaik (2021) examined the short-term effect of COVID-19 on stock market indices from a global perspective. Specifically, the study addressed the effect of 6 announcements by the WHO on Covid-19 on stock market indices of firms from five sectors of 9 world, developed and developing economies. These authors found that the effect of such announcements on stock market indices is significant and varied among developed and developing economies.

In Nigeria, not much literature has examined the Covid-19 – stock market effect. Abul et al. (2020) examined the extent to which Covid-19 confirmed cases and fatalities have affected the Nigerian stock market using a dataset from March 23rd to September 11th, 2020. The authors used diverse estimations techniques including the autoregressive distributed lag), canonical cointegrating regression, dynamic ordinary least squares (DOLS) and fully modified ordinary least squares and arrived at the conclusion that Covid-19 impacted negatively on the Nigerian stock market performance in terms of confirmed cases but impacted positively on its performance in terms of the number of deaths through the Covid-19. Ozili (2020) examined the effect of Covid-19 pandemic on the world's economy and observed that pandemic negatively impaired the world economies just as it does on the Nigerian financial markets mainly due to the general lockdown that attended the first phase of the virus and the other protocols guiding the disposition of people during the outbreak. Alade et al. (2020) used the Vector autoregressive (VAR) models to examine the connection between the Covid-19 pandemic and the capitalization of the Nigerian stock market for a three-month period (March to May 2020). Looking at the twin effect of global and Nigerian Covid-19 confirmed cases on the Nigerian stock market, the researchers discovered that while the global confirmed cases have negative effect on stock market capitalization, the effect of Nigeria's confirmed cases is mixed. However, in the two situations, none of the relationship is statistically significant. Still in Nigeria, Osagie et al. (2020) examined the effects of Covid-19 pandemic on the performance of the Nigerian Stock Exchange for the period January 2nd to April 16th, 2020, with GARCH (Exponential and Quadratic) models. The authors found that the pandemic exerted a significant negative effect on stock returns for the period under study.

RESEARCH METHODOLOGY

The data used in this study are sourced from secondary sources. They include the confirmed cases of Covid-19 cases, the number of deaths recorded due to the Covid-19 and volume of trade on the Nigeria Stock Exchange from December 1st, 2020, to March 31st, 2021. While daily data on the Covid-19 confirmed cases and number of deaths for the period were obtained from the web page of the Nigeria Centre for Disease Control (NCDC), the data on volume of trade are sourced from the daily price list of the Nigerian Stock Exchange for the period under study.

Following Abul, et al (2020) model that examined the effect of Covid-19 pandemic on Nigerian stock market capitalization from the perspective of global and Nigerian confirmed cases, the present study examines the effect of confirmed cases and number of deaths recorded from Covid-19 scourge on the all share index (ASI) and aggregated volume of trade (VOL) on the Nigerian stock market.

Our models for this study are two-pronged. The first expresses a relationship between stock market prices and the confirmed cases of Covid-19 and number of Covid-19 related deaths in Nigeria while the second expresses a relationship between stock market development (proxied by volume of trade) and the confirmed cases of Covid-19 and number of Covid-19 related deaths in Nigeria for the period described as the second wave of the pandemic in Nigeria. Hence, the research model is expressed as:

$ASI = f(CON; DEA)$ ..... *(i)*
$VOL = f(CON; DEA)$ ..... *(ii)*
where;
ASI = All Share Index on the Stock Exchange Market
VOL = Volume of stocks traded on the Stock Exchange Market
CON = Confirmed cases of second wave Covid-19 infections
DEA = Number of second wave Covid-19 related deaths

Expressing equations (i) and (ii) in econometric and logarithm form, the model for this study is expressed as:

$lnASI = a + b_iCON + b_2DEA + \varepsilon$ ..... *(iii)*
$lnVOL = a + b_iCON + b_2DEA + \varepsilon$ ..... *(ivi)*
where;
ln = natural logarithm
b1, b2 = regression parameters
ε = error term

While Model (i) deals with establishing the effect Covid-19 second wave on stock prices, Model (ii) examines the effect of Covid-19 second wave on volume of stock traded on the floor of the Nigerian Stock Exchange Market during the research period. The two null hypotheses tested in the study are that:

i. Covid-19 pandemic second wave had no significant effect on stock prices in Nigeria, and
ii. Covid-19 pandemic second wave had no significant effect on volume of stock traded on the Nigerian Stock Exchange market.

In order to determine the most appropriate estimation technique to use in drawing inference, the study variables are subjected to the ADF test of stationarity (unit root) to test the null hypothesis of the presence of unit root. The Autoregressive Distributed Lag (ARDL) Bound test is used to establish whether the variables co-integrate or not. The reason for co-integration test is to ascertain whether there exists a long-run relationship between the dependent and independent variables. The ARDL Bound Test is suitable to test for variables with a mixture of stationarity at level and on first difference (I(I); I (0)) and it tests the null hypothesis of no co-integration. The decision rule under Bound Test is to compare the estimated F-Statistic with the lower and upper bound values. Co-integration exists if the former is greater than the upper critical bound value but if it is lower than the lower critical bound value, then there is no co-integration. However, in a situation where the estimated F-Statistics is in-between the lower and upper bounds, an inconclusive situation arises.

Having established that co-integration exists among the variables under study, the autoregressive distributed lag technique is used to determine the short and long run relationship between stock prices and Covid-19 as well as between volume of trade on the stock exchange and Covid-19 indices in Nigeria between December 2020 and March 2021. The results derived from the ARDL long-run effect analysis are then subjected to some post-estimation tests which include the Breusch-Pagan-Godfrey test of residual heteroskedasticity (to test for homoscedasticity of residuals), Jarque-Bera test of residual normality and the cumulative sum of squares of recursive residuals (CUSUM) test.

RESULTS AND DISCUSSION

Effect of Covid-19 Second Wave on Stock Prices of Nigerian Firms

This section presents the results of analysis of model 1 which examines the relationship between Covid-19 second wave and stock prices of firms listed on the Nigerian Stock Exchange. Model 1 captures the effect of number of confirmed Covid-19 cases and number of deaths on All Share Index.

Descriptive Statistics – Model i

Table 1 contains the descriptive statistics of the three variables (ASI, CON and DEA). It reveals that during the second wave of Covid-19 pandemic, while the mean values of All Share Index (ASI), number of deaths (DEA) and confirmed Covid-19 cases (CON) are 39288.09, 7.925926 and 833.3457 respectively, the median values of the variables are 39805.78, 7 and 749 for ASI, DEA and CON respectively. Furthermore, ASI, DEA and CON have maximum values of 42412.68, 27and 2314 and minimum values of 34250.74, 0 and 48, respectively. While ASI is skewed to the left with a coefficient of -0.939619, DEA and CON are positively skewed to the right as shown by the coefficient of skewness of 0.976687 and 0.450791 for DEA and CON respectively. According to the Jarque-Bera (JB) statistics and their corresponding probabilities, while ASI and DEA are not normally distributed (JB (ASI) =12.21392, Prob. 0.00000 and JB (DEA) = 13.79908, Prob. 0.001008), CON is normally distributed with JB statistic of 4.302524, Prob. 0.116337). There are 81 observations in all.

Table 1. Descriptive Statistics – Model 1

	ASI	DEA	CON
Mean	39288.09	7.925926	833.3457
Median	39805.78	7.000000	749.0000
Maximum	42412.68	27.00000	2314.000
Minimum	34250.74	0.000000	48.00000
Std. Dev.	2138.939	6.429965	543.9434
Skewness	-0.939619	0.976687	0.450791
Kurtosis	2.985775	3.522440	2.320316
Jarque-Bera	12.21392	13.79908	4.302524
Probability	0.002227	0.001008	0.116337
Sum	3260911.	642.0000	67501.00
Sum Sq. Dev.	3.75E+08	3307.556	23669956
Observations	81	81	81

Unit Root Tests – Model i

Table 2 contains a summary of the test of stationarity for each of the variables used in model 1. It is shown that while ASI and CON are stationary at first difference with ADF statistics and probabilities (-25.35392 (0.00000) and -8.299411 (0.00000), respectively, DEA is stationary at level with ADF statistics and probability -3.149874 and 0.0256 respectively. These results show that the level of stationarity of the variables are a combination of 1(1) and 1(0).

Table 2. Summary of Unit Root Test Results – Model 1

Augmented Dickey-Fuller Unit Root Test Results					
Variable	**Lag Length**	**ADF Statistics**	**Prob.**	**Order of Stationarity**	**Comment**
ASI	5	-25.35392	0.00000	1(1)	Stationary at first difference
CON	5	-8.299411	0.00000	1(1)	Stationary at first difference
DEA	2	-3.149874	0.02560	1(0)	Stationary at level

Co-integration Test – Model i

The Bound test is used to establish whether the variables in question are co-integrated. Table 3 summarizes the results of Bound test carried out. From Table 3 the F-Statistic is 28.14750 which is greater than the critical lower and upper bounds at 99%, 97.5%, 95% and 90% level of significance. This means that the variables used in this study are co-integrated. The null hypothesis of no co-integration cannot be accepted. The existence of co-integrating equations among the variables, coupled with the results of unit root test provide the basis for using the ARDL method in estimating short and long run relationship between the dependent variable, ASI and independent variables, CON and DEA.

Table 3. Test of Co-integration

Test Statistic	Value	k
F-Statistic	28.14750	2

Critical Value Bonds		
Significance	IO Bound	I1 Bound
10%	2.63	3.35
5%	3.1	3.87
2.5%	3.55	4.38
1%	4.13	5

Short and Long-run relationship – Model i

Having established that the variables are stationary at level and first difference and that according to the result of Bound test they are co-integrated, the ARDL technique is then used to examine the short and long-run effect of second wave Covid-19 variables on stock price. Table 4 is the abridged ARDL results. In the short-run, the number of deaths due to Covid-19 second wave positively affect stock prices but the effect is statistically insignificant. A unit rise in DEA will cause stock price to insignificantly increase by 0.538123 with a probability of 0.1243 ($p > 0.05$). Also, the number of second wave Covid-19 confirmed cases exerts a positive but statistically insignificant effect on stock prices. A unit increase in CON will lead to an insignificant 1.486851 in stock prices with a probability of 0.1310 ($p > 0.05$). In both cases, the null hypotheses of no significant relationship between second wave of Covid-19 pandemic on stock prices in the short-run cannot be rejected because the effect is positive, it is not significant enough for inference purpose.

Table 4. Abridged Results of ARDL – Model 1

Short-run Effects					Long-run Effects				
Variable	**Coefficient**	**Std Error**	**t-Stats**	**Prob.**	**Variable**	**Coefficient**	**Std Error**	**t-Stats**	**Prob.**
D(LGASI(-1))	0.931270	0.128309	7.258033	0.0000	LGDEA	0.372076	0.254391	1.462616	0.1465
D(LGDEA)	0.538123	0.347389	1.549051	0.1243	LGCON	-0.375442	0.286819	-1.308983	0.1933
D(LGCON)	1.486851	0.977078	1.521731	0.1310	C	3.889210	0.727356	5.347055	0.0000
CointEq(-1)	-1.686411	0.155218	-10.8648	0.0000	Cointeq = LGASI - (0.3721*LGDEA - 0.3754*LGCON + 3.8892)				

In the long-run, the number of deaths due to the second wave Covid-19 pandemic (DEA) positively but statistically insignificantly affect stock prices (ASI). An additional death recorded will make stock prices to rise by an insignificant 0.372076 with probability of 0.1465 ($p > 0.05$). On the contrary, the number of confirmed second wave Covid-19 cases exerts a negative but statistically insignificant effect on stock prices. An additional confirmed case will make stock prices to insignificantly fall by 0.375422 with probability of 0.1933 ($p > 0.05$). The null hypothesis of no significant relationship between Covid-19 second wave and stock prices in the long-run cannot be rejected. In summary, while DEA exerts a positive but statistically insignificant effect on stock prices in the short and long-run, CON exerts a positive and negative but statistically insignificant effect on stock price on the short and long-run respectively.

Table 5. Heteroskedasticity Test – Model 1

F-statistic	3.413352	**Prob. F(7,109)**	0.0025
Obs*R-squared	21.03591	**Prob. Chi-Square(7)**	0.0037
Scaled explained SS	17.71396	**Prob. Chi-Square(7)**	0.0133

Post-Estimation Test – Model i

The post-estimation tests results carried out on the first model are seen in Figure 5 where it is revealed that the Jarque-Bera test of residual normality result shows that the residual of model 1 is bell-shaped and normally distributed (JB 2.368019, $p = 0.306049 > 0.05$). Furthermore, results of the

Breusch -Pagan-Godfrey test of residual heteroskedascticity show that based on the probabilities of F-Statistics and Chi-square (0.0025 < 0.05 and 0.0037 < 0.05, respectively), the residual of the variables is heteroskedastic (see Table 5). Finally, the model's cumulative sum of recursive residual reveal that the model and sample were stable as the equation line falls in-between the critical bounds lines of 5% (Figure 6).

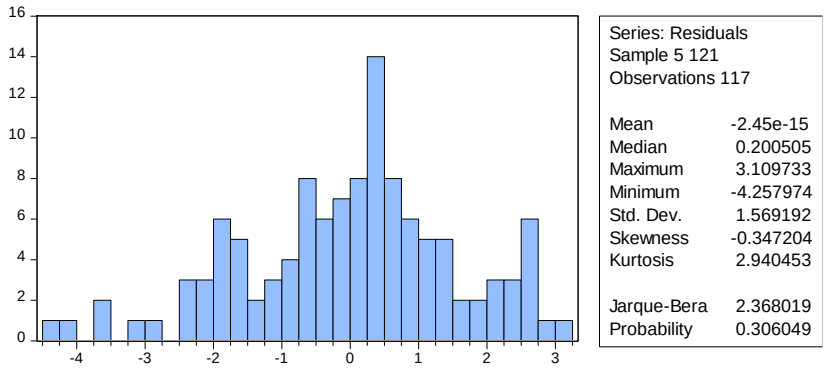

Figure 5. Residual Normality Test – Model 1

Effect of Covid-19 Second Wave on Volume of Trade in the Nigeria Stock Market

Model 2 examines the relationship between Covid-19 second wave and volume of stock traded on the Nigerian Stock Exchange. The model captures the effect of number of confirmed Covid-19 cases and number of deaths on aggregate monthly volume of stock traded for the period.

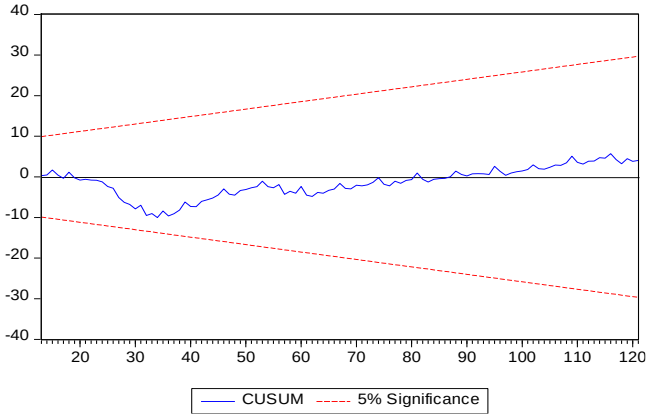

Figure 6. CUSUM Test – Model 1

Descriptive Statistics – Model ii

Table 6 shows the descriptive statistics which reveal the statistical properties of the variables used in model 2 of the study. From Table 6, during the second wave of Covid-19 pandemic, while the mean values of trade volume (VOL), number of deaths (DEA) and confirmed Covid-19 cases (CON) are 455.9917, 7.925926 and 833.3457 respectively, the median values of the variables are 368.9600, 7 and 749 for VOL, DEA and CON respectively. Furthermore, VOL, DEA and CON have a maximum value of 1470, 27 and 2314 and minimum values of 144.4, 0 and 48 respectively. All the investigated variables are positively skewed to the right as shown by the coefficient of skewness of 1.785553, 0.976687 and 0.450791 for VOL, DEA and CON respectively. According to the Jarque-Bera (JB) statistics and their corresponding probabilities, while VOL and DEA are not normally distributed (JB (VOL)=85.25637, Prob. 0.00000 and JB (DEA) = 13.79908, Prob. 0.001008), CON is normally distributed with JB statistic of 4.302524, Prob. 0.116337). There are 81 observations in all.

Table 6. Descriptive Test – Model 2

	VOL	DEA	CON
Mean	455.9917	7.925926	833.3457
Median	368.9600	7.000000	749.0000
Maximum	1470.000	27.00000	2314.000
Minimum	144.4000	0.000000	48.00000
Std. Dev.	255.6143	6.429965	543.9434
Skewness	1.785553	0.976687	0.450791
Kurtosis	6.536714	3.522440	2.320316
Jarque-Bera	85.25637	13.79908	4.302524
Probability	0.000000	0.001008	0.116337
Sum	36935.33	642.0000	67501.00
Sum Sq. Dev.	5227094.	3307.556	23669956
Observations	81	81	81

Unit Root Tests – Model ii

Table 7 contains a summary of the test of stationarity for each of the variables used in this study. The results of the test show that while VOL and CON are stationary at first difference with ADF statistics and probabilities (-11.87929 (0.00000) and -8.299411 (0.00000) respectively, DEA is stationary at level with ADF statistics and probability -3.149874 and 0.0256 respectively. These results show that the level of stationarity of the variables are a combination of 1(1) and 1(0).

Table 7. Summary of Unit Root Test Results – Model 2

Augmented Dickey-Fuller Unit Root Test Results					
Variable	**Lag Length**	**ADF Statistics**	**Prob.**	**Order of Stationarity**	**Comment**
VOL	5	-11.87929	0.00000	1(1)	Stationary at first difference
CON	5	-8.299411	0.00000	1(1)	Stationary at first difference
DEA	2	-3.149874	0.02560	1(0)	Stationary at level

Co-integration Test – Model ii

The Bound test is used to establish whether the variables in question are co-integrated. Table 8 summarizes the results of Bound test carried out where the F-Statistic is 28.70714 which is greater than the critical lower and upper bounds at 99%, 97.5%, 95% and 90% level of significance. This means that the variables used in this study are co-integrated. The null hypothesis of no co-integration cannot be accepted. The existence of co-integrating equations among the variables, coupled with the results of unit root test provide the basis for using the ARDL method in estimating short and long run relationship between the dependent variable, VOL and independent variables, CON and DEA.

Table 8. ARDL Bound Test

Test Statistic	Value	k
F-Statistic	28.70714	2

Critical Value Bonds		
Significance	IO Bound	I1 Bound
10%	2.63	3.35
5%	3.1	3.87
2.5%	3.55	4.38
1%	4.13	5

Short and Long-run relationship – Model ii

Table 9 is the abridged ARDL results for model 2 of the study. It shows that, in the short-run, the number of confirmed Covid-19 second wave (CON) has a statistically significant positive effect on stock prices such that a unit rise in CON caused stock price to significantly increase by 1.188034 with a probability of 0.0416 ($p < 0.05$). Also, the number of second wave Covid-19 related deaths exerts a

positive but statistically insignificant effect on stock prices. A unit increase in DEA will lead to an insignificant increase of 0.259762 in stock prices with a probability of 0.1986 ($p > 0.05$). The null hypothesis that Covid-19 second wave does not have significant effect on VOL in the short –run cannot be accepted.

Table 9. Abridged Results of ARDL – Model 2

Short-run Effects					**Long-run Effects**				
Variable	Coefficient	Std Error	t-Stats	Prob.	Variable	Coefficient	Std Error	t-Stats	Prob.
D(LGVOL(-1))	0.895582	0.126802	7.062850	0.0000	LGCON	0.120798	0.165630	0.729323	0.4674
D(LGCON)	1.188034	0.576103	2.062189	0.0416	LGDEA	0.148343	0.146903	1.009803	0.3148
D(LGDEA)	0.259762	0.200816	1.293530	0.1986	C	1.281726	0.419760	3.053477	0.0028
CointEq(-1)	-1.694044	0.155657	-10.88319	0.0000	Cointeq = LGVOL - (0.1208*LGCON + 0.1483*LGDEA + 1.2817)				

In the long-run, the number of confirmed Covid-19 second wave cases (CON) has an insignificant positive effect on stock prices such that a unit rise in CON will cause stock price to insignificantly increase by 0.120798 with a probability of 0.4674 ($p < 0.05$). Also, the number of second wave Covid-19 related deaths (DEA) exerts a positive but statistically insignificant effect on stock prices. A unit increase in DEA will lead to an insignificant increase of 0.148343 in stock prices with a probability of 0.3148 ($p > 0.05$). The null that the Covid-19 second wave has no significant effect on volume of stock traded cannot be accepted.

Table 10. Heteroskedasticity Test – Model 1

F-statistic	3.062636	**Prob. F(7,109)**	0.0055
Obs*R-squared	19.22975	**Prob. Chi-Square(7)**	0.0075
Scaled explained SS	14.84962	**Prob. Chi-Square(7)**	0.0380

Post-Estimation Test – Model ii

The post-estimation tests results carried out on the second model are seen in Figure 7 where the Jarque-Bera test of residual normality result shows that the residual of model 2 is bell shaped and normally distributed (JB 2.468026, $p = 0.291122 > 0.05$). Furthermore, results of the Breusch-Pagan-Godfrey test of residual heteroskedascticity show that based on the probabilities of F-Statistics and Chi-square ($0.0056 < 0.05$ and $0.0075 < 0.05$, respectively), the residual of the variables is heteroskedastic (Table 10). Finally, the model's cumulative sum of recursive residual reveal that the model and sample were stable as the equation line falls in-between the critical bounds lines of 5% (Figure 8) .

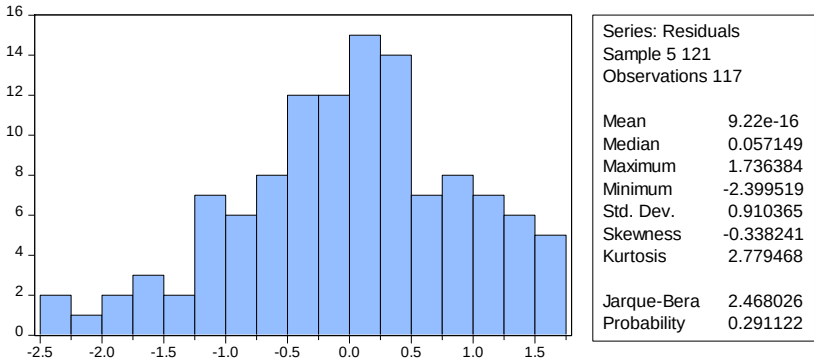

Figure 7. Residual Normality Test – Model 2

Discussion

This study was set out to examine the effect of Covid-19 second wave on the performance of the Nigerian stock market. Specifically, the study examined the effect of Covid-19 second wave on the

stock market from two perspectives: stock prices and volume of trade in the stock exchange market. The study made use of secondary data (stock price, volume of trade, number of confirmed cases of Covid-19 during the second wave and number of recorded deaths due to the pandemic). While data relating to the Nigerian stock market were sourced from the NSE Factbook, the data on Covid-19 were sourced from the official webpage of the Nigerian Centre for Disease Control (NCDC) for the period 1st December 2020 to 31st March 2021, the period referred to as the Covid-19 second wave period.

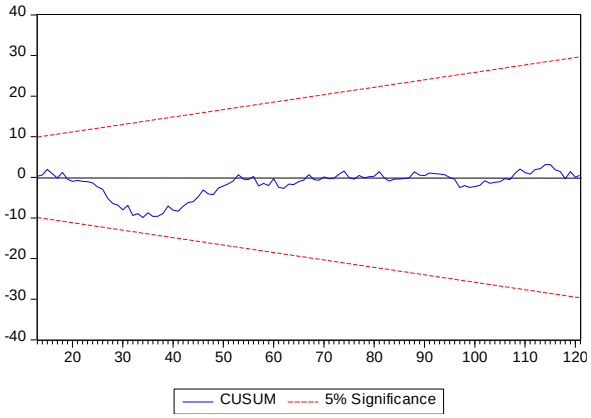

Figure 8. CUSUM Test – Model 2

In addressing the first objective of deciphering the effect of Covid-19 second wave on stock prices of firms listed on the NSE, the ADRL technique was used to analyze the sourced data. Results show that in the short run, both Covid-19 second wave confirmed cases and number of deaths have positive but statistically insignificant effect on stock prices. However, on the long-run, whereas the effect of confirmed Covid-19 second wave cases on stock price was negative and insignificant, the effect of number of deaths was positive though not statistically significant. In both the long and short-run, the effect of Covid-19 second wave on stock prices of listed firms in Nigeria is insignificant in agreement with the null hypothesis.

Probable reasons for the insignificant effect of Covid-19 second wave on stock prices may be due to the fact that investors have become aware of the first wave and have developed absorbers for the shock it caused. It is interesting to find that trading on the NSE occurred in almost all the trading days during the study period. Obviously, investors did not overreact, on the aggregate, to the events that accompanied the Covid-19 second wave with respect to the pricing of stocks in the stock market. If anything at all, investors react positively to the Covid-19 second wave in the short run and indifferently on the long-run.

The second objective was to ascertain the effect of Covid-19 second wave on the volume of trade on the NSE for the period under study. Results show that in the short run while the number of Covid-19 second wave confirmed cases have positive and statistically significant effect on volume of trade, the number of recorded deaths has a positive but statistically insignificant effect on it. On the long run, however, the effect of both confirmed cases and number of deaths is positive but statistically insignificant. We conclude that in contrast to the null hypothesis, the Covid-19 second wave significantly affects the volume of stock traded on the Exchange. When stock market performance is viewed from the aspect of volume of trade in the market, it is noteworthy that rather than impair volume of trade, Covid-19 second wave confirmed cases actually improved it. This may be due to several reasons: the fact that the fears attached to the first wave of the pandemic was ebbing out; the low recorded number of confirmed cases after initial spike or the need for investors to raise fund through sale of stocks without significantly increasing its price among others.

CONCLUSION

In conclusion, this study revealed that while the Covid-19 pandemic did not significantly affect stock prices in both short and long run, number of confirmed cases significantly and positively affected volume of stock traded in the market in the short run. On the long-run, it had no significant effect on volume of traded stock. This implies that the Covid-19 second wave has significant effect on volume of trade on the NSE and that the effect is positive. This agrees with findings of Sansa (2020), Abu et al (2020) and Alade et al. (2020). The pandemic however did not exert significant effect on stock prices in contradiction to the findings of Olakojo et al. (2021), Osagie et al. (2020) and Feinstein (2020) among others. This study recommends futuristic and pro-active counter pandemic strategies by both regulators and operators in the Nigerian Stock Exchange. Such strategies should include investment in information and communication technologies that will facilitate seamless stock trading beyond the walls of the market. Trade from home channels should be provided by the Stock Exchange to facilitate stock trading from remote sources during lockdowns.

Limitations of the Study

The second wave of Covid-19 pandemic continues, and it is doubtful whether there exists any end in sight. The four months period covered by this study is by no means the whole the period of the second wave as it continues. Therefore, continuous studies as the pandemic progresses may alter the results obtained in our present study. Again, the study is absolutely based on the figures declared by the government agency in charge of disease control in Nigeria and the Nigerian Stock Exchange.

REFERENCES

Abul, N., Awadh, A. M. G., Sakanko, M. A., Mateen, A., Joseph, D., & Ben-Obi, O. A. (2021). How have COVID-19 confirmed cases and deaths affected stock markets? Evidence from Nigeria. *Contemporary Economics,* 15(1), 76-99.

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.

Alfaro, L., Chari, A., Greenland, A., & Schott, P. (2020). *Aggregate and firm-level stock returns during pandemics, in real time* [SSRN Discussion Paper Series]. https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3562034

Baker, S. R., Bloom, N., Davis, S. J., Kost, K. J., Sammon, M. C., & Viratyosin, T. (2020). *The unprecedented stock market impact of COVID-19 [Working Paper No. 26945]. National Bureau of Economic Research.* http://www.nber.org/papers/w26945

Bleakley, H. (2010). Health, human capital and development. *Annual Review of Economics,* 2(1), 14-23.

Bleakley, H. & Lange, F. (2009). Chronic disease and the interaction of education, fertility and growth. *The Review of Economics and Statistics,* 91(1), 52-65.

Bobonis, G. J., Miguel, E., & Puri-Sharima, C. (2006). Anemia and school of participation. *Journal of Human Resources,* 41(4), 692-721.

Cutler, D., Fung, W., Kremer, M. & Singhai, M. (2007). *Mosquitoes: The long-term effects of malaria eradication in India, Working Paper 13539 [NBER Working Paper Series]. National Bureau of Economic Research.* https://www.nber.org/system/files/working_papers/w13539/w13539.pdf

Ding, W., Levine, R., Lin, C., & Xie, W. (2020). *Corporate immunity to the Covid-19 pandemic [NBER Working Paper Series No. W27055]. National Bureau of Economic Research.* http://www.nber.org/papers/w26945.

Feinstein, Z. (2020). *Reanimating a dead economy: Financial and economic analysis of the Zombie outbreak.* https://arxiv.org/abs/2003.09943

Hanspal, T., Weber, A., & Wohlfart, J. (2020). *Income and wealth shocks and expectations during the COVID-19 pandemic [CESifo Working Paper No. 8244]. Center for Economic Studies and ifo Institute (CESifo).* https://www.econstor.eu/handle/10419/216640

He, Q., Liu, J., Wang, S., & Yu, J. (2020). The impact of COVID-19 on stock markets. *Economic and Political Studies,* 8(3), 275-288.

International Labour Organisation (ILO) (2020). *ILO Monitor: COVID-19 and the world of work. Updated estimates and analysis.* https://www.ilo.org/wcmsp5/groups/public/@dgreports/@dcomm/documents/briefingnote/wcms_743146.pdf

Laxminarayan R. & Malani, A. (2011). *Economics of Infectious Diseases*, in Oxford Handbook of Health Economics (P. Smith, S. Glied Ed). Oxford University Press.

Lopez, A. D, Mathers, C. D, Ezzati, M., Jamison, D. D & Murray, C. J. L. (eds) (2006). *Global Burden of Disease and Risk Factors.* Oxford University Press

Liu, H-Y., Manzoor, A., Wang, C, Y., Zhang, L., & Manzoor, Z. (2020). The COVID-19 outbreak and affected countries stock markets response. *International Journal of Environmental Research and Public Health,* 17(2800), 1-19.

Lucas, A. M. (2010). Malaria eradication and educational attainment: Evidence from Paraguay and Sri Lanka. *American Economic Journal of Applied Economics,* 2(2), 46-71.

Miguel, E. & Kremer, M. (2004). Worms: Identifying impacts of education and health in the presence of treatment externalities. *Econometrica,* 72(1), 159-217.

Morley, J. (2019). The business cycle: Periodic pandemic or rollercoaster ride? *International Journal of Economic Policy Studies,* 13(2), 425-431.

Olakojo, S. A., Onanuga, A. T. & Onanuga, O. T. (2021). COVID-19: Putting stock markets back on recovery among the crude oil producing economies. *Contemporary Economics,* 15(1), 34052.

Osagie, M., Maijamaa, A. B. & John, D. O. (2020). *On the effects of COVID-19 outbreak on the Nigerian Stock Exchange performance: Evidence from GARCH models*. Preprints 2020, 2020040444.

Ozili, P. K. (2020). *COVID-19 in Africa: Socioeconomic impact, policy response and opportunities [MPRA Paper 99617]. University Library of Munich, Germany.* https://ideas.repec.org/p/pra/mprapa/99617.html

ReVelle, C. S., Lynn, W. R., & Feldmann, F. (1967). Mathematical models for the economic allocation of tuberculosis control activities in developing nations. *American Review of Respiratory Diseases,* 96(5), 893-909.

Sanders, J. L. (1971). Quantitative guidelines for communicable disease control programs. *Biometrics,* 27(4), 833-93.

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), 29-39.

Sethi, S. P. (1974), Quantitative guidelines for a communicable disease program: A complete synthesis. *Biometrics,* 30(4), 681-691.

Singh, G. & Shaik, M. (2021). The short-term impact of COVID-19 on global stock market indices. *Contemporary Economics,* 15(1), 1-18.

Weitemeyer, J. (2021). *Economic impact of the COVID-19 pandemic*. Statista Experts Webinar Series Covid-19 Fact and Developments. https://www.statista.com/page/Covid-19-coronavirus

---

Article correspondence should be sent to:
Anthony Olugbenga Adaramola, PhD
Associate Professor, Department of Finance, Faculty of Management Sciences, Ekiti State, Ado-Ekiti, Ekiti State, Nigeria (anthony.adaramola@eksu.edu.ng)

Recommended Citation:
Adaramola, A. O., Kayode, P. A., Omotayo, V. A., & Ogiamien, O. F. (2022). Effect of Covid-19's Second Wave on the Nigerian Stock Market. Journal of Business and Entrepreneurship, 10(2), 145-160.

This article is available online at:
http://ojs.sampoernauniversity.ac.id (ISSN: 2302-4119 Print, 2685-6255 Online