

Analysis of the Reaction of Stock Returns to the 2019 Novel Coronavirus Disease: Evidence from the Nigerian Banking Sector

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Abstract: Since its outbreak in China in December, 2019 and subsequent spread to Nigeria in February 2020, coronavirus disease (COVID-19) has been contagious in effect, not only medically but financially, thereby causing feverish behavior among investors. This is perceived to have potential impact on stock market returns generally and banking sector's stocks returns in particular. Therefore, this research aims to empirically determine the effect of COVID-19 on stock returns, with a focus on the Nigerian banking sector whose stocks are one of the most traded in the Nigerian stock market. This study applies Pearson correlation and Ordinary Least Squares regression technique in the investigation of the reaction of Nigerian banking sector's stock returns to COVID-19 new confirmed (positives), discharges (recoveries) and fatalities (deaths) cases. Secondary data on weekly basis in respect of COVID-19 and banking sector's stock returns were obtained from the websites of the Nigeria Centre for Disease Control and the Nigerian Stock Exchange respectively. The 34-week event study began on March 2, 2020 and ended on October 25, 2020. Empirical findings show a negative and weak correlation between coronavirus and banking sector's stock returns in Nigeria. The regression results indicate that every new confirmed (positive) case of coronavirus in Nigeria has a negative and significant effect on the returns of the banking sector's stock in Nigeria. This study therefore concludes that coronavirus has significant debilitating effect on the banking

sector's stock returns in Nigeria. It is therefore suggested that investors should focus on portfolio rebalancing with is skewed towards other securities other than stocks but more of fixed-income securities (such as bonds, debentures) as well as real-estate investments.

Keywords: Banking sector; Coronavirus; COVID-19; Stock returns; OLS.

JEL Classification Codes: G14, G21, I10

INTRODUCTION

The outbreak of the 2019 novel coronavirus disease (COVID-19) in Wuhan, China is not only medically contagious in effect but also economically and financially. The aftermath of some of the measures aimed at protecting lives from the disease, most especially the lock-down and social distancing measures, have brought about closing of world markets, business offices, plants and production outfits, etc. These have generally dampened the world economy. Demirguc-Kunt *et al.* (2020) posit that COVID-19 causes unrepresented global shock, with the disease itself and mitigation efforts of social distancing measures and partial and national lockdown measures, having a significant impact on the economy. As one of the biggest crises of modern times, the pandemic is incomparable with any past infectious disease outbreak, in its powerful impact globally and especially on the stock market (Baker *et al.*, 2020; Wójcik & Ioannou, 2020).

Since its advent in February 2020 in Nigeria, the financial market, particularly the stock market has not been left the same. An examination of the Nigerian Stock Exchange (NSE) as at week ending on 28th February 2020, shows the Banking Index (NSE-Bank) to be 315.50 points and the weekly changes of the index has been oscillating between negative and positive. NSE-Bank was 315.33 points as at the end of the first week of October 2020 while as at the end of the week ending on 23rd October 2020, the index became 344.86. Further statistics indicate that generally, banking sector index in Nigeria increase by 29.36 points (344.86 less 315.50) or 9.30% over the study period. Although, there are occasional monthly declines in the banking index, there are more increases than the decreases in the study period. For instance, the banking index shows that of 24.41% and 3.12% decline in March and June respectively. However, there are 15.82%, 7.68%, 4.13% and 0.14% monthly increase in April, May, July, August and September 2020 respectively. Further statistics reveal that the index of the banking sector's stock in Nigeria in the study period shows an average of 288.3053 points and ranges between a minimum of 234.47

points and a maximum index of 291.41 points. With its standard deviation (27.50305) far below the mean values, it can be said that Nigerian banking index is not widely dispersed from the average in the period of study.

The Nigerian banking sector dominates the financial system in the country, with 90% of the total financial system assets concentrated in the sector (Mamman & Hashim, 2014). The sector through its various activities have also been found to impact the Nigerian economy positively (Akpansung & Babalola, 2011; Innocent *et al.*, 2019; Mamman & Hashim, 2014; Omoruyi, & Osawmonyi, 2013). Banks have been compared (Cecchetti and Schoenholtz (2020)) to black boxes, whereby external observers suffer asymmetric information problem as touching the value of their assets, most especially in crisis time. The authors argue that consequently, bad news can lead depositors to doubt the solvency of their bank and therefore makes the banks to be vulnerable to runs occasioned by simultaneous withdrawal of deposits by a large number of customers. Aldasoro *et al.* (2020) submit that the banking industry has been harder hit than most sectors by the spread of COVID-19. Pricewaterhousecoopers[PWC], (2020), notes furthermore that, due to COVID-19, the banking industry is exposed to the risks of economic contraction, declining fee and trading income, higher credit losses and deterioration of asset quality, capital and liquidity, breaches of cybersecurity, operational constraints of keeping employees safe and meeting customer expectations, and deterioration of IT and other support services in the industry.

Stylized Facts on COVID-19

According to NCDC (2020), coronavirus is a zoonotic disease in that it is majorly transmitted between animals and people. The author notes further that the novel COVID-19 is caused by a new strain of coronavirus (SARS-CoV-2) which has not been previously identified in humans. The initial transmission of the disease appeared to be from an animal source, but there has been person-to-person transmission in countries. The symptoms of the disease include: cough, fever, shivering, body pains, headache, sore throat, recent loss of taste or smell, difficulty in breathing/shortness of breath, loss of speech or mobility or confusion, diarrhea/abnormal pain, running nose/catarrh, tiredness, aches and pains, red or irritated eyes, a rash on the skin or discolouration of fingers or toes (Nigeria Centre for Disease Control [NCDC], 2020; World Health Organisation[WHO], 2020).

On 27th February 2020, a 44-year old Italian citizen was diagnosed of COVID-19 in Lagos State and the case is the first to be reported in Nigeria since the first

confirmed case was reported from China in January 2020 (NCDC, 2020). In order to reduce the risk of infection or spread of COVID-19, members of the public are advised by NCDC in line with WHO recommendations, to adhere to the following hand and respiratory hygiene measures: washing of hands regularly with soap and water or use of an alcohol-based sanitizer; use of a non-medical face mask/covering for all persons while in public spaces; practice of no-touch greetings; maintenance of a minimum 2 metres physical distance from each and most especially from anyone who is coughing or sneezing; avoiding crowded spaces such as open markets, crowded supermarkets and pharmacies.

Statistics shows that as at 25th October, 2020, the total confirmed cases of COVID-19 in Nigeria stood at 61,992 with 57,465 recoveries and 1,130 deaths, leaving 3,397 as active cases, representing about 93 percent recovery rate and case fatality rate (CFR) of 1.8% in Nigeria. On the same date, in Africa, there were confirmed COVID-19 cases of 1,716,864 with 41,262 resulting in a case fatality rate of 2.4%. Globally, the count for confirmed COVID-19 cases was 42,512,186 with 1,147,301 deaths resulting in a case fatality rate of 2.7% (NCDC, 2020).

There have been attempts by extant empirical studies to investigate the effect of COVID-19 on the general performance of the stock markets in both developed and developing countries (Alber (2020), Anh and Gan (2020), Babarinde (2020), Bahrini and Filfilan (2020), Bakar and Rosbi(2020), Banerjee *et al.* (2020), Ikwuagwu *et al.* (2020), Kotishwar (2020), Maroua and Slim (2020), Ngwakwe (2020), Waheed *et al.* (2020)). However, the authors are not aware of any empirical study in Nigeria that have empirically examined the effect of COVID-19 on banking sector's stock returns in the country. This lacuna is not peculiar to Nigeria;the effect of coronavirus on banking sector's stocks returns have been examined relatively by very few scholars even in other countries (Aldasoro *et al.* (2020), Demirguc-Kuntet *al.* (2020)). This empirical lacuna is what this study attempts to fill.

The main aim of this study is to examine empirically the effect of coronavirus on banking sector's stock returns in Nigeria. The specific objectives are to:

1. Determine the relationship between COVID-19 positive cases and banking sector's stocks returns in Nigeria;
2. Evaluate the relationship between COVID-19 fatal cases and banking sector's stocks returns in Nigeria;
3. Assess the relationship between COVID-19 recovery cases and banking sector's stocks returns in Nigeria;

4. Investigate the effect of COVID-19 positive cases on banking sector's stocks returns in Nigeria;
5. Determine the effect of COVID-19 fatal cases on banking sector's stocks returns in Nigeria; and
6. Examine the effect of COVID-19 recovery cases on banking sector's stocks returns in Nigeria.

This study is based on six research hypotheses stated thus:

H_{o1}: There is no significant relationship between COVID-19 positive cases and banking sector's stocks returns in Nigeria.

H_{o2}: There is no significant relationship between COVID-19 recovery cases and banking sector's stocks returns in Nigeria.

H_{o3}: There is no significant relationship between COVID-19 fatal cases and banking sector's stocks returns in Nigeria.

H_{o4}: COVID-19 positive cases do not have significant effect on banking sector's stocks returns in Nigeria.

H_{o5}: COVID-19 recovery cases do not have significant effect on banking sector's stocks returns in Nigeria.

H_{o6}: COVID-19 fatal cases do not have significant effect on banking sector's stocks returns in Nigeria.

The organisation of this paper is as follows. Section one is on introduction while Section two deals with literature review on coronavirus and stock returns with a particular focus on the banking sector. In Section three, the methodology of the study is discussed while Section four presents and discusses the empirical data analyses and results. Section five, finally concludes the paper and provides some recommendations.

LITERATURE REVIEW

Empirically, more studies have been conducted on the impact of coronavirus on the general stock markets performance than banking sector's specifically. These past studies are of diverse findings and conclusions, ranging from neutral, positive and negative impact of the disease on the stock market. For instance, Alber (2020) confirms the negative effect of coronavirus on stock market return for China, France, Germany and Spain. Likewise, Bahrini and Filfilan (2020) find that daily returns of the major stock market indices in the Gulf Cooperation Council (GCC) countries

responded negatively to COVID-19. Furthermore, Liu *et al.* (2020) indicate that coronavirus has a significant negative effect on stock market returns across all affected countries and areas including 21 leading stock market indices in major affected countries including Japan, Korea, Singapore, the USA, Germany, Italy, and the UK etc. Lee *et al.* (2020) show the impacts of COVID-19 on the Malaysian stock market to be adverse on the market index and most sectorial indices. Other studies have also confirmed the negative impact of coronavirus on stock market in different countries (such as Bakar and Rosbi (2020) in Malaysia; Banerjee *et al.* (2020) in India; Maroua and Slim (2020) in Saudi; Anh and Gan (2020) in Vietnam; D'Orazio and Dirks (2020) in the Euro Area.; Al-Awadhi *et al.* (2020) in China; Kotishwar (2020) in USA, Spain, France, Italy, China and India).

Contrarily, Waheed, *et al.* (2020) found that Karachi stock exchange index has positive increment in stock returns in the country. In a related study, Ngwakwe (2020) shows that coronavirus has positive effect on Chinese stock market while the effect of the pandemic on USA and Europe indices is negative. In Nigeria, Ikwuagwu *et al.* (2020) show that returns on investors in health firms reacted positively to the information of Covid-19, but this positive reaction was insignificant. Liew and Puah (2020) find that in China stock market, health care, information technology and telecommunication services sectors were relatively more pandemic-resistant, while other sectors were more severely hurt by the pandemic outbreak. In the same China, Sansa (2020) confirm positive relationship between COVID-19 and stock market.

Ashraf (2020) show that stock market returns in selected 64 countries declined as the number of confirmed cases increased, however response to the growth in deaths is not that statistically significant. In a recent study, Babarinde (2020) confirms no evidence of causality between coronavirus and stock prices in Nigeria, as none of the measures of coronavirus is statistically significant in explaining stock prices in the period of study.

Furthermore, specifically, studies devoted to the banking sector reaction to coronavirus are examined below. In a market assessment study, Aldasoro *et al.* (2020) examined the effects of COVID-19 on the banking sector. The authors found that banks' performance on equity and debt markets to be at par with the post-Lehman Brothers in 2008 collapse experience. The study concludes that banks have suffered more in comparison to other sectors and previous crises. Demirguc-Kunt *et al.* (2020) also analyze bank stock prices around the world to assess the impact of the COVID-19 pandemic on the sector. The authors established that for most countries, bank

stocks underperform relative to other publicly traded companies in their home country, and relative to non-financial institutions.

In summary, there are differences across countries, depending on the resilience and proper economic/financial mitigating measures actively rolled out and their effectiveness, most past studies reviewed confirm the negative impact of coronavirus on stock market performance. In fact, the negative effect is felt more by the banking sector. This empirical review has exposed the scantiness/lack of empirical studies on the effect of coronavirus on the performance of the banking sector's stocks in developed and most essentially in developing country in Nigeria where the role of the sector has been significant in the overall economy, and financial system development in particular. Therefore, an attempt is made in this research to provide one of the pioneering empirical literature on the nexus between COVID-19 and banking sector's stock returns in Nigeria using event study methodology over a 34-week period.

METHODOLOGY

This study uses an event study method (Babarinde, 2020; Demirguc-Kunt *et al.*, 2020; Ikwuagwu *et al.*, 2020; Liu *et al.*, 2020) to examine the effect of coronavirus on banking sector's stock returns in Nigeria. The sector is examined due to the fact the Nigerian financial system is driven and dominated by the sector and its positive role in the economy at large. Event study technique is useful in the assessment of the impact of certain event on the returns of equities and bonds as well as stock prices (Khotari & Warner, 2006; Rao & Sreejith, 2014). Thus, COVID-19 as event, is examined in terms of its effect on stock returns in the Nigerian banking sector.

As a result, past data on COVID-19 new cases of confirmed (positives), discharges (recoveries) and fatalities (deaths) were investigated in terms of their relationship with and impact on stock returns of banks in Nigeria. Secondary data on weekly basis in respect of COVID-19 and banking sector's stock returns were obtained from websites of the Nigeria Centre for Disease Control (NCDC) and Nigerian Stock Exchange (NSE) respectively. The 34-week study was conducted between on March 2, 2020 and October 25, 2020.

The estimation technique is the Ordinary Least Squares (OLS) regression in addition to the Pearson correlation technique. Before the estimation proper, descriptive statistics, and test of multicollinearity were conducted on the study variables. Therefore, series of model diagnostic tests were conducted to ensure the model are efficient and reliable. After model estimation, some diagnostics are

necessary to ensure that statistical assumptions of the regression model are met. Some of these tests carried out include tests of normality, autocorrelation, model stability, specification error, heteroscedasticity. Tests of study hypotheses were also carried using Wald test and the OLS results.

Model Specification

In specifying study model, this study adapts Babarinde (2020)'s model of the impact of coronavirus on stock prices in Nigeria. Instead of NSE All-Share Index (ASI) employed by Babarinde as dependent variable, banking sector's stock returns (BSRN) becomes the dependent variable in this study. Therefore, in this study, banking sector's stock returns is expressed as a function of coronavirus new positive cases, coronavirus new recovery cases and coronavirus new fatal cases. While Babarinde applied VAR technique, in this study OLS is applied.

Banking sector's stock returns as a function of coronavirus is mathematically expressed in equation (1) thus:

$$BSRN = f\left(\sum_{i=1}^n COVID-19\right) \quad (1)$$

BSRN is defined mathematically defined in equation (2) as:

$$BSRN = \frac{NSE\ BANKING\ INDEX_t - NSE\ BANKING\ INDEX_{t-1}}{NSE\ BANKING\ INDEX_{t-1}} \quad (2)$$

$$\begin{aligned} & \left(\sum_{i=1}^n COVID-10\right) \\ & = COVID-19\ new\ positive\ cases\ (CNNP) + COVID \\ & = 19\ new\ recover\ cases\ (CNNR) + COVID \\ & - 19\ new\ fatal\ cases\ (CNNF) \end{aligned} \quad (3)$$

$$\text{Therefore: } BSRN = CNNP + CNNR + CNNF \quad (4)$$

The econometric version of mathematical equation in (4) expressed in logarithmic form is as stated in equation (5):

$$LOG(BSRN_t) = \alpha + \theta_1 LOG(CNNP_t) + \theta_2 LOG(CNNR_t) + \theta_3 LOG(CNNF_t) + \varepsilon_t \quad (5)$$

Where; $BSRN_t$ is banking sector's stock returns in Nigeria,

$CNNP_t$ denotes COVID-19 new positive cases,

$CNNR_t$ represents COVID-19 new recovery cases,

$CNNF_t$ signifies COVID-19 new fatal cases,

α is the constant,

$\theta_1, \theta_2, \theta_3$ are the model's parameters,

ε_t is the stochastic error term, and,

t represents time (duration) in weeks, 1-34 weeks.

Theoretically, it is expected that the COVID-19 recovery cases should generate a recovery too from the feverish behavior of stock investors. Therefore, it should bring about a positive change in the stock returns in the banking sector. However, increasing number of new fatal and confirmed cases of coronavirus is expected to further lead to decline in stock returns in the banking sector. In summary, and are expected to be negatively signed with . However, is expected to have positive coefficient.

RESULTS AND DISCUSSION

Descriptive Statistics

The descriptive statistics in Table 1 indicate the average weekly positive, discharge and fatal cases of coronavirus to be 363, 409 and 5 respectively. The average stock returns posted by the banking sector stands at 86%. Banking sector's stock returns and the discharged cases of coronavirus are widely dispersed from their average. This is against a relatively stable fatal and positive cases of coronavirus. Out of the four variables of study, only positive cases of coronavirus, (with a very high J-B' p-value) is passes the normality test. Other three variables are not normally distributed. Except for the positive cases whose kurtosis is roughly 3, and considered to be mesokurtic; the kurtosis value of all other variables exceed 3, which implies that the variables are leptokurtic in nature. Unlike banking sector's stock returns which is negatively skewed, all other variables are positively skewed.

Multicollinearity Tests

The Variance Inflation Factors (VIFs) as an indicator of the degree to which the variance of an estimator is inflated due to multicollinearity among the regressors is

Table 1: Descriptive Statistics

	<i>BSRN</i>	<i>CNNP</i>	<i>CNNR</i>	<i>CNNF</i>
Mean	0.863529	363.4412	409.0294	5.029412
Median	1.360000	328.5000	188.5000	4.000000
Maximum	29.06000	1174.000	4876.000	20.00000
Minimum	-85.63000	0.000000	0.000000	0.000000
Std. Dev.	18.95506	303.8246	867.1064	4.661157
Skewness	-2.760519	0.846198	4.285688	1.169280
Kurtosis	13.93774	3.183324	22.16779	4.260352
Jarque-Bera	212.6642	4.105237	624.5699	9.997913
Probability	0.000000	0.128398	0.000000	0.006745
Observations	34	34	34	34

Source: Authors' computation.

based on the rule of thumb, which states that if the VIF of a variable exceeds 10, that variable is said to be highly collinear and/or the closer is tolerance factor ($1/\text{VIF}$) to 1, the greater the evidence that the variable is not collinear with the other regressors (Gujarati, 2004). Therefore, since the VIF (centred) presented in Table 2, show values ranging between 1.52 and 4.91, which is still below the threshold of 10, and TOL (coefficient variance is closer to 1 (ranges between 0.067 and 0.195); it can be decisively concluded that none of the independent variables is highly collinear with the other.

Table 2: Variance Inflation Factors

<i>Variable</i>	<i>Coefficient Variance</i>	<i>Uncentered VIF</i>	<i>Centered VIF</i>
LCNNP	0.195925	131.6638	4.915324
LCNNR	0.067180	36.65683	3.928387
LCNNF	0.137058	7.936753	1.525516

Source: Authors' computation.

Unit Root Tests

Non-stationarity provides one result for a period and a different result for another period (Rao & Sreejith, 2014). In other words, non-stationarity resorts in spurious regression results that are time-dependent. To avoid the violation of this OLS time series regression, the unit root properties of the time series data is examined using

two tests of unit root, namely the augmented Dickey-Fuller (ADF) and Phillips-Perron (PP) tests. The results of the tests as presented in Tables 3 and 4 indicate that all the variables are stationary at level. This is attested to by both the probability values and the tests critical values in both tests.

Table 3: Augmented Dickey-Fuller (ADF) Unit Root Test

<i>Variable</i>	<i>t-Statistic</i>	<i>1% level</i>	<i>5% level</i>	<i>10% level</i>	<i>Prob.</i>	<i>I(d)</i>
LBRN	-5.733637	-3.646342	-2.954021	-2.615817	0.0000	I(0)
LCNNF	-4.128083	-3.699871	-2.976263	-2.627420	0.0036	I(0)
LCNNP	-2.697977	-3.661661	-2.960411	-2.619160	0.0858	I(0)
LCNNR	-2.809620	-3.670170	-2.963972	-2.621007	0.0689	I(0)

Source: Authors' computation.

Note: Reject hypothesis of unit root when the test statistic exceeds any of the three critical value at 1%, 5% and 10% levels or when the p-value is less than any of the three significance levels.

Table 4: Phillips-Perron (PP) Unit Root Test

<i>Variable</i>	<i>t-Statistic</i>	<i>1% level</i>	<i>5% level</i>	<i>10% level</i>	<i>Prob.</i>	<i>I(d)</i>
LBRN	-5.734031	-3.646342	-2.954021	-2.615817	0.0000	I(0)
LCNNF	-4.127459	-3.699871	-2.976263	-2.627420	0.0036	I(0)
LCNNP	-2.901425	-3.661661	-2.960411	-2.619160	0.0566	I(0)
LCNNR	-3.186574	-3.670170	-2.963972	-2.621007	0.0308	I(0)

Source: Authors' computation.

Note: Reject hypothesis of unit root when the test statistic exceeds any of the three critical value at 1%, 5% and 10% levels or when the p-value is less than any of the three significance levels.

Correlation Analysis

In order to determine the strength and nature of relationship between coronavirus and banking sector's stock returns in Nigeria, the Pearson correlation test was employed. The result of the test as presented in Table 5 shows that positive and recovery cases of coronavirus are negatively correlated with banking sector's stock returns in Nigeria as against a positive correlation coefficient of coronavirus fatalities. Generally, by this result, it can be asserted that a negative, but weak, correlation exists between coronavirus and banking sector's stock returns in Nigeria in the period of study.

Table 5: Correlation Matrix

<i>Probability</i>	<i>LBSRN</i>	<i>LCNNP</i>	<i>LCNNR</i>	<i>LCNNF</i>
LBSRN	1.000000	-0.275336	-0.101201	0.065713
LCNNP	-0.275336	1.000000	0.847111	0.522283
LCNNR	-0.101201	0.847111	1.000000	0.300130
LCNNF	0.065713	0.522283	0.300130	1.000000

Source: Authors' computation.

Model Estimation

To investigate the effect of coronavirus on banking sector's stock returns in Nigeria, the Ordinary Least Squares (OLS) regression model is estimated and the results presented in Table 6. The results confirm that coronavirus positive cases (CNNP) exert negative and statistically significant effect on banking sector's stock returns in Nigeria such that 1% increase in positive cases of coronavirus will result in about 86% decrease in banking sector's stock returns in Nigeria. Besides CNNP, all other indicators of coronavirus (CNNR and CNNF) do not have significant effect on banking sector's stock returns in Nigeria. It can be inferred from this regression analysis that, every new confirmed (positive) cases of coronavirus in Nigeria leads to a significant decline in the returns of the banking sector's stock in the country.

Table 6: OLS Regression Results

<i>Dependent Variable: LBSRN</i>				
<i>Variable</i>	<i>Coefficient</i>	<i>Std. Error</i>	<i>t-Statistic</i>	<i>Prob.</i>
LCNNP	-0.857557	0.442634	-1.937396	0.0766*
LCNNR	0.356475	0.259192	1.375331	0.1942
LCNNF	0.506185	0.370214	1.367278	0.1966
Constant	4.528650	1.348538	3.358192	0.0057
R-squared	0.253795	Mean dependent var		2.189613
Adjusted R-squared	0.067244	S.D. dependent var		0.924241
S.E. of regression	0.892626	Akaike info criterion		2.823020
Sum squared resid	9.561372	Schwarz criterion		3.016167
Log likelihood	-18.58416	Hannan-Quinn criter.		2.832910
F-statistic	1.360456	Durbin-Watson stat		1.835170
Prob(F-statistic)	0.301699			

Source: Authors' computation.

Post-Estimation Diagnostic Tests

The estimated regression model is investigated further to ensure that the underlying assumptions are not expressly violated. Violations of the underlying assumptions of the model can dampen the degree of reliance that can be placed on the results thereof. Specifically, the post-estimation diagnostics conducted are autocorrelation, normality, heteroscedasticity, regression equation specification error and model stability tests and the results are presented in this sub-section.

Autocorrelation Test

The regression model is diagnosed for any problem of serial correlation of residuals via the Ljung-Box Q -statistics approach. The Q -statistic is based on the null hypothesis on no autocorrelation up to certain lag order. The Correlogram- Q -statistics presented in Table 7 show that even up till lag order 12 (with p-value 0.630) we cannot reject the null hypothesis of no autocorrelation in the model. By this result, we can say that the estimated regression model is free from serial correlation problem.

Table 7: Correlogram- Q -statistics

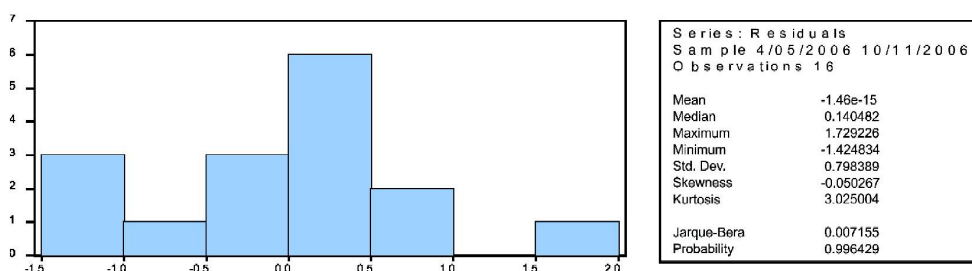
<i>Autocorrelation</i>	<i>Partial Correlation</i>	<i>AC</i>	<i>PAC</i>	<i>Q-Stat</i>	<i>Prob</i>
. .	. .	1 0.026	0.026	0.0126	0.911
. * .	. * .	2 0.143	0.142	0.4329	0.805
. .	. .	3 -0.043	-0.051	0.4735	0.925
. * .	. * .	4 -0.125	-0.147	0.8498	0.932
. * .	. * .	5 -0.139	-0.124	1.3529	0.929
. * .	. * .	6 -0.171	-0.136	2.1947	0.901
. ** .	. ** .	7 -0.288	-0.280	4.8424	0.679
. .	. .	8 0.022	0.028	4.8601	0.772
. .	. * .	9 0.048	0.088	4.9555	0.838
. * .	. .	10 0.096	0.017	5.3970	0.863
. .	. * .	11 0.025	-0.104	5.4332	0.908
. ** .	. * .	12 0.247	0.190	9.8353	0.630

Source: Authors' computation.

Normality Test

Normality, a key assumption of the OLS regression is examined in this via the Normality-Histogram Plot as depicted in Figure 1. The Jarque-Bera (0.007155) has a very high p-value, which implies that we cannot reject the null hypothesis of

Figure 1: Normality-Histogram Plot



Source: Authors' computation.

normality of the model even at 10%. This position is also reinforced by the kurtosis of roughly 3 and skewness of about 0. It clear from these results that the regression model is normally distributed.

Heteroscedasticity Test

The model is also investigated for any evidence of problem of heteroscedasticity using Harvey test of heteroscedasticity. The results of the test (in Table 8) indicate that the null hypothesis of homoscedasticity cannot be rejected even at 10% considering the p-values of the F-statistic (0.1491), Obs*R-squared (0.1346) and Scaled explained SS (0.1209), which are higher than 10% each. It can therefore be inferred from this test that the estimated regression model is homoscedastic.

Table 8: Heteroscedasticity Test (Harvey)

F-statistic	2.134871	Prob. F(3,12)	0.1491
Obs*R-squared	5.567833	Prob. Chi-Square(3)	0.1346
Scaled explained SS	5.815941	Prob. Chi-Square(3)	0.1209

Source: Authors' computation.

Regression Equation Specification Error Test(RESET)

The regression model is also examined in terms of its specification, to avoid misspecification of its functional form. The Ramsey Regression Equation Specification Error Test (RESET) test is presented in Table 9. The result shows that the model is correctly specified. This is evidenced by the very high p-value of the F-statistic (0.9569) and Likelihood ratio (0.9468), which led to the non-rejection of the null hypothesis of no of specification error in the estimated regression model.

Table 9: Ramsey RESET Test

Test statistics	Value	Df	Probability
F-statistic	0.003060	(1, 11)	0.9569
Likelihood ratio	0.004451	1	0.9468

Source: Authors' computation.

Model Stability Tests

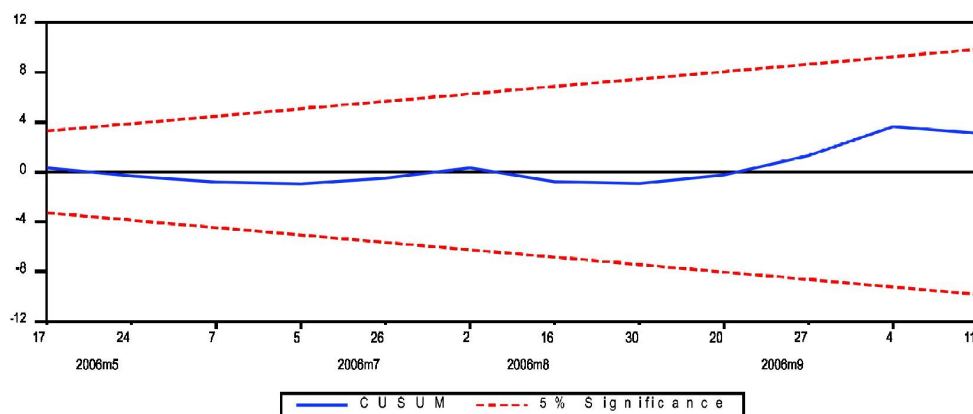
The extent to which the model is structurally stable over time as well the stability of the individual coefficients of the model are determined using the Cumulative sum of recursive estimate (CUSUM) test and Recursive Coefficients stability test respectively.

The model's CUSUM graph as presented in Figure 2 reveals that the plot of the test does not gyrate outside of the upper and lower critical boundaries. This implies that the model's parameter is stable structurally over the study period. In the same vein, the Recursive Coefficients stability test graph presented in Figure 3 attest to the stability of individual coefficients in the estimated multiple regression model.

Test of Hypotheses

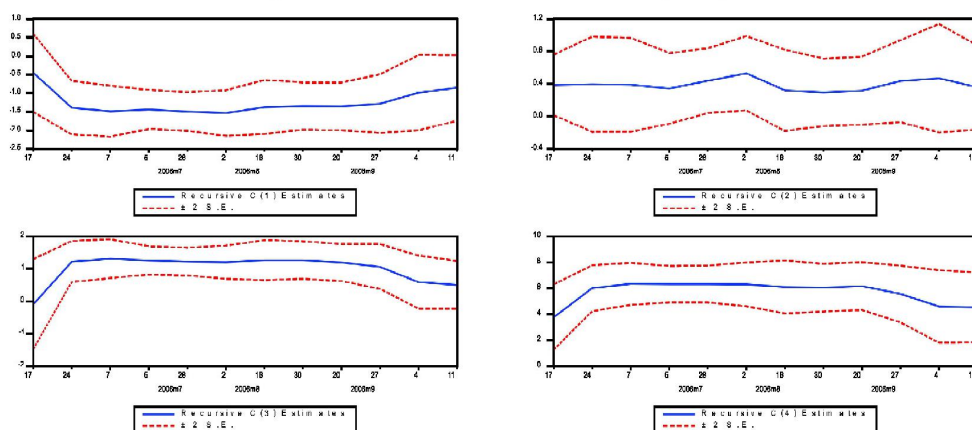
The hypotheses testing in this study is carried out using the Wald Test (Coefficient Restrictions), which computes a test statistic based on the unrestricted regression.

Figure 2: CUSUM Stability Test



Source: Authors' computation (2020)

Figure 3: Recursive Coefficients Stability Graph



Source: Authors' computation.

H₀1: There is no significant relationship between COVID-19 positive cases and banking sector's stocks returns in Nigeria

The result of the Wald test of hypothesis one presented in Table 10 indicates a single linear restriction such that the F -statistic and Chi-square statistics are identical in coefficient (3.753502), with their respective p -value of 0.0766 and 0.0527. These show that we can decisively reject the null hypothesis of no significant relationship between COVID-19 positive cases and banking sector's stocks returns in Nigeria. We can therefore establish that there is a significant relationship between COVID-19 positive cases and banking sector's stocks returns in Nigeria.

Table 10: Wald Test of Relationship Between COVID-19 Positive Cases and Banking Sector's Stocks Returns in Nigeria

<i>Test Statistic</i>	<i>Value</i>	<i>Df</i>	<i>Probability</i>
F-statistic	3.753502	(1, 12)	0.0766
Chi-square	3.753502	1	0.0527
Null Hypothesis: C(1)=0			
Null Hypothesis Summary:			
<i>Normalized Restriction (= 0)</i>	<i>Value</i>	<i>Std. Err.</i>	
C(1)	-0.857557	0.442634	
Restrictions are linear in coefficients.			

Source: Authors' computation.

H₀2: There is no significant relationship between COVID-19 recovery cases and banking sector's stocks returns in Nigeria

The result of the Wald test of hypothesis two reported in Table 11 indicates that the *F*-statistic and Chi-square statistics are identical in coefficient (1.891537) and their respective *p*-values are 0.1942 and 0.1690. Therefore, we cannot reject the null hypothesis of no significant relationship between COVID-19 recovery cases and banking sector's stocks returns in Nigeria. This suggests that there is no significant relationship between COVID-19 recovery cases and banking sector's stocks returns in Nigeria in the period under review.

Table 11: Wald Test of Relationship Between COVID-19 Recovery Cases and Banking Sector's Stocks Returns in Nigeria

<i>Test Statistic</i>	<i>Value</i>	<i>Df</i>	<i>Probability</i>
F-statistic	1.891537	(1, 12)	0.1942
Chi-square	1.891537	1	0.1690
Null Hypothesis: C(2)=0			
Null Hypothesis Summary:			
<i>Normalized Restriction (= 0)</i>	<i>Value</i>		<i>Std. Err.</i>
C(2)	0.356475	0.259192	
Restrictions are linear in coefficients.			

Source: Authors' computation.

H₀3: There is no significant relationship between COVID-19 fatal cases and banking sector's stocks returns in Nigeria

Based on Wald test result in Table 12, the single linear restriction in the test specification also brings about identical coefficient for *F*-statistic and Chi-square statistics (1.869450), with their respective *p*-value standing at 0.1966 and 0.1715. This implies that we cannot reject the null hypothesis of no significant relationship between COVID-19 fatal cases and banking sector's stocks returns in Nigeria. With this result, we can therefore say that there is no significant relationship between COVID-19 fatal cases and banking sector's stocks returns in Nigeria in the period of study.

Table 12: Wald Test of Relationship Between COVID-19 Fatal Cases and Banking Sector's Stocks Returns in Nigeria

<i>Test Statistic</i>	<i>Value</i>	<i>Df</i>	<i>Probability</i>
F-statistic	1.869450	(1, 12)	0.1966
Chi-square	1.869450	1	0.1715
Null Hypothesis: C(3)=0			
Null Hypothesis Summary:			
<i>Normalized Restriction (= 0)</i>	<i>Value</i>	<i>Std. Err.</i>	
C(3)	0.506185	0.370214	

Restrictions are linear in coefficients.

Source: Authors' computation.

In testing hypotheses 4, 5 and 6, the results of the OLS regression reported in Table 6 are employed.

H₀ 4: COVID-19 positive cases do not have significant effect on banking sector's stocks returns in Nigeria

Considering the regression results (in Table 6) showing the coefficient of -0.857557 and an associated p-value (0.0766) for log of COVID-19 positive cases (LCNNP), it can therefore be asserted COVID-19 positive cases have a negative effect on banking sector's stocks returns in Nigeria at 10% level of significance. With this result, we can decisively reject the hypothesis that COVID-19 positive cases do not have significant effect on banking sector's stocks returns in Nigeria. This means that COVID-19 positive cases have significant effect on banking sector's stocks returns in Nigeria.

H₀ 5: COVID-19 recovery cases do not have significant effect on banking sector's stocks returns in Nigeria

The regression results reveal the coefficient and p-value of COVID-19 recovery cases (LCNNP) to be 0.356475 and 0.1942 respectively. Thus, it is shown here that COVID-19 recovery cases have positive effect on banking sector's stocks returns in Nigeria but it is not significant statistically. By this we therefore cannot decisively reject the null hypothesis that COVID-19 recovery cases do not have significant effect on banking sector's stocks returns in Nigeria. This suggests that COVID-19 recovery cases not have significant effect on banking sector's stocks returns in Nigeria in the period of investigation.

H₀6: COVID-19 fatal cases do not have significant effect on banking sector's stocks returns in Nigeria

Finally, the regression results indicate COVID-19 fatal cases to be positively signed with a coefficient of 0.506185, with an associated high p-value of 0.1966. This implies that we cannot decisively reject the null hypothesis that COVID-19 fatal cases do not have significant effect on banking sector's stocks returns in Nigeria. This implies that COVID-19 fatal cases have only a suggestive but non-significant effect on banking sector's stocks returns in Nigeria in the study period.

DISCUSSION OF FINDINGS

This study investigates the relationship and impact of coronavirus on stock returns of the Nigerian banking sector. The study investigated three measures of coronavirus, namely, new confirmed cases, new discharged cases and new fatal cases, and their effect on stock returns in the Nigerian banking sector. As a measure of relationship, Pearson correlation test was employed to establish the strength and direction of relationship between each of the three indicators of coronavirus and banking sector's stock returns.

The results of the correlation analysis indicate that coronavirus positive(confirmed) cases have a coefficient of -0.275356. This implies that coronavirus confirmed case has a weak negative relationship with banking sector's stock returns in Nigeria. Similarly, coronavirus discharged cases correlation coefficient is -0.101201, which suggests that a weak negative correlation exists between discharged cases and banking sector's stock returns in Nigeria. Surprising, the fatal cases of the virus with a correlation coefficient of 0.065713, portrays a positive, though very weak, correlation of fatal cases of coronavirus and banking sector's stock returns in Nigeria.

The regression results reveal that coronavirus positive cases (CNNP) is negatively signed with a coefficient of -0.857557 and has a probability value of less than 10%. This means that coronavirus positive cases have negative and statistically significant effect on banking sector's stock returns in Nigeria such that 1% increase in positive cases of coronavirus will result in about 86% decrease in banking sector's stock returns in Nigeria. The coefficient of 86% is a very high coefficient as against the weak correlation coefficient provided by the Pearson correlation test. Interestingly, both correlation and OLS results agree to the fact that coronavirus new positive (confirmed) cases is negatively related to and impactful on banking sector's stock returns in Nigeria. The result of the Wald test is also in line with this result when it

is established from the test that we can decisively reject the null hypothesis of no significant relationship between COVID-19 positive cases and banking sector's stocks returns in Nigeria.

Moreover, besides CNNP, all other indicators of coronavirus (CNNR and CNNF) do not have significant effect on banking sector's stock returns in Nigeria. Specifically, coronavirus new recovery cases have a coefficient and p-value of 0.356475 and 0.1942 respectively. This implies that, coronavirus new recovery cases have positive suggestive but non-significant effect on banking sector's stock returns in Nigeria. This result is partly in consonance with a priori expectation of a positive significant influence of discharged cases of coronavirus on stock returns in the Nigerian banking sector. The result of the Wald test is also in line with this result when it is established from the test that we cannot reject the null hypothesis of no significant relationship between COVID-19 recovery cases and banking sector's stocks returns in Nigeria.

Furthermore, OLS results indicate coronavirus new fatal cases to have a coefficient of 0.506185 with an associated high p-value of 0.1966. This means that that coronavirus fatalities have a surprising positive but non-significant influence on banking sector's stocks returns in Nigeria. This result is not in line with theoretical expectation of a negative significant effect of coronavirus fatalities on stock returns. The result of the Wald test is also in line with this result when it indicates that we cannot reject the null hypothesis of no significant relationship between COVID-19 fatal cases and banking sector's stocks returns in Nigeria.

SUMMARY OF FINDINGS

The findings of this study are summarised below.

1. Coronavirus confirmed cases have a weak and negative relationship with banking sector's stock returns in Nigeria;
2. A weak negative correlation exists between coronavirus discharged (recovery) cases and banking sector's stock returns in Nigeria;
3. There is a positive but very weak correlation between fatal cases of coronavirus and banking sector's stock returns in Nigeria;
4. Coronavirus positive cases have negative and statistically significant effect on banking sector's stock returns in Nigeria;
5. Coronavirus discharged (recovery) cases have positive but non-significant effect on banking sector's stock returns in Nigeria;

6. Coronavirus fatal cases have a surprising positive but non-significant influence on banking sector's stocks in Nigeria.

CONCLUSION AND RECOMMENDATIONS

In this study, we have been able to establish empirically that a negative and weak correlation exists between coronavirus and banking sector's stock returns in Nigeria. Similarly, it is submitted in this study that every new confirmed (positive) cases of coronavirus in Nigeria leads to a significant decline in the returns of the banking sector's stock in Nigeria. It can therefore be that coronavirus has debilitating effect on the banking sector's stock returns in Nigeria.

It is therefore suggested that investors should focus on portfolio rebalancing which is skewed towards other securities other than stocks but more fixed-income securities (such as bonds, debentures) as well as real-estate investment. Empirical studies in the future should attempt including other variables such as market sentiment, investors emotions and psychology, and macroeconomic variables (such interest rate, inflation rate, exchange rate) in modelling the effect of coronavirus on sectorial stock returns. This study uses Nigerian data sets, panel of countries should also be examined as well as cross-countries comparative analysis of the effect of the novel coronavirus and banking sector's stock returns as well as other sectors of the economy.

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