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EFFECT OF OIL PRICE CHANGES ON NIGERIA'S MARKET PERFORMANCE: AN NARDL APPROACH

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ABSTRACT

This paper examined the effect of oil price changes on Nigeria's market performance proxied by all-share index and using monthly frequency data that cover the period from January1997 to August 2020. It employed the Non-linear autoregressive distriuted lag methodology for data analysis. The results of the study suggest that both the increases The and decreases in oil price have positive impacts on Nigeria's stock market performance. However, while a decrease in the oil price in the current period has a significant impact on the Nigerian stock market performance , both the decrease in oil price in the past period and its increase in the current period affect the Nigerian stock market performance non-sgnificantly..The results of the study suggest that market participants should target oil price movements as an important instrument for predicting the changes in Nigeria's stock market performance.

Keywords: Nigeria, Brent oil price, NARDL, Stock market performance, All- share index.

1.0 Introduction

For several years, a lot of literature has examined the relationships between oil price and the stock market. Some of the early works on this subject – matter such as Jones and Kaul(1996), Sadorsky(1999),Miller and Ratti(2009), and Chen(2011) report a negative connection between oil price and stock market returns.On the other hand, the results of others studies like Basher and Sadorsky(2006), Mohanty,Nandha, Turskistani,and Alaitani(2011) as well as Wang, Wu and Yang(2013) suggest that the response of the stock market to oil price movements depends to a large extent on the net position of the country investigated in the global oil market and the forces that are responsible for the oil price shocks. ForYoussef and Mokni (2019),the relationship between the volatilities of the stock market and oil price returns vary, depending on the net position of the relevant country in the global oil market.However,economic theory generally expects positive correlations between oil price changes and stock market returns in oil-exporting nations and negative connections between the two variables in oil-importing countries.

Several studies have shifted their attention recently to the interaction between oil and stock returns. According to Youssef and Mokni (2019),some of the works in this category include Miller and Ratti (2009), Reboredo (2010), Filis, Degiannakis and Floros (2011), Daskaliaki and Skiadopoulos (2011), Zhang and Li(2014), Zhu, Su, You and Ren(2017) and Aydogan, Gokoe, and Yulkenchi (2017).. This recent upsurge of interest in the oil/stock relationships has been attributed to the assumption of the investing public that correlations have important implications for asset allocation and portfolio optimization (Youssef & Mokni, 2019), Undoubtably,stock market plays an essential role in the economic development of a nation. However,eventhough a

number of studies have been carried out on the causal relationship between oil price and stock returns, in the context of Nigeria, not many studies can be traced in literature (Adaramola,2012). Nigeria is one of the African countries that are oil producing emerging economies and which rely heavily on oil exports. While there is no general consensus in the empirical literature regarding the existence and nature of a relationship between oil prices and stock market performance, many of these studies have indeed shown that oil price changes had significant effects on macroeconomic environments (Cunado & Garcia, 2005; Kilian, 2008; Cologne & Manera, 2008). In Nigeria, the studies on the relationship between oil price and stock returns have been scanty (see Akinlo.2014) even though Nigeria is a country where oil and its derivatives play a significant role in production and a nation that is highly dependent on oil revenue for the survival of its economy. According to Kanu, Nwaimo and Chimezirim (2017), the Nigerian economy relies heavily on crude oil export revenues and a change in oil price is expected to affect all her economic frontiers. The peculiar nature of Nigerian economy notwithstanding, the studies that have examined the relationship between oil price shocks and stock returns have emerged with conflicting results. For instance , while Omisakin, Adeniji and Omojolabi (2009), Mordi, Michael and Adebiyi (2010), Abbas and Terfa (2010), Adebiyi, Adenuga, Abeng and Omanukwue (2010), Akomolafe and Danladi (2014), Akinlo (2014), Iheanacho (2016), Lawal, Somoye and Babajide (2016), Ojikutu, Onolemhemhen and Isehunwa (2017) and Obi, Oluseyi and Olaniyi (2018), find oil price shock as having a positive effect on stock price, Adaramola (2012) and Effiong (2014) report a negative relationship between oil price shock and stock return. In addition, Effiong (2014) claims that the effect of oil price shock on stock price in Nigeria is insignificant. This conflict of results has left much gap in literature and has created some vacuum which this study intends to fill. This study considers Nigeria suitable to be used as proxy for developing economies as she is a developing economy which is not only one of the largest member of OPEC and the largest net-exporter of oil in Africa but also a highly promising economy for international portfolio diversification. Furthermore, this study takes interest in focusing on Nigeria which is one of the oil-exporting countries sharing some specific economic features that differ on their reliance on oil price changes.

Additional reasons for carrying out this study exist. First, the literature points at both positive and negative impacts of oil prices on stock market performance and this study was aimed at revealing for policy makers whether the impacts are positive or negative in Nigeria. Secondly, this to the best of the authors' knowledge the first study to investigate the impact of oil prices on stock on stock market performance proxied by all-share index in Nigeria by adopting a NARDL approach for Nigeria during the period 1997:1 – 2020:8. Finally, this study adds valuable knowledge about Nigeria which is both an oil exporter and importer. Cosequently, the need to provide further evidence on theeffect of oil prices changes on all-share index in is of great interest to investors, regulators, academics, and the economy in general.

The aim of this study, therefore, is to examine the effect of oil price fluctuation on the Nigerian stock market performances. The importance of this study is underscored by the need for

investors and policy- makers to understand the link between oil price changes and stock market performance. In addition, its significance lies on its envisaged ability to generate results that will improve stock returns forecasting accuracy, provide relevant information for investors and policy makers, make available reference materials for researchers and the academia as well as assist firms in constructing diversified portfolios and determining risk management strategies (see Youssef & Mokni,2019).

The rest of the paper is arranged as follows.Section 2 presents the literature review.Sction 3 contains the mehodology.Section 4 presents and discusses the results of the study while Section5 concludes the paper.

2.0. Literature Review

2.1 Conceptual and theoreticals review

Two major concepts underly this study, oil price fluctuation and all share index.. Beginning with the former, the nominal oil price is usually measured in US dollars per barrel. The real oil price is computed by adjusting the nominal oil price for any alerations in the US price level which is usually based on the US consumer price index (CPI). Rather than analyze current or spot price dynamics, an alternative is to focus on futures price dynamics, as these also reflect expectations.. Oil prices are denominated in US dollars and available from the US Energy Information Administration (EIA). In the crude oil market, there are various types and qualities of oil used for different purposes. The price of oil highly depends on its grade, factors such as specific gravity, its content as well as location. 160 different blends of oil have been identified universally. However, the three primary benchmarks are West Texas Intermediate (WTI), Brent and Dubai. Crude oil prices are quoted in different markets worldwide.

All-share index can be regarded as a national index.It is is one of the proxies for the performance of the stock market. It reflects the investors' sentiment on the state of the national economy. In Nigeria, it is value-weighted and involves all the trading securities on the Nigerian stock market. The efficiency of capital markets is measured by the ability of the securities to reflect and carry along all relevant information in their prices(Kanu, Nwaimo & Chimezirim,2017).

According to Degiannakis,Filis and Arora(2018), the complex and time varying relationship between oil prices and stock markets has caught the attention of the financial press, investors, policymakers, researchers, and the general public in recent years. The authors found that the causal effects between oil and stock markets depend heavily on whether research is conducted using aggregate stock market indices, sectorial indices, or firm-level data and whether stock markets operate in net oil-importing or net oil-exporting countries. They equally observed that conclusions vary depending on whether studies use symmetric or asymmetric changes in the price of oil, or whether they focus on unexpected changes in oil prices. Finally, they discovered that most studies show oil price volatility transmits to stock market volatility, and that including measures of stock market performance improves forecasts of oil prices and oil price oscillations.

The authors highlghted some theoretical transmission mechanisms by which oil price changes can affect the behaviour of stock markets.They categorized the channels in five different ways,namely the stock valuation channel,monetary channel, output channel, fiscal channel and uncertainty channel.

Based on economic theory, any asset price is expected to be determined by its expected discounted cash flows (Williams, 1938; Fisher, 1930 in Youssef & Mokni, 2019). For this reason, researchers claim that any factor that can change these discounted cash flows should have a significant impact on an asset price (Filis, Degiannakis & Floros,2011). This line of reasonining prompted Hamilton (1996), Sadorsky (1999), Arouri and Nguyen (2010) to affirm that an increase in oil price would result in a reduction in production as such a rise in oil price will make inputs more expensive and contribute directly to the level of inflation. Inflation would, in turn, cause a reduction in investors' earnings expectations from the stock market. Hence, any increase in oil price is expected to be accompanied with a decline in stock prices. According toYoussef and Mokni (2019), many existing studies claim that oil price shocks influence stock markets indirectly through macroeconomic variables such as inflation and economic growth. A rise in the oil price is expected to have a positive impact in an oil-exporting country, since the country's income will rise. With such increase in income, expenditures and investments will increase, a stuation which, in turn, enhances productivity and unemployment (Filis, Degiannakis & Floros, 2011). In this case, an oil price increase evokes a positive response from the stock markets (Youssef & Mokni,2019). Oil price is considered by some researchers as representing information flow. Even though diversification aims at minimizing a portfolio's unsystematic risk events, the economic consequences and risk spillovers that might emerge from declining oil price can make portfolio diversification more difficult. Tabelsi (2017) cited in Youssef and Mokni (2019) hold the view that risky assets would be strongly correlated in the stressed periods and that such situation is capable of increasing the risk of collapse. However, for an oil-importing country, the situation will be different as an increase in oil price is expected to have a positive impact. An oil price increase will bring about an increase in production costs, as oil is regarded as the most important production input (see Arouri & Nguyen 2010; Kim & Loungani 1992). The studies of Hamilton (1996) andYoussef and Mokni (2019) contend that the escalating cost of crude oil will affect consumer's behavior, which will, in turn, reduce their demand and spending as a result of higher consumer prices. Decreasing consumption of crude oil would cause a decrease in production and, in return, increase unemployment (see, Lardic & Mignon, 2006; Brown & Yücel, 2002; Davis & Haltiwanger, 2001 in Youssef & Mokni, 2019). In addition, oil price shocks affect stock markets as a result of the uncertainty they create for the financial world, depending on the forces pushing up oil prices (demand-side or supply-side).

Filis et al. (2011) assert that stock markets will respond positively to oil price shocks originating from an increase in global demand and negatively if the shock originates from the supply-side. For Huang, Musulis and Stoll (1996) cited in Laura and Dieter (2015), if oil plays an important role in an economy. it is logical to expect its prices to be correlated with stock returns. The stock price

portrays the state of the economy and is regarded as the stock market's best estimate of the future profitability of business enterprises (Jones, Leiby & Paik, 2004). It is usually calculated as the present discounted value of their future profits. Laura and Dieter (2015) trace the origin of most of the models designed to calculate the value of a stock to the theory of the valuation of firms for the reason that, in principle, the theory-based value of a stock can be derived from the firm's market value divided by the number of its shares. The value of the firm is equal to the present value of the expected future free-cash-flows, minus the value of all liabilities.

Cheikh, Naceur and Kanaan(2018) contend that when there is an oil price drop, oil revenue falls, resultingin weaker fiscal and external positions.They affirm that stock returns fall to the extent that market participants expect an adverse effecton non-oil growth, of which the expected fiscal adjustment is a key determinant. The sensitivity of stock return to price decline is likely to improve while oil price declines, if market participants anticipate a higher probability of a negative impact on non-oil growth. Given the linkages between oil price and stock return, the sensitivity of stock return to oil price depends on economic conditions as well as policy-related

There are a lot of theories in modern financial economics with technological development that tend to explain stock market performance such as Modern portfolio theory/mean-variance analysis (1952) proposed by Harry M. Markowitz and published in 1952 (Markowitz,1952),separation theorem/liquidity preference theory, theory of capital structure propounded by Modigliani and Miller (1958), the capital asset pricing model (CAPM), devised in the seminal work of Markowitz (1952) and later simplified by Sharpe (1963;1964), Lintner(1969), and Mossin (1966),as well as Fama (1970)'s efficient market hypothesis.This work is anchored on the CAPM.

2.2 Empirical Review

A large body of literature has been used to investigate the effect of oil price on sectoral and aggregate stock returns. These studies have remained controversial for several decades. On the one hand, the results of some studies such as Jones and Kaul (1996), Sadorsky (1999), Papapetrou (2001), Shimon and Raphael (2006), Miller and Ratti (2009), Kilian (2009), Oberndorfer (2009), Cunado and Perez de Gracia (2014) as well as Sim and Zhou (2015) suggest that oil price returns exert a negative effect on stock returns. They explain that this effect emanates from factors that relate with either the demand or supply side of oil.

Using vector auto regression and monthly data for the period 1947-1996,Sadorsky (1999) observed that both oil price returns and oil price volatility have negative impacts on the US stock returns. Shimon and Raphael (2006) also affirmed that the oil price return and volatility can influence the macroeconomic growth and the financial assets return. In addition, Driesprong, Jacobson and Maat (2008) asserted that oil returns are capable of significantly affecting the future stock returns negatively both in developed and emerging countries. Furthermore, Diesprong et al. (2008) claimed that there is one-month lag reaction of oil price changes in stock returns, as investors underestimate the importance of oil changes in the economy. In a related

dimension, Park and Ratti (2008) did a comparison of the impacts of oil price volatility on stock returns between the US and 13 European economies, using monthly data for the period 1986-2005 and employing a multivariate VAR analysis. The results of the study suggest that an increase in the volatility of oil prices causes a decrease in stock returns either immediately or with one month lag. In yet another study, Kilian (2009) foud that oil price shocks that are caused by precautionary or speculative demand for crude oil may have a negative effect on the U.S. stock returns. Furthermore, the outcome of the study of Oberndorfer (2009) suggests that oil price volatility affects the Eurozone oil and gas stock corporations negatively. This implies that a short position in energy corporations in times of high oil fluctuation expectations is profitable. After carrying out a similar study, Cunado and Perez de Gracia (2014) affirmed that oil price changes have a negative impact on the majority of the European stock market returns. This is a confirmation that oil- importing economies are affected by oil prices. After studying the US market and employing monthly data spanning from 1973 to 2007 to find out the effect of oil returns on the US equities returns, Sim and Zhou (2015) also emerged with results that suggest that negative oil price shocks affect US equities positively when the US market is performing well. Contrary to the foregoing observations, some empirical studies found no evidence of a negative correlation between oil returns and stock returns. For instance, Wei (2003) found that the oil price shock of 1973-74 had no influence on stock returns. Arouri and Nguyen (2010) examined the impact of oil price changes and stock markets by incorporating Dow Jones (DJ) Stoxx 600 and twelve European sector indexes for the period 2008-2009.They employed a two-factor GARCH model. The results of the study soggest strong linkages between oil price fluctuations and stock markets. However, the magnitude and the direction of the particular effect was noticed to be dependent on the nature of the sectors.

Another group of studies focused attention on the asymmetric effects of oil prices on stock market returns. One of those studies, Park and Ratti (2008) found that oil price shocks do not have asymmetric effects on stock returns in the European oil importing countries. However, some evidence of asymmetric effects on stock returns was noticed for oil importing and exporting countries such as the U.S. and Norway. Also, after using a generalized least squares model for the period 1990-2006 to carry out similar research, Sadorsky (2008) confirmed that oil prices have asymmetric effects on stock prices..Further, while focusing on the period 2005-2009 and taking into account Gulf Cooperation Council countries, Lee and Chiou (2011) carried out an empirical study that concentrated attention on the US stock market for the period 1992-2008.The results of their study showed that there is a negative relationship between oil prices and stock returns. The results also suggest that changes both in oil price dynamics and oil price volatility shocks may have asymmetric impact on stock returns. Furthermore, at the end of their study based on 560 US firms listed in the NYSE and grouped into 14 sectors, Narayan and Sharma (2011) found that there is an asymmetric effect on stock returns for food, banking, financial, chemical, manufacturing, and real estate sector. For Sim and Zhou (2015), their work which was based on firm-level data for the period 1990-2012 also found that positive and negative oil price

shocks have asymmetric effects on US stock returns both during and after the financial crisis of 2008. In another dimension, Degiannakis, Filis, and Kyzys (2014) investigated the effects of oil price shocks on stock market volatility in Europe by concentrating on three measures of volatility, i.e. the conditional, the realized and the implied volatility and considering the sources of oil price shocks. With the aid of Structural VAR model, they found that supply-side shocks and oil specific demand shocks do not have impact on stock market volatility, whereas oil price changes caused by aggregate demand shocks have a negative relationship and impact on stock market volatility. Precisely, their research findings suggest that the aggregate demand oil price shocks have a significant explanatory power on both current and forward looking volatilities and that a robustness excercise using short and long-run volatility models supports the results. Ramos and Veiga (2013) examined the effects of oil price increases on the stock market both oil consuming and producing economies. They invstigated 18 countries during the period of 1988 to 2009 using a Generalized Autoregressive Conditional Heteroskedasticity Model (GARCH). The oil-consuming countries studied include Austria, Belgium, Finland, France, Germany, Greece, Ireland, Japan, the Netherlands, Portugal, Spain, Sweden and Switzerland, while the oil-producing countries comprise Canada, Colombia, Mexico, Norway and Russia. The authors found that an increase in the price of oil results in a negative impact on stock returns in oil-importing economies. Inagreement with the findings of Nusair (2016), the study discovered that an increase in the price of oil has a positive impact on stock returns for oil-exporting economies. Muritala, Adeniyi, Ija Iya, Adekunle, Nageri and Yinus(2020) equally examined the dynamic impacts of oil prices on stock market development in four oil exporting sub-Saharan African countries during the period from 1989 to 2015. The Arbitrage Pricing Theory (APT) was employed as the theoretical framework where stock market prices were hypothesized to be fully reflective of all available information. Static panel data (Pooled OLS, panel Fixed Effect Model, panel Random Effect Model) and dynamic panel model of Generalized Method of Moments (GMM) were also employed in the estimation. The estimation of the static panel model showed that oil prices, exchange rates, gross domestic product, inflation and the corruption index have a positive and significant impact on stock market development. There was,however, a slight improvement from the estimation of the GMM dynamic panel model which suggested that oil prices, exchange rates, gross domestic product, investment, inflation and the corruption index have a positive and significant impact on stock market development.

According to Muritala,et al.(2020), some studies examined the nexus between oil prices and stock prices in emerging and developing countries.They include Brasher (2004), Maghyereh (2004), Narayan and Narayan (2010), Ramos and Veiga (2010), Imarhiagbe(2010), Muritala, Taiwo and Olowookere(2012), Adaramola (2012), Asaolu and Ilo (2012), Ogiri, Amadi, Uddin and Dubon (2013), Itotenaan, Amadi, Moshfique and Dubon (2013) and Akinlo, (2014).

Some of the few related studies in Nigeria are as follows. Muritala, Taiwo and Olowookere (2012) investigated the impact of crude oil price and stock price on some selected macroeconomic indicators using co-integration and error correction on time series data from 1980 to 2010. The

results reveal that crude oil price, stock price and exchange rate are significant in determining the growth of the Nigerian economy. Adaramola (2012) investigated the long-run and short-run dynamic effects of oil price on stock returns in Nigeria using the Johansen co-integration and granger causality tests on time series data from 1985 to 2009. The results indicated a significant positive stock return to oil price shock in the short-run and a significant negative stock return to oil price shock in the long-run. Asaolu and Ilo (2012) studied the relationship between the Nigerian stock market return and the world crude oil price.The analysis was carried out under the co-integration and vector error correction (VECM) framework from 1984 to 2007. The authors found that the Nigerian stock market return and oil price are co-integrated in the long run as a result of the dominance of the oil sector on the Nigerian economy. Ogiri, Amadi, Uddin and Dubon (2013) invstigated the impact of oil price on stock market performance in Nigeria using vector error correction model (VECM). The result showed that oil price changes significantly explain the stock price movement. Itotenaan, Amadi, Moshfique and Dubon (2013) investigated the nexus between oil prices and stock market performance in Nigeria using different empirical methods such as the VECM and VAR models. Akinlo (2014) also studied the relationship between changes in oil prices and stock market growth over the period 1981-2011 using the VECM approach.The result suggested a long run relationship between oil price, exchange rate and stock market growth.

In summary, the majority of the studies carried out on this subject matter employed the VECM method of analysis.This study attempted to contribute to/and update the literature in Nigeria by investigating the oil price /stock market development using the NARDL approach and monthly data series spanning from January 1997 to August 2020.

3. Methodology

This study used quantitative research design with some regression estimates in testing the effect of oil price on stock market performance in Nigeria. Stock market performance was represented by all-share index (ASI) - the dependent variable. The independent variable involved oil price (OP). The study seeks to examine the effect of oil prices on stock market performance in Nigeria which is one of the Sub-Sahara African (SSA) oil producing countries. The choice of Nigeria for the study was predicated on the fact that it is one of the Sub-Sahara African (SSA) countries that have had their stock markets expanded considerably after 1989.In addition, Nigeria is a country which, apart from having a well-developed stock market, is also oil producing and exporting nation that can stand proxy for the West African region .

3.1 Data description

Monthly data series covering the period from January 1997 to August 2020 were employed for estimation in conformity with the general preference of empirical studies for such data-frequencies especially when investigating oil-stock-prices correlation This study covers the recent episodes of economic recession in Nigeria as well as the Covid-19 pandemic.With regard

to the oil price data, monthly Brent spot prices were employed .They were denominated in US dollars and obtained from the US Energy Information Administration (EIA) short-term outlook. In order to check for robustness, pre-tests were carriedout with other crude oil benchmarks such as West Texas Intermediate (WTI) and the OPEC spot prices. It was confirmed that using those oil prices instead of the Brent spot prices would not significantly alter the results of our benchmark specifications.The monthly data for Nigerian all-share index in Nigerian naira US dollars were purchased from the Nigeria Stock Exchange (NSE), Stock Exchange House, 2-4 Customs Street, Lagos, Nigeria through contactcentre@nigerianstockexchange.com and www.nse.com.org.. Each of the two data series used for the work comprised 284 observations. The data sets were fed into the computer as Excel file with two columns - the date and the corresponding information for the particular date. From the Excel, the data sets were trasferred to the Eviews 10 software for regression analysis

3.2 Model Specification

In allignment with Jungo and Kim (2019), this study used the Nonlinear Autoregressive Distributed Lag model to carry out the estimation. To investigate the subject thoroughly, specific account of the asymmetric effects of oil price changes was taken in the modeling process. According to Allen and McAleer(2020)**.** this technique is attractive as it represents the simplest method available for modeling combined short- and long-run asymmetries.The NARDL model, which employs the bounds testing framework, can be applied to both stationary and non-stationary time series vectors, or combinations of both provided that none of the data series is of the I(2) integration order. Its superiority over the ARDL model arises from the fact that its very construction allows one to incorporate the possibility of asymmetric effects of positive and negative changes in explanatory variables on the dependent variable. NARDL model captures the nonlinear and asymmetric co-integration between variables. In addition, it distinguishes between the short-term and long-term effects of the independent variables on the dependent variable. In order to capture non-linear and asymmetric relationship among the variables, the NARDL model developed by Balami (2012) was applied in this study. For the purposeof this study,the model was modified and specified as follows:-

$$\Delta ASI_t = \alpha_0 + \rho ASI_{t-1} + \beta_1^{+} OP^{+}_{t-1} + \beta^{-}_2 OP^{-}_{t-1} + \sum_{t=1}^{-p} \alpha_1 ASI_{t-1} + \sum_{t=0}^{-p} \alpha_2 OP^{+}_{t-1} \sum_{t=0}^{-p} \alpha_3 OP^{-}_{t-1} + \mu_t \quad \text{.....(1)}$$

In this NARDL equation, αi represent short run coefficients while βi represent the long term coefficients with i = 1....4th. While the short term analysis relates to the immediate effect of the independent variable on the dependent variable, the long term analysis discloses the speed of adjustment towards equilibrium. The variables ASI_t and OPt in this model stand for market capitalization and Brent spot oil prices respectively; t stands for time. Wald test was conducted

to find out the long run asymmetry $\beta=\beta+=\beta-$ and short run asymmetry $\alpha=\alpha+=\alpha-$ for the selected variables.

4.Results and discussion of findings

4.1 Descriptive statistics

Table 1 presents the descriptive statistics for price series as well as their stochastic properties. The monthly average oil price is 57.72USD and ASI has an average of N 24503.18 million. On a monthly basis, the (ASI) All Share Index and Oil Prices reach their maximum value of N65652.4million and 133.9USD respectively. The two series are positively skewed. All share index has a normal kurtosis. The Jarque-Bera test indicates the non-normality of ASI and OP data series.

Table 1: Descriptive statistics

	ASI	OP
Mean	24503.18	57.72750
Median	24767.60	55.72500
Maximum	65652.40	133.9000
Minimum	4890.800	9.800000
Std. Dev.	12895.73	32.16818
Skewness	0.420285	0.451290
Kurtosis	3.004379	2.149733
Jarque-Bera	8.361163	18.19500
Probability	0.015290	0.000112
Sum	6958902.	16394.61
Sum Sq. Dev.	4.71E+10	292846.1
Observations	284	284

4.2. ARDL Unit Root Results

As a starting point, this study conducted a stationarity tests as presented in tables 2.1.a,2.1.b,2.2.a and 2.2.b in order to confirm the existence of unit root. The research employed the conventional Augmented Dickey-Fuller (ADF)tests. The standard unit root test technique is applied to both variables comprising exchange rates and oil price to test for the existence of unit-roots.

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Table 2.1a Unit Root Test for Stationarity for Oil Price (OP) (At level Form)

Null Hypothesis: OP has a unit root

Exogenous: Constant
Lag Length: 1 (Automatic - based on SIC, maxlag=4)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-2.066324	0.2587
Test critical values:	1% level	-3.453400	
	5% level	-2.871582	
	10% level	-2.572193	

*MacKinnon (1996) one-sided p-values.
Augmented Dickey-Fuller Test Equation
Dependent Variable: D(OP)
Method: Least Squares
Date: 12/04/20 Time: 07:09
Sample (adjusted): 1997M03 2020M08
Included observations: 282 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
OP(-1)	-0.023666	0.011453	-2.066324	0.0397
D(OP(-1))	0.159905	0.058968	2.711706	0.0071
C	1.443707	0.757448	1.906014	0.0577

R-squared	0.036984	Mean dependent var	0.084787
Adjusted R-squared	0.030080	S.D. dependent var	6.254042
S.E. of regression	6.159262	Akaike info criterion	6.484372
Sum squared resid	10584.29	Schwarz criterion	6.523116
Log likelihood	-911.2965	Hannan-Quinn criter.	6.499909
F-statistic	5.357337	Durbin-Watson stat	2.036816
Prob(F-statistic)	0.005211		

The result of unit root test for OP (at level) in table 2.1a indicates that the t-statistic -2.066324 and the p-value is 0.2587.Since p-value is greater than 0.05, the null hypothesis that OP has a unit root was rejected .This implies that OP is not stationary at level.Consequently, the test was repeated with OP at first difference(table 2.1.b).

Table 2.1.b. Unit Root Test for Stationarity for Oil Price (OP) (inFirst Difference Form)
Null Hypothesis: D(OP) has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on SIC, maxlag=4)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-14.40261	0.0000
Test critical values:	1% level	-3.453400	
	5% level	-2.871582	
	10% level	-2.572193	

*MacKinnon (1996) one-sided p-values.
Augmented Dickey-Fuller Test Equation
Dependent Variable: D(OP,2)
Method: Least Squares
Date: 12/04/20 Time: 07:10
Sample (adjusted): 1997M03 2020M08
Included observations: 282 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(OP(-1))	-0.850886	0.059079	-14.40261	0.0000
C	0.074333	0.368937	0.201480	0.8405

R-squared	0.425565	Mean dependent var	0.014681
Adjusted R-squared	0.423513	S.D. dependent var	8.159340
S.E. of regression	6.195120	Akaike info criterion	6.492468
Sum squared resid	10746.26	Schwarz criterion	6.518297
Log likelihood	-913.4380	Hannan-Quinn criter.	6.502826
F-statistic	207.4352	Durbin-Watson stat	2.029434
Prob(F-statistics	0.000000		

The result of unit root test for OP at first difference shows that the t-statistic is -14.40261 while the p-valueis 0.0000.Since the p-value is less than 0.05, the null hypothesis that OP has a unit root was rejected in favor of the alternative hypothesis.This implies that OP is stationary at first difference.

Table 2.2aUnit Root Test for Stationarity for All Share Index At level

Null Hypothesis: ASI has a unit root
Exogenous: Constant
Lag Length: 3 (Automatic - based on AIC, maxlag=4)

	t-Statistic	Prob.*

Augmented Dickey-Fuller test statistic		-2.186985	0.2116
Test critical values:	1% level	-3.453567	
	5% level	-2.871656	
	10% level	-2.572233	

*MacKinnon (1996) one-sided p-values.
Augmented Dickey-Fuller Test Equation
Dependent Variable: D(ASI)
Method: Least Squares
Date: 10/31/20 Time: 22:06
Sample (adjusted): 1997M05 2020M08
Included observations: 280 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
ASI(-1)	-0.021586	0.009870	-2.186985	0.0296
D(ASI(-1))	0.047629	0.058732	0.810963	0.4181
D(ASI(-2))	0.083179	0.058640	1.418469	0.1572
D(ASI(-3))	0.205968	0.058835	3.500786	0.0005
C	571.0341	273.5565	2.087445	0.0378

R-squared	0.065303	Mean dependent var	59.27618
Adjusted R-squared	0.051707	S.D. dependent var	2161.354
S.E. of regression	2104.734	Akaike info criterion	18.15946
Sum squared resid	1.22E+09	Schwarz criterion	18.22437
Log likelihood	-2537.325	Hannan-Quinn criter.	18.18550
F-statistic	4.803217	Durbin-Watson stat	1.972908
Prob(F-statistic)	0.000925		

Figure 6

Result of unit root test for ASI

The t-statistic in table 2.2a is -2.186985 and the p-value is 0.2116. At 5 % level of significance, p-value is greater than 0.05, the null hypothesis that ASI does have unit root would not be rejected.

Table 2.2.2b presents the result of unit root test for ASI at first difference

. The t-statistic is -5.891472 while the p-value = 0.0000. Since the p-value is less than 0.05, the null hypothesis is rejected.The implication is that qat first difference,

. ASI does not have unit root. This result shows that All Share Index is stationary at first difference form. i.e I(1) order integration.

The findings reveal that the order of integration for both OP and ASI data series is I(1) and none is I(2).

Table 2.2.b.: Unit Root Test for Stationarity for All Share Index (ASI) (At First Difference Form)

Null Hypothesis: D(ASI) has a unit root
Exogenous: Constant
Lag Length: 4 (Automatic - based on AIC, maxlag=4)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-5.891472	0.0000
Test critical values:	1% level	-3.453737	
	5% level	-2.871731	
	10% level	-2.572273	

*MacKinnon (1996) one-sided p-values.
Augmented Dickey-Fuller Test Equation
Dependent Variable: D(ASI,2)
Method: Least Squares
Date: 10/31/20 Time: 22:07
Sample (adjusted): 1997M07 2020M08
Included observations: 278 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(ASI(-1))	-0.665749	0.113002	-5.891472	0.0000
D(ASI(-1),2)	-0.270426	0.104857	-2.578994	0.0104
D(ASI(-2),2)	-0.210376	0.097650	-2.154397	0.0321
D(ASI(-3),2)	-0.019746	0.083045	-0.237778	0.8122
D(ASI(-4),2)	-0.103930	0.060485	-1.718276	0.0869
C	41.51490	127.0930	0.326650	0.7442

R-squared	0.501265	Mean dependent var	2.756835
Adjusted R-squared	0.492098	S.D. dependent var	2969.692
S.E. of regression	2116.418	Akaike info criterion	18.17418
Sum squared resid	1.22E+09	Schwarz criterion	18.25248
Log likelihood	-2520.212	Hannan-Quinn criter.	18.20560
F-statistic	54.67607	Durbin-Watson stat	1.997260
Prob(F-statistic)	0.000000		

4,3 NARDL Dynamic estimation Results

Table 3 : Dynamic estimation
Dependent Variable: LASI
Method: ARDL
Date: 11/10/20 Time: 05:15
Sample (adjusted): 1997M05 2020M08
Included observations: 280 after adjustments
Maximum dependent lags: 4 (Automatic selection)
Model selection method: Akaike info criterion (AIC)
Dynamic regressors (4 lags, automatic): LOP_POS LOP_NEG
Fixed regressors: C
Number of models evalulated: 100
Selected Model: ARDL (1, 0, 3)
Note: final equation sample is larger than selection sample

Variable	Coefficient	Std. Error	t-Statistic	Prob.*
LASI(-1)	0.976526	0.014889	65.58848	0.0000
LOP_POS	0.011794	0.014410	0.818448	0.4138
LOP_NEG	0.120921	0.046887	2.578963	0.0104
LOP_NEG(-1)	-0.154123	0.071717	-2.149056	0.0325
LOP_NEG(-2)	0.160621	0.071316	2.252239	0.0251
LOP_NEG(-3)	-0.116977	0.048378	-2.417988	0.0163
C	0.228871	0.135132	1.693688	0.0915

R-squared	0.985724	Mean dependent var	9.941720
Adjusted R-squared	0.985410	S.D. dependent var	0.648686
S.E. of regression	0.078354	Akaike info criterion	-2.230483
Sum squared resid	1.676033	Schwarz criterion	-2.139613
Log likelihood	319.2676	Hannan-Quinn criter.	-2.194035
F-statistic	3141.649	Durbin-Watson stat	2.144903
Prob(F-statistic)	0.000000		

*Note: p-values and any subsequent tests do not account for model
selection.

Asymmetric effect: the response of all share index to positive and negative shocks in oil price
Table 3 presents the NARDL dynamic estimation results.The negative shock, D(LOP_NEG) ,of the oil price in the current period has a significant effect on the all share index. One unit decrease in oil price D(LOP_NEG) (Negative shocks) in the current period is associated with 0.120921 or (12%) decrease in all share index. Negative shocks in oil price D(LOP_NEG) in the current period has a statistically significant effect on the all share index since the p-value is 0.0104. The p-value is less than 0.05. Consequently, the null hypothesis that there is no significant effect of negative oil price shocks on all share index is rejected. The negative shock, D (LOP_NEG (-1)), of the oil price in the past period does not have a significant effect on the all share index. One unit decrease in oil price D (LOP_NEG (-1)) (Negative shocks in the past period) is associated with 0.043644 or (4.3%) increase in all share index. Negative shocks in oil price D (LOP_NEG (-1)) in the past period do not have significant effect on the all share index since the p-value is 0.3683. The p-value is greater than 0.05. Consequently, the null hypothesis that there is no significant effect of negative oil price shocks on all share index is rejected..

The positive shock, LOP_POS, on the oil price does not have a significant effect on the all share index. One unit increase in oil price (LOP_POS) is associated with 0.011794 or (1.1%) increase in all share index. Positive shocks in oil price (LOP_POS) do not significantly affect the all share index since the p-value is 0.4138. The p-value is greater than 0.05.Consequently, the null hypothesis that there is no significant effect of positive oil price shocks on all share index is accepted.In summary, both the increases and decreases in oil price have positive effects on Nigeria's all-share index.However,while a decrease in the oil price in the cuurnt period has a significant effect on the index, both the decrease in oil price in the past period and its increase in the current period affect aii-share index non-sgnificantly.

Testing for Short-Run Asymmetries

It became necessary to determine if the difference between the coefficient of the POS and NEG shocks is statistically significant in order to conclude on whether or not the relationship between All share index and Oil Price LOP is Asymmetric.

Short-Run Asymmetric Test using Wald Test

To determine if the two shocks were of the same magnitude (symmetric effect) or were different (asymmetric effect).The Wald test (table4) result shos that the p-value is 0.0292, The implication is that the null hypothesis that both the POS and NEG shocks in the oil price are the same should be rejected. Hence,the positive and negative shocks has asymmetric effect on all share index.

Table 4:
Wald Test:
Equation: NARDL07

Test Statistic	Value	Df	Probability
t-statistic	-2.192569	273	0.0292
F-statistic	4.807358	(1, 273)	0.0292
Chi-square	4.807358	1	0.0283

Null Hypothesis: C(2)=C(3)
Null Hypothesis Summary:

Normalized Restriction (= 0)	Value	Std. Err.
C(2) - C(3)	-0.109127	0.049771

Restrictions are linear in coefficients.

4.4 Short and long term relationship: bounds test

The result of bounds test is presented in table 4.

. The Null Hypothesis: is that there is no cointegration among the variables. The F-Statistic = 1.967891 while the Critical Value of the lower bound I(0) is 3.1 at 5% Since 1.967891 is less than critical values of I(0), the Null hypothesis was rejected The implication is that there is no cointegration among the variables. Therefore there is no long run relationship between the variables.

Table 4:
ARDL Long Run Form and Bounds Test
Dependent Variable: D(LASI)
Selected Model: ARDL(1, 0, 3)
Case 2: Restricted Constant and No Trend
Date: 11/10/20 Time: 05:17
Sample: 1997M01 2020M08
Included observations: 280

Conditional Error Correction Regression				
Ariable	Coefficient	Std. Error	t-Statistic	Prob.

C	0.228871	0.135132	1.693688	0.0915
LASI(-1)*	-0.023474	0.014889	-1.576663	0.1160
LOP_POS**	0.011794	0.014410	0.818448	0.4138
LOP_NEG(-1)	0.010442	0.014770	0.706939	0.4802
D(LOP_NEG)	0.120921	0.046887	2.578963	0.0104
D(LOP_NEG(-1))	-0.043644	0.048434	-0.901104	0.3683
D(LOP_NEG(-2))	0.116977	0.048378	2.417988	0.0163

* p-value incompatible with t-Bounds distribution.
** Variable interpreted as Z = Z(-1) + D(Z).

Levels Equation
Case 2: Restricted Constant and No Trend

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LOP_POS	0.502410	0.431316	1.164830	0.2451
LOP_NEG	0.444809	0.486998	0.913369	0.3619
C	9.749808	0.605190	16.11034	0.0000

EC = LASI - (0.5024*LOP_POS + 0.4448*LOP_NEG + 9.7498)

F-Bounds Test			Null Hypothesis: No levels relationship	
Test Statistic	Value	Signif.	I(0)	I(1)
			Asymptotic: n=1000	
F-statistic	1.967891	10%	2.63	3.35
K	2	5%	3.1	3.87
		2.5%	3.55	4.38
		1%	4.13	5
			Finite Sample: n=80	
Actual Sample Size	280			
		10%	2.713	3.453
		5%	3.235	4.053

1%	4.358	5.393

4.5 Heterskedasticity Test

Table 5 presents the reult of the heterskedasticity test.Since the p-value is 0.0460, the null hypothesis whch state that residual is homoskedastic was rejected;the implication is that the residual is heteroskedastic.

Table 5:

Heteroskedasticity Test: Breusch-Pagan-Godfrey

F-statistic	3.003056	Prob. F(6,273)	0.0074
Obs*R-squared	17.33614	Prob. Chi-Square(6)	0.0081
Scaled explained SS	95.69110	Prob. Chi-Square(6)	0.0000

Test Equation:
Dependent Variable: RESID^2
Method: Least Squares
Date: 11/10/20 Time: 22:41
Sample: 1997M05 2020M08
Included observations: 280

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-0.069162	0.034507	-2.004270	0.0460
LASI(-1)	0.008447	0.003802	2.221822	0.0271
LOP_POS	-0.007813	0.003680	-2.123220	0.0346
LOP_NEG	0.002442	0.011973	0.203941	0.8386
LOP_NEG(-1)	-0.025818	0.018314	-1.409750	0.1598
LOP_NEG(-2)	-0.010347	0.018211	-0.568139	0.5704
LOP_NEG(-3)	0.026770	0.012354	2.166978	0.0311

R-squared	0.061915	Mean dependent var	0.005986
Adjusted R-squared	0.041298	S.D. dependent var	0.020435
S.E. of regression	0.020008	Akaike info criterion	-4.960643
Sum squared resid	0.109292	Schwarz criterion	-4.869773
Log likelihood	701.4900	Hannan-Quinn criter.	-4.924195
F-statistic	3.003056	Durbin-Watson stat	1.575246
Prob(F-statistic)	0.007385		

4.6 Serial Autocorrelation LM Test

The Serial Autocorrelation LM Test carried out(Table 6) indicates that the F-statistic has a p-value of 0.2718 .Consequently, the null hypothesis that there is no serial autocorrelation problem was accepted.

Table 6:

Breusch-Godfrey Serial Correlation LM Test:

F-statistic	1.309155	Prob. F(2,271)	0.2718
Obs*R-squared	2.679378	Prob. Chi-Square(2)	0.2619

Test Equation:
Dependent Variable: RESID
Method: ARDL
Date: 11/10/20 Time: 22:45
Sample: 1997M05 2020M08
Included observations: 280
Presample missing value lagged residuals set to zero.

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LASI(-1)	0.000840	0.015683	0.053537	0.9573
LOP_POS	-0.000657	0.014775	-0.044436	0.9646
LOP_NEG	0.007665	0.047494	0.161380	0.8719
LOP_NEG(-1)	-0.016582	0.072435	-0.228921	0.8191
LOP_NEG(-2)	0.009410	0.071706	0.131224	0.8957
LOP_NEG(-3)	-0.001105	0.048329	-0.022860	0.9818
C	-0.007596	0.142240	-0.053405	0.9574
RESID(-1)	-0.070217	0.063394	-1.107627	0.2690
RESID(-2)	0.064663	0.062928	1.027578	0.3051

R-squared	0.009569	Mean dependent var	3.25E-16
Adjusted R-squared	-0.019669	S.D. dependent var	0.077507
S.E. of regression	0.078265	Akaike info criterion	-2.225813
Sum squared resid	1.659995	Schwarz criterion	-2.108980
Log likelihood	320.6138	Hannan-Quinn criter.	-2.178951
F-statistic	0.327289	Durbin-Watson stat	2.011466
Prob(F-statistic)	0.955165		

4.7 Discussion of findings

This study investigated the effect of oil price changes on the stock market performance in Nigeria between the period from January 1997 and August,2020. It used the Nonlinear autoregressive lag model to capture the possible short-, medium-, and long-term causal effects between the variables of studied as well as the asymmetric nature of their relationship. The NARDL estimation was done after ex-raying the summary characteristics of the variables and ensuring their stationarity. Also tests were carried out to establish the absence of serial correlation,find out the short and lungrun relationship among the variables, thehomoeskadicity or heteroskedasticity of the date series and the suitability of NARDL for analysis. The NARDL equation was estimated with oil price as exogenous variable to all-share index. This was so modeled because international oil price is exogenous to Nigeria's economy. The global oil prices are dictated by the economic conditions in the international market which are external to the Nigerian economy. The results of the study indicate the presence of short run asymmetric effect between oil price and all-share index and that there is no long run relationship between them.In addition, The results of the study suggest that both the increases and decreases in oil price have positive impacts on Nigeria's all-share index.However,while a decrease in the oil price in the cuurnt period has a significant impact on the index, both the decrease in oil price in the past period and its increase in the current period affect the Nigerian all-share index non-sgnificantly.

These results align with theoretical a priori expectation for an oil exporting country like Nigeria that an increase or decrease in the international oil price should have positive effect on Nigeria;s stock market performance. The results confirm the findings of several empirical studies that propose a positve relationship between oil price and stock market return such as Alsharif(2020),Agbo and Nwankwo(2019),Talbi(2018),Salisu and Isah(2017), Akinlo(2014), Ramos and Veiga(2014), Onoh(2011), Asaolu and Ilo (2012) Ogiriet al. (2013) and Akinlo (2014). However, the results vary from those of Kelikume and Muritala(2019), Miller and Ratti(2009), Nandha, Park and Ratti(2008) and Hammoudeh(2007) that suggest negative connections between the two variables. In addition,while this study finds no long run relationship oil price between and stock market performance ,for some earlier works like Anthony (2012),Asaolu and Ilo (2012) Ogiri et al. (2013), Oriakhi and Osaze. (2013), Akinlo (2014). Najaf and Najaf. (2016). Ojikutu, Onolemhemhen and Isehunwa (2017) Marathe and Raju (2020) , there is a long-term relationship between the macroeconomic variables and crude oil.One of the policy implication of the findings is that short term energy policy would be appropriate for oil price and stock market performance relationship in Nigeria. The disagreement among results could have arisen because the causal effects between oil and stock markets depend heavily on whether research is conducted using aggregate stock market indices, sectorial indices, or firm-level data and whether stock markets operate in net oil-importing or net oil-exporting countries. In addition, conclusions

vary depending on whether studies use symmetric or asymmetric changes in the price of oil, or whether they focus on unexpected changes in oil prices(Degiannakis, Filis & Arora,2018)

One of the policy implications of the findings of this study is that diversifying in both oil and stock markets will not create benefits for the investors holding the portfolio because of the integration of the markets, and that risk minimization through portfolio diversification are unattainable by holding assets in oil and stock markets(see Anoruo and Mustafa ,2007).

5.Conclusion

This paper investigated the effect of oil price changes on the performance of Nigeria.s stock market proxied by all-share index and using monthly frequency data that cover the period from January1997 to August 2020. It concluded through the NARDL model estimation that oil price is positively related to stock market development. The results of the study suggest the presence of short run asymmetric effect between oil price and all-share index and the absence of long run relationship between them.In addition, They equally suggest that both the increases and decreases in oil price have positive impacts on Nigeria's stock market performance. However, while a decrease in the oil price in the current period has a significant impact on the Nigerian stock market performance , both the decrease in oil price in the past period and its increase in the current period affect the Nigerian all-share index non-sgnificantly..The results of the study suggest that market participants should target oil price movements as an important instrument for predicting the changes in Nigeria's stock market performance.The varying impacts of oilprice changes on stock returns also signal that investors can diversify and shuffle their portfolio investment strategies through risk return trade off. In an economy like that of Nigeria that heavily relies on oil revenue, practical and urgent steps need to be taken to develop alternative sources of revenue. The reason is that a drop in world oil prices spells doom for any oil dependent economy like Nigeria.

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