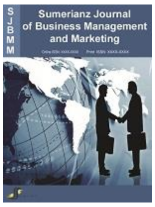
Sumerianz Journal of Business Management and Marketing, 2021, Vol. 4, No. 2, pp. 35-45
ISSN(e): 2617-0175, ISSN(p): 2617-1724
Website: https://www.sumerianz.com
DOI: https://doi.org/10.47752/sjbmm.42.35.45



Original Article Open Access

Crude Oil Price Shock and the Nigerian Stock Market Performance in the Face of Covid-19 Pandemic Evidence from ARDL & Granger Causality Approach

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Article History

Received: February 19, 2021

Revised: April 10, 2021

Accepted: April 15, 2021

Published: April 18, 2021

Abstract

The study examined empirically the linear relationship between crude oil price shock and the Nigerian stock market performance, with the main objective of ascertaining the impact of the recent sharp decline in crude oil prices on stock market performance in the face of the global socio-economic challenge posed by COVID-19 pandemic. It used monthly time series data from the central bank of Nigeria (CBN) website (www.cbn.gov.ng) from 2017-2020 This period was chosen to capture the effects of changes in oil price on the performance of the Nigerian stock market within the context of the global economic challenges due to the COVID-19 pandemic. The auto-regressive distributed lag ARDL approach has been applied in the model specification and data analysis for the study. The results of the ARDL in both the short and long run revealed that the recent crude oil price shock has a significant impact on stock market performance in Nigeria. The results of the granger causality test also reveal a unidirectional causality from crude oil price to stock market performance with a piece of evidence from the current decline of global crude oil prices from December 2019 to April 2020. The study, therefore, suggests the need for the Nigerian capital market to continue to pursue with vigor the implementation of the capital market master plan in the hope that a more developed capital market should be able to absorb external shocks such as those arising from crude oil price fluctuations.
Keywords: Nigerian stock market; COVID-19; Crude oil; ARDL.

1. Introduction

Oil plays an important role in the global economy. All countries need oil to meet the needs of their manufacturing industries, transports, and electricity. Given the crucial role of oil as raw material, all non- oil-producing countries have to import oil to meet their domestic oil needs. This is also the case for oil-producing countries that have limited production. In addition to the effect of a limited supply of oil and OPEC cartel, demands for imports of world oil can affect the price of world oil (Moebert, 2007). Changes in oil prices can therefore affect the economy of a country (Cuepers and Smeets, 2015). Higher oil prices can influence the economy in the forms of transfers of wealth from oil-consuming countries to oil-producing countries, increase the cost of producing goods and services, increase inflation and its effect on financial markets and consumer confidence (Nandha and Faff, 2008).

Recently, market demands, geographical location, and reserves available determine the prices of oil (Hicks, 1969; Huang *et al.*, 1996; Levine, 1997; Schumpeter, 1972). In recent times, several studies are about the effect of oil prices on the economic and financial sector but the effects of oil prices on stock prices are more or less taken into account.

The International Monetary Fund (2000) concerning the relationship between oil prices and stock markets argues that oil price shocks affect stock markets because of their connection in a country's economic activity, monetary policy, and corporate income. Huang *et al.* (1996), opines that there are several ways the economic levels of the commodity used and the expected cash flows of most companies are reliant on oil prices price shocks, the trade balance of a country, and the inflation rate. Asaolu and Ilo (2012), states that the impact of oil prices on the stock market depends on the firms listed on the stock market of the country.

Redoules (2009), observe the relationship between oil price and stock markets during the financial crisis in the United States (US) and found out that the economic recession led to a decline in oil consumption. According to Dupuis and Anjou (2008), the financial crisis of 2008 has led to the withdrawal of capital from the oil market.

Over the years, the price of crude oil has been unstable. It rose from US$25 per barrel in 2002 to US$55 in 2005, achieving a peak of US$138 in mid-2008. From that level, it underwent a precipitous decline, falling to US$30 in January 2016 before beginning to rise somewhat sluggishly to stabilize around US$57 per barrel by the third quarter of 2017 (CBN, 2017). The fluctuations in oil price observed during the period have been attributed to

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demand and supply shocks in the international crude oil market (Hamilton, 1983; Loruss and Pieroniy, 2015). Most recently, the demand for oil the global began falling in the first quarter of 2020 due to the COVID-19 pandemic that ravaged the global economy (Paulo and Andrea, 2020). Oil consumption averaged 94.4 million barrels per day in 2019, reduced to 5.6 million barrels per day 1n 2020. Prices of crude oil fell to as low as $11.26 per barrel in April 2020 and a forecasted annual percentage change of -70.67% (Paulo and Andrea, 2020).

The likely effect of oil shocks on real economic activity has stimulated the interest of researchers in exploring its linkage with stock market performance. Numerous studies such as Ramos and Velga (2010), Buthaina *et al.* (2017) argued that the relationship is asymmetric, implying that the effect of an oil price decrease on stock performance significantly differs from that of the oil price increase. However, other scholars such as Dhaoui and Khraief (2014), Uwubanmwen and Omorokunwa (2015), and Abraham (2016) found that the relationship is linear or symmetric, which assumes that the increase and decrease in oil prices are equal in opposite directions.

The piece of literature on the impact of oil price shocks on stock performance is inconclusive. While some authors (e.g. Ani *et al.* (2014)) argued that oil price fluctuations do not influence stock returns, others (e.g. Hamma *et al.* (2014); Olufisayo (2014) and Abraham (2016) maintained that oil price changes affect stock market performance. In contrast, Adebiyi *et al.* (2009); Basher and Sadorsky (2006); Akinlo and Apanisile (2014) provided empirical evidence that oil price shocks affect stock markets of only oil-exporting countries but not those of non-oil exporting economies.

In the case of Nigeria, oil price shocks are reckoned to be among the factors affecting stock market performance because of the predominance of crude oil both as a source of government revenue and foreign exchange earnings. The record has shown that the country's all-share index (ASI), which measures stock market performance has persistently declined from 65,652.38 in February 2008 to less than 30,000 in December 2012. It, however, increased from 31,853.19 to 41,210.10 between January 2013 and September 2014, after which it underwent a steady decline, plunging to less than 30,000 from October 2015 to the end of May 2017 (CBN, 2017). Also, the most recent records have shown that Nigeria's all-share index (ASI) declined from 28,843.530 in January 2020 to 21,300.470 in march 2020 this happens due to the COVID-19 pandemic that crushed crude oil prices during the same period (CEIC, 2020). It is clear from the above picture that stock market performance (as measured by the country's all-share index) has tended to exhibit a similar pattern of movement with that of crude oil price, tending to fall when crude oil falls, and to recover when it recovers (Basher and Sadorsky, 2006; Hamilton, 1983; Zhu *et al.*, 2016).

Given the need to offer some policy suggestions on ways to reduce the vulnerability of the stock market to external shocks, especially those emanating from oil price declines, several studies have assessed the relationship between stock market performance and oil prices (Abraham, 2016; Adebiyi *et al.*, 2009; Asaolu and Ilo, 2012; Mordi and Adebiyi, 2010; Okere and Ndubuisi, 2017; Olufisayo, 2014; Uwubanmwen and Omorokunwa, 2015). However, to the best of my knowledge, the existing literature has not captured the recent period between December 2019 and May 2020, in which the COVID-19 seriously affected crude oil prices leading to a decline of the all-share index (ASI) in the Nigerian Stock Market.

The objective of this paper is to examine the effect of oil price shocks on stock market performance in Nigeria using monthly data for the period 2017-2020. The paper adopted the autoregressive distributed lags (ARDL) model by Pesaran *et al.* (2001) for its empirical analysis, to assess the recent impact of crude oil price crash on the Nigerian stock market due to the COVID-19 pandemic. This has enabled the paper to improve on the existing literature that has not captured the most recent period. The findings of this paper would be of immense importance to the Nigerian government, and the apex regulatory body in charge of the capital market, the Securities and Exchange Commission of Nigeria (SEC). The paper is expected to be beneficial also to the private sector and even the academia seeking to understand the oil price impact on the stock market. To achieve the foregoing, the rest of the paper is structured into four sections. After reviewing the literature in section two, the paper discusses the methodology in section three. Section four presents results and discussion while section five offers some concluding remarks.

2. Literature Review

The review of literature is presented in three subsections covering theoretical, empirical literature, and literature gap.

2.1. Theoretical Literature

Efficient Market Hypothesis (EMH) is one of the most famous roots upon which many asset pricing models stand. It states that the market price of an asset in an efficient market reflects the best assessment of its value at a given time (Porras, 2016). It further added that the current price of an asset reflects (incorporates) both the current and future expected information that needs to be known about the asset as well as its fundamentals (set of variables that drives changes in the value of the underlying asset in question). One implication of EMH is that it is impossible or difficult for an investor to beat the market on a risk-adjusted basis or through arbitrage, consistently because the prices already reflect the entire information available relative to the asset in question (Porras, 2016;2017). By this theory (EMH), for example, in stock markets, stock prices follow a random walk and are unpredictable; thus, only unanticipated new information can change the underlying asset valuations (Shiller, 2015). This is because, theoretically, in an efficient market, information is costless; investors are rational and have homogenous expectations as well as equal access to all available information. Thus, asset prices reflect their fundamentals and cannot deviate from their equilibrium value, as such bubbles cannot occur since they are deviations from equilibrium (Diba and Grossman, 1988; Fama, 1965b; Matthias, 1997; McQueen and Thorley, 1994).

A shock could be defined as a sudden event beyond the control of economic authorities that has a significant impact on the individual or economy (see, Varangis *et al.* (2004)). Shocks are different from volatility because of their degree, and so shocks may be classified as instances of extreme volatility. A shock could either be positive or negative depending on whether its effect is beneficial or detrimental to the individual or economy. Hamilton (2003) defined an oil price shock to be a nominal net oil price increase that is statistically higher than the highest oil price during the previous three years. If a positive oil price shock follows a greater decline in oil prices, then it will have little effect on the economy. Using this definition, Kilian (2006) finds that there are major nominal oil price shocks in 1973/74, 1979/80, 1981, 1990/91, 2000/01, 2002/03, and 2004. Additionally, he found that there were minor nominal oil price shocks in 1975/76, 1989/90, and 1996/97. While many of these events can be associated with exogenous political events, not all of them are. This is not only true for the minor nominal oil price shocks but also the oil price shock in 2000/01 and 2004. While political events in OPEC countries may be a good indicator of a forthcoming oil price shock, it does not hold for every case.

A stock market otherwise known as shares entails ownership claims on a business and also is an aggregation of buyers and buyers. Stocks may include privately traded stocks such as the shares sold by private companies in the form of equity or crow funding platforms and the securities listed on a public stock exchange (Neal and Larry, 2005). The Nigerian stock exchange (NSE) is regarded as the largest stock market that aids in the development of Africa's financial markets. The NSE was established in 1960 and it is licensed under the investment and security act (ISA) and the supervision of the Security and Exchange Commission (SEC) of Nigeria. The NSE all-share index ASI is a total market (broad-base) index, reflecting a total picture of the behaviors of the common shares quoted on the Nigerian stock exchange. It is calculated daily, showing how the price moved. It started in January 1984, the base year, with a value of 100, and has now risen beyond the 6,000 marks.

2.2. Empirical Literature

The investigation on the relationship between oil price and stock market activities is not a new area of research but the impact of oil price shocks (in terms of the causes) has been receiving increasing attention from scholars as a result of its importance. Numerous studies have been carried out to examine the effects of oil price shocks on stock market performance in both developed and developing countries. Ramos and Velga (2010), consider the effect of oil shocks on stock returns for a sample of 43 developed and developing countries using asymmetric cointegration technique. For the sub-sample of developed countries covered in their study, their results indicate that an increase in oil prices tends to depress international stock markets, while decreases do not necessarily increase the returns. In contrast, their results show that for developing countries in the sample, stock market returns have tended to be insensitive to oil price variations.

Sim and Zhou (2015), study the relationship between oil prices and US equities by proposing a novel quantile-on-quantile approach to construct estimates of the effect that the quantiles of oil price shocks have on the quantiles of the US stock return. The results of the study show that large, negative oil price shocks can affect US equities positively when the US market is performing well and that negative oil price changes could influence the US stock market. The results of the study also show that the impact of positive oil price shocks is weak. The implication is that the relationship between oil prices on the US equities is asymmetric.

Dhaoui and Khraief (2014), examine whether oil price shocks have an impact on stock market returns empirically using monthly data for eight developed countries for the period from January 1991 to September 2013. The authors observe strong negative correlations between oil price and stock market returns in seven of the selected countries. Oil price changes are observed to be having a non-significant effect on the stock market of Singapore. However, concerning the volatility of returns, the changes in oil prices are seen to be significant for six markets and without much effect on the others.

Su-fang *et al.* (2013) examine the nonlinear dynamic relationship between oil price and stock markets for a sample of eight Asia Pacific economies. The results suggest evidence of asymmetric oil- stock market nexus in South Korea and Malaysia. However, there are no asymmetric adjustments between oil price and stock markets in Japan, Australia, South Korea, India, Indonesia, and Singapore.

Using a sample of developing countries, Akinlo and Apanisile (2014) examines the impact of oil price volatility on economic growth in sub- Saharan Africa using panel analysis. Their results show that oil price volatility tended to exert a positive and significant effect on economic growth for oil-exporting countries but turned out to be insignificant for non-oil-producing countries. Similarly, Hamma *et al.* (2014) find out that not only that there exist a relationship flowing from oil volatility to stock market performance in Tunisia but also that the conditional volatility of the stock market depends on its past variation and that of the shocks on the oil prices. In contrast, Buthaina *et al.* (2017) find that Jordan's stock returns tend to react to oil price variations asymmetrically. However, the study finds out that compared to their declines, oil price increases have a larger impact on stock returns.

For Nigeria, Adebiyi *et al.* (2009) report that real stock returns tend to respond immediately and negatively to oil price shocks in the country. Further, their Granger causality test shows evidence of causality running from oil price shocks to stock returns. Similarly, Olufisayo (2014) supports this finding of a unidirectional relationship between oil price shocks and stock returns. In the same vein, Asaolu and Ilo (2012) find out that in the long-run oil price decrease has a negative and significant effect on Nigerian stock market returns. Adebiyi *et al.* (2009), have also reaffirmed these findings.

In contrast, Uwubanmwen and Omorokunwa (2015) find out that oil price has a positive and significant effect on Nigerian stock performance. Also, recent studies by Abraham (2016) and Okere and Ndubuisi (2017), using the autoregressive distributed lag (ARDL) model contradicted the negative findings, reporting that oil prices are positively related to the performance of the Nigerian stock market and economic activities.

2.3. Summary of Gaps in the Literature/Critics of the Past Studies

From the review, it can be concluded that there are mixed findings on the impact of crude oil price shocks on stock market performance. Furthermore, none of the existing studies captured the relationship between crude oil price shocks and stock market performance within the context of the recent global economic challenge posed by the COVID-19 pandemic from 2019-2020.

3. Methodology

3.1. Introduction

This section comprised of a theoretical framework on which the study is based upon, method of data collection, sources, and nature of data for the study followed by model specification and method of data analysis and lastly diagnostic tests.

3.2. Theoretical Framework for the study

The stock market crash of 1929 made discounted cash flow analysis to gain population because of its violation method for stocks. In 1930, Irvin fisher in his population book knows as *the theory of interest*, and John Bur Williams in his famous work on *the theory of investment value* coined the discount cash flow (DCF) method in modern economic terms (Damodaran and Aswath, 1996).

Theoretically, oil price can affect the financial market as explained in the Discount Cash Flows (DCF) approach. According to this approach, stock prices are calculated as

$$P = E(c)/E(r) \quad \text{...(1)}$$

Where P indicates the stock price, C as the cash flow, r is the discount rate and E ( ) refers to the expectation operator. The stock return R can be realized as:

$$R = d(E(c))/E(c) - d(E(r))/E(r) \quad \text{...(2)}$$

Where d ( ) is the differentiation operator. Therefore, the stock returns R is determined by the systematic movements in expected cash flows and discount rates and these two variables can be affected by the oil prices in different ways. Oil prices can affect the expected cash flows as oil is the commodity input used in the production of many goods. Therefore, changes in oil prices may lead to changes in production costs in the same direction but the effect on the world economy stock prices is in the opposite direction. However, the effect of oil price on specific stock price is determined by the dependency on oil, i.e. whether the company is a net producer or net consumer of oil (Huang *et al.*, 1996)

3.3. Source of Data

The study employed monthly time series data from June 2017 to May 2020 for its empirical analysis. The data were all sourced online from the website of the Central Bank of Nigeria (www.cbn.gov.ng). This period was chosen to capture the impact of changes in oil price on the performance of the Nigerian stock market within the context of the global economic challenges due to the COVID-19 pandemic.

3.4. Model Specification

Following Pesaran *et al.* (2001) and Ibrahim (2015), the ARDL model for the analysis of the effect of oil price shock on stock performance is specified as follows:

$$ASI_t = \beta_0 + \beta_1 OP_t + \beta_2 MPR_t + \varepsilon_t \quad \text{...(3)}$$

Where ASI denotes all share index, which is a proxy for Nigerian stock market performance. OP stands for the crude oil price, MPR represents monetary policy rate while: $\beta_{1,} and \beta_2$ are the long-run parameters of the independent variables in the model.

3.4.1. The ARDL Model

To capture both the short run and long run linear effect of oil price shock on Nigerian stock market performance, equation (4) is framed in an ARDL setting along the line of Pesaran and Shin (1999) and Pesaran *et al.* (2001) as follows:

$$\Delta ASI_t = \beta_o + \beta_1 ASI_{t-1} + \beta_2 OP_{t-1} + \beta_3 MPR_{t-1}$$

$$+ \sum_{i=1}^{n1} \varphi i \Delta ASI_{t-1} + \sum_{i=0}^{n2} \theta_2 \Delta LOP_{t-i} + \sum_{i=0}^{n3} \theta_3 \Delta LMPR_{t-i} + \varepsilon_t \quad \text{..... (4)}$$

φi = Represents the autoregressive parameter

$\theta_2\theta_3$ = Is the coefficient of the short-run effects of crude oil price shocks and monetary policy rates on stock performance

$\beta_1, \beta_2, \beta_3,$ = Is the coefficient of the long-run effects of crude oil price shocks and monetary policy rates on stock performance.

3.4.2. Error Correction Model (ECM)

Upon establishing ARDL cointegration between $LASI, LOP, andLMPR$, the error correction model (ECM) for the ARDL model is specified as follows:

$$\Delta LASI_t = \varpi_0 + \sum_{i=1}^{n1} \varpi_1 \Delta LASI_{t-i} + \sum_{i=0}^{n2} \varpi_2 \Delta LOP_{t-i} + \sum_{i=0}^{n3} \varpi_3 LMPR_{t-i} +$$

$$\sigma ECM(-1) + \psi_t \text{ .... (5)}$$

Where: ϖ_0 is the constant term while $\varpi_1, \varpi_2 and \varpi_3$ are short-run coefficients while σ is the coefficient on one-period lagged error correction term, ECM_{t-1} , which represent the long-run dynamics of all share index, oil prices, and monetary policy rate.

3.4.3. Diagnostic Tests

To ensure that the model used in cointegration analysis is robust, this study employs several diagnostic tests. For serial correlation, the Breusch-Godfrey test is used. The Breusch-Godfrey test is used in place of the popular Durbin-Watson test because it is applicable to use when lagged dependent variables are present in the model and it can take into account higher orders of serial correlation (Asteriou and Hall, 2006). Other diagnostic tests conducted include Descriptive Statistics, Normality Test, Heteroskedasticity test, Ramsey reset test, CUSUM & CUSUM of square tests.

4. Results and Discussions

4.1. Descriptive Statistics Results

Table-4.1. Descriptive Statistics Results

	LASI	LOP	LMPR
Mean	10.36215	3.613702	4.230881
Median	10.34353	3.575190	4.843793
Maximum	10.69972	4.601865	5.940697
Minimum	9.966484	2.668616	1.433083
Std. Dev.	0.184609	0.632916	1.324212
Skewness	0.002255	0.178352	-0.641217
Kurtosis	2.239061	1.578042	2.137284
Jarque-Bera	0.820319	3.044701	3.384297
Probability	0.663545	0.218198	0.184124
Sum	352.3132	122.8659	143.8499
Sum Sq. Dev.	1.124655	13.21921	57.86670
Observations	34	34	34

Source: Authors' Computations from E-views 10

The above table displays the summary statistics of oil price (LOP), all share index (LASI), and monetary policy rate (LMPR). Data transformation has been done using the log function as suggested by Granger (1969), Fama (1965a), Moore and Vamvakidis (2008) to bring in the uniform unit stability and reduction of distortions. The standard deviation of all variables shows a minimum variation from their mean ranging from 0.18 to 1.32. This signifies that the deviation from the mean of all the variables is minimum and also makes them have a good explanatory power of the behavior of the dependent variable all-share index (ASI). All the data series have shown a positive mean value, this justifies the upward trend of time series in which all share index (LASI) has recorded the highest mean value and (LOP) has observed the lowest mean value among the select variables. All of the selected data series have observed the skewness values to be less than one. Monetary policy rate (LMPR) have shown a negative skewness value that illustrates left side affinity with the longer left tail as compared to right tail, while other data series of the all-share index (ASI), and oil price (OP) have displayed positive skewness indicating longer right side skewed tails against the left side tail. All data series LASI, LOP, and LMPR have a platykurtic curve with a flat top having a kurtosis value being less than 3.

4.2. Stationary Test Results

Table-4.2. *Unit Root Test Results*

VARIABLE	ADF TEST LEVEL	RESULTS 1ST DIFF.	PP TEST LEVEL	RESULTS 1ST DIFF.
LASI		-2.857712***		-4.783200***
LOP	-6.521582*		-1.366242*	
LMPR		-7.247426***	-3.491781*	

Source: Authors' Computations from E-views 10
Note:
*** Show significance at the 1% level
** Show significance at the 5% level
* Show significance at the 10% level

The above table reports the results of Augmented Dickey-Fuller (ADF) and the Philip Perron (PP) tests respectively for the (ARDL) model employed for the study. At level the null hypothesis of unit root is rejected for LOP at 10%, while the null hypothesis of unit root is rejected at first difference for LASI and LMPR at 1% respectively for the ADF test. On the other hand, the results of the Philip Perron test shows that variables LOP and LMPR are stationary at level or integrated at the order I (0) at 10% respectively, while LASI is stationary at first difference I (1) at 1%. After proving that all the variables are stationary at either I (0) or I (1) and none of the variables are I (2), the next step is to test the existence of cointegration among the variables of the study. According to Elbourne (2007), Bernanke (2008), and Blanchard and Riggi (2009), to test for the existence of cointegration all variables employed are required to be stationary. Consequently, this study assesses the stationary of the variables by conducting the ADF and PP unit root test.

4.3. ARDL Bounds Test for Cointegration Results

Table-4.3. ARDL Bounds Test for Cointegration Results

Model Specification.	F-Stat.	%	Lower Boundary I (0)	Upper Boundary (1)	Conclusion
ASI/ OP ,MPR	4.843549	10%	2.21	3.20	Cointegration.
		5%	2.97	3.21	
		1%	3.73	4.15	

Source: Authors' Computations from E-views 10

The above table shows the results of the ARDL bounds test for cointegration. The F-statistic for the ARDL equation is (4.843549) which exceeds the upper bound critical values at 1%, 5%, and 10% significant levels. This leads us to conclude that the presence of cointegration validates the existence of a long-run relationship between oil price, all share index, and monetary policy rate in the case of Nigeria over the study period of 2017-2020. The findings from the bound test for cointegration are supported by the critical values of Pesaran *et al.* (2001) and Narayan (2005).

4.4. Estimates of Short-Run Models ECM.

Table-4.4 stimates of the short-run models (ECM) (ARDL Model)

Variable	Coefficient	Std. Error	T. Stat.	Prob.
D(LASI(-1))	0.509766*	0.181284	2.811966	0.0111
D(LASI(-2))	0.168824	0.166634	1.013142	0.3237
D(LASI(-3))	0.525482**	0.176335	2.980021	0.0077
D(LOP)	1.459083***	0.046815	0.621232	0.0008
D(LOP(-1))	0.130120*	0.045761	2.843494	0.0104
D(LOP(-2))	0.075934	0.045458	1.670419	0.1112
D(LOP(-3))	0.062717	0.046720	1.342403	0.1953
CointEq(-1)*	-0.878662***	0.185418	-4.738806	0.0001

Source: Authors' Computations from E-views 10
Note:
*** Show significance at the 1% level
** Show significance at the 5% level
* Show significance at the 10% level

The estimates in Table 4.4 above reveal the short run's contemporaneous coefficients of the variables employed. However, concentrating our analysis on the main variable of interest (oil prices LOP), the results show that the short-run coefficient of crude oil prices D (LOP) is positive and statistically significant at 1%. This means that a 1% increase in LOP will lead to about a 1.45% increase in all-share index ASI ceteris- Paribus in the short run.

Besides, the Table reveals that the coefficient of the one period lagged error correction term, ECT (-1) is -0.87 is statistically significant at a 1% level. The negative sign on the ECT (-1) and its statistical significance at 1% level are consistent with a priori theory, and confirm the presence of a long-run relationship (cointegration) among all share index, oil price, and monetary policy rate. Moreover, the absolute value (0.87) on the ECT (-1) implies that the speed of adjustment towards long-run equilibrium is high, which implies that about 0.87% of the short term's disequilibrium is corrected within a year. Furthermore, the negative sign and the statistical significance of the ECT (-1) indicate the presence of a one-way or unidirectional causality which runs from crude oil prices to all share index in the long run. Moreover, the findings that the ECM-based tests can detect the long-run relationship among variables of study is generally consistent with the works of Kremers *et al.* (1992), Hansen (1995), Banerjee *et al.* (1997), and Pesaran *et al.* (2001). This reflects the well-established power dominance of the ECM-based test resulting from the inclusion of potentially valuable information relating to the correlation between the regressors and the underlying disturbances.

4.5 Estimates of the Long Run Coefficients

Table-4.5 *Estimates of the Long-run Coefficient (ARDL Model)*

Variable	Coefficient	Std. Error	T. Stat.	Prob.
LOP	0.140379***	0.032586	4.307930	0.0004
LMPR	0.085943***	0.020447	4.203238	0.0005
C	11.25646***	0.079323	141.9067	0.0000

Source: Authors' Computations from E-views 10
Note:
*** Show significance at the 1% level
** Show significance at the 5% level
* Show significance at the 10% level

Table 4.5 shows the long-run estimates of the ARDL model for the study. The long-run coefficient of oil prices LOP is positive and statistically significant at 1%. This means that a 1% change or increase in oil prices LOP will lead to a corresponding increase of all share index ASI with 0.14% and vice versa. These findings depict the current global economic challenge posed by the COVID-19 pandemic which led to the decline of the global economic growth leading to a persistent fall in oil prices which in turn affects the Nigerian stock market performance. Furthermore, the positive sign and statistical significance of the long-run coefficient of oil prices (LOP) demonstrate the presence of a long-run unidirectional causality that runs from oil prices to the all-share index (ASI). Also, the coefficient of monetary policy rate LMPR is positive and statistically significant at 1%.

4.6. Granger Causality Test Results

Table-4.6 *Granger Causality Test Results ARDL Model*

H0	OBS	F-STAT	P-VALUE	DECISION
LOP ≠ LASI	33	2.05387	0.0078	Reject H0
LASI ≠ LOP	33	1.88113	0.1719	Do Not Reject H0
LMPR ≠ LASI	33	2.62448	0.0909	Do Not Reject H0
LASI ≠ LMPR	33	0.91195	0.4138	Do Not Reject H0
LMPR ≠ LOP	33	0.95517	0.3974	Do Not Reject H0
LOP ≠ LMPR	33	3.33775	0.0507	Reject H0

Source: Authors' Computations from E-views 10
Note:
*** Show significance at the 1% level
** Show significance at the 5% level
* Show significance at the 10% level

Table 4.6 above shows the results of the Granger causality test based on the ARDL model. The P. value of causality running from LOP to LASI is statistically significant with a value less than 0.05. This is an indication of unidirectional causality from oil price shocks to stock performance. Similarly, there is unidirectional causality from oil price LOP to exchange monetary policy rate. This result is consistent with the findings of Killian and Park (2009) Chen *et al.* (2014), Broadstock and Filis (2014), Apergis and Miller (2009).

4.7. Diagnostic Test Results

Table-4.7. *Diagnostic Test Results for ARDL Model*

STATISTIC	COEFFICIENT	P-VALUE
R-Squared	0.73	-
Adj. R-Square	0.64	-
F. Statistic	4.843549***	(0.0000)
Durbin Watson (DW)	2.23	-
Autocorrelation	1.8026	(0.1950)

Normality	0.5066	(0.7762)
Heteroskedasticity	1.3275	(0.2850)
Ramsey RESET	0.351884	(0.7290)

Source: Authors' Computations from E-views 10
Note:
*** Show significance at the 1% level
** Show significance at the 5% level
* Show significance at the 10% level

The results of diagnostic tests for the ARDL model are reported in Table 4.7 It shows that the value for Adjusted R^2 is (0.64) which suggests that oil prices LOP and monetary policy rates LMPR account for about 64% of the total variations or changes in the stock market performance during the period of the study. Also, the probability value (0.000) for the F-statistics, which is less than 5%, implies that all the independent variables (LOP and LMPR) are important determinants of stock performance. Lastly, the value (2.23) for the Durbin Watson (D.W) statistics, which is approximately 2, reveals that the model is not having a serial correlation challenge. More importantly, the results for the post-estimation diagnostics tests performed on the long-run model show that the P-values (0.77, 0.1950, and 0.2850) in respect of the Jarcque- Bera test for normality, Lagrange Multiplier (LM) test for serial correlation, and the Bruesh-Pagan-Gofrey (BFG) test for heteroscedasticity, respectively, are greater than 5%, hence our decision to accept the null respective hypotheses. Consequently, we conclude that the residuals are normally distributed; they are homoskedastic and they are not serially correlated.

Furthermore, the probability value (0.7290) for the Ramsey Reset test which is also greater than 5% reveals that the model is free from specification error. In other words, it is correctly specified. Finally, the plots or graphs of the cumulative sum (Cum sum) and cumulative sum squared (Cumsum SQ) shown in the Appendix are within the critical bounds at a 5% significance level. These results indicate that all the parameters of the long-run model have been stable throughout the study. This situation implies that the long-run model is therefore relevant for policy recommendation.

4.8. Correlation Analysis

Table-4.8 *Results of Correlation Analysi*

	LASI	LOP	LMPR
LASI	1.000000	-	-
LOP	0.789882	1.000000	
LMPR	0.816950	-0.748907	1.000000

Source: Authors' Computations from E-views 10

Table 4.8 above represents the correlation statistics which show the relationship of key variables in the study. The relationship among the variables was tested at a 5 percent level of significance. The results show that all share index (ASI) is positively related to oil price (OP). This shows that stock market returns are positively related to the oil price, and it implies a significant association between stock market returns and oil price volatilities or shocks and vice versa. The result also reveals that interest rate proxy by monetary policy rate is positively related to all share index, this implies that as the economy is going through a tough time due to the COVID-19 pandemic the C.B.N adopts an accommodating policy by lowering short term interest rate to stimulate growth and get the economy back on track. This result is consistent with the works of (Kenny *et al.* (2017)).

5. Summary and Conclusion

Over the years crude oil prices have been fluctuating due to market forces of demand and supply. Most recently, Global natural pandemic such as the COVID-19 often cuts down the supply of oil thereby affecting its price generally. Oil has a chain of effects across numerous sectors of the global economy including the stock market, a crash in oil price directly leads to a decline of all share index ASI in Nigeria's stock market. This is because the oil stock constitutes a large percentage of the Nigerian stock market.

This study examined empirically the linear relationship between crude oil prices and stock market performance in Nigeria with the main objective of ascertaining the negative impact of fall in crude oil price shock on the stock market in the face of the global socio-economic challenge posed by the COVID-19 pandemic. It used monthly time-series data from the CBN website www.cbn.gov.ng for the period of (2017-2020). The auto-regressive distributed lag (ARDL) approach has been applied in the model specification and data analysis for the study. The results of the (ARDL) in both the short and long run revealed that an increase in crude oil prices has a positive and significant impact on the Nigerian stock market, while on the other hand, the results indicate that decrease in crude oil prices has a negative and significant impact on the Nigerian stock market, this is indicated by the decline of all share index ASI in the Nigerian stock market for the periods of March and April 2020. The results of the granger causality test also reveal a unidirectional causality from crude oil prices to the Nigerian stock market.

Recommendations

In November 2015, the Nigerian security and exchange commission (SEC) mapped out a ten-year plan for the development of the Nigerian capital market. Regrettably, out of the ninety initiatives outlined in the master plan only thirteen were completed. The study recommends the continued implementation of the capital market master plan in this challenging period to capital market posed by COVID-19, this is because only 14.4% of the master plan was successfully implemented. In the light of the results obtained, the study also recommends for;

1. The need for the Nigerian government to drive capital-raising to fund critical sectors of the economy such as infrastructure, agriculture, SMEs, and solid minerals.
2. Align the market structure capabilities and competencies to the requirements of the economy.
3. Improve the competitiveness and attractiveness of the capital market; and
4. Create a conducive legal and regulatory framework for deepening and developing the Nigeria capital market.

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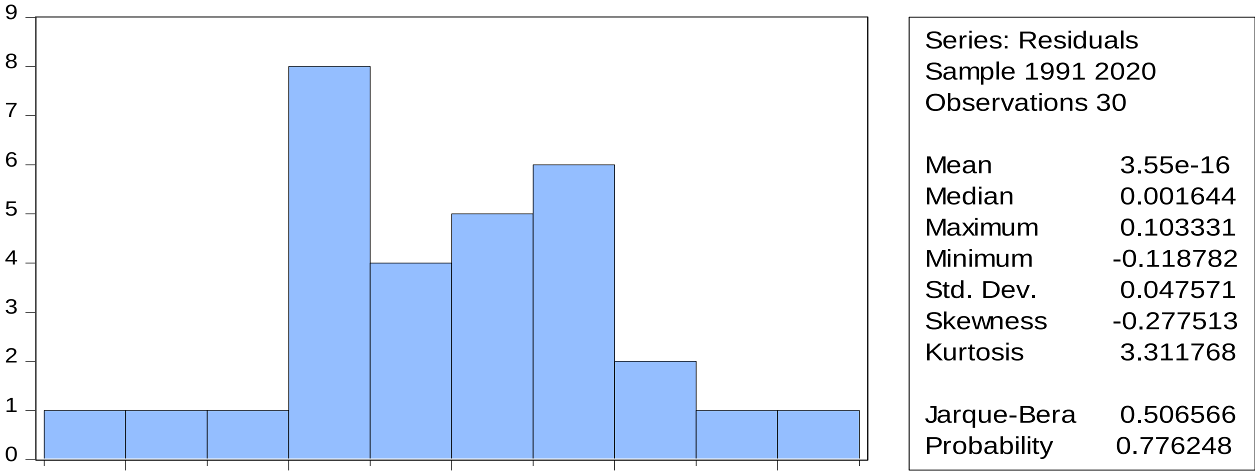
Appendix

Appendix A

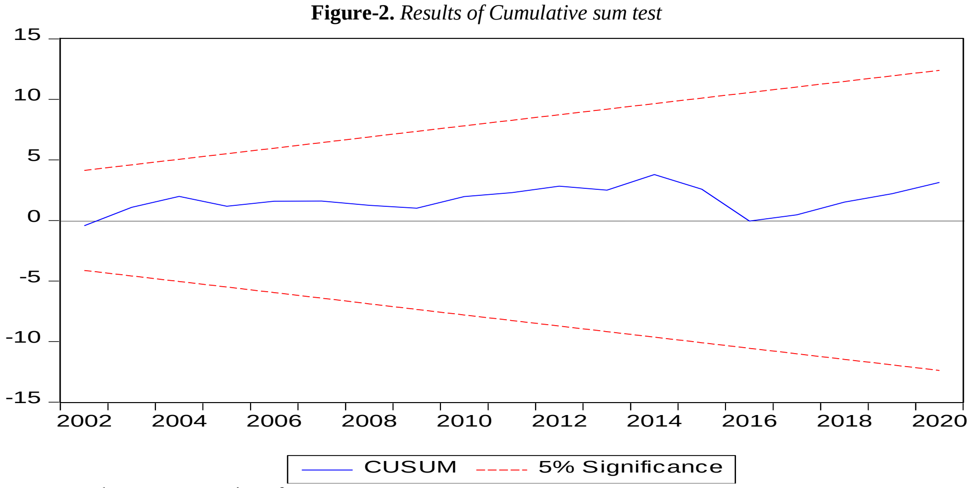
Figure-1. *Normality Test Results*



Source: Authors' Computations from E-views 10

Appendix B

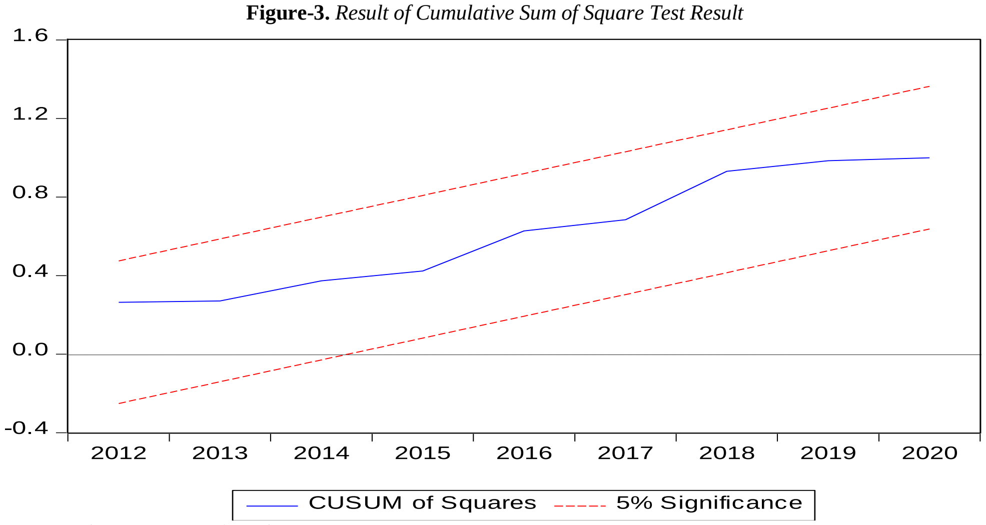
Figure-2. *Results of Cumulative sum test*



Source: Authors' Computations from E-views 10

Appendix C

Figure-3. *Result of Cumulative Sum of Square Test Result*



Source: Author's Computations from E-views 10