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Original Research Article

Impact Of Oil Price Changes On The Market Capitalization Of The Nigerian Capital Market

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Abstract

The objective of this study was to determine the impact of oil price changes on the Nigerian market capitalization focusing the nonlinear autoregressive distributed lag model. The series consisted of monthly data points from 1997:1 to 2020:8 totalling up to 284 observations obtained from the Nigerian stock market and Energy Information Administration data stream. The two variables were found stationary at first difference. The results of the study show that both positive and negative innovations in international oil price have significant and direct impacts on the Nigerian market capitalization in the short run. The study reommends that policymakers should be cognizant of oil price movements. When oil price changes take place, relevant monetary policy measures should be employed to stabilize the unanticipated impacts on market capitalization that may distort the Nigerian economy. In addition to diversifying away from oil to reduce market volatility.Nigeria should devise strategies that can ensure stability in its capital markets by vigorously pursuing pro-growth policies irrespective of the shocks in oil price and other exogenous macroeconomic indicators.

Keywords: Oil Price, Market Capitalisation, Nardl, Nigeria.

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INTRODUCTION

The nexus between oil price changes and macroeconomic activities have continued to attract the attention of researchers all over the universe since the early 1970s. This is as a result of the observed overwhelming importance of crude oil worldwide. Researchers and scholars regard oil price movements as important determinants that influence macroeconomic activities and, ultimately, stock market indices in different parts of the world (Siddique,2014). The degree of attention currently given to oil price oscillations is justified by the important roles that oil prices play in the modern economy. This arises from the revelation by several studies that the price of crude oil, which is the primary fuel of industrial activities, plays a significant role in determining the shape of countries' economic and political developments (Siddique, 2014; Berk & Aydogen,2012). It performs such function by influencing aggregate indicators directly and, also, impacting operational costs and revenues. Cunado and Garcia (2003) as well as Cologne and Manera (2008) project oil price changes as a variable which impacts significantly on domestic price levels, gross domestic product, investment and savings. Consequently, irregular price movements in the energy markets have become an issue of serious concern among both economists and policy-makers (Eksi, Senturk & Vildirim, 2012). Globally, the impacts of crude oil price changes on economic variables have been a controversial but interesting topic over the past years. The controversy exists in the sense that different and divergent results have been obtained amidst the dire necessity to reduce the negative results of oil price oscillations on the economy. Many questions have continued to be asked concerning the direct and indirect relationships between these variables. In an effort to unravel this, many researchers have used several measures in different dimensions to study this trend. All of these arise from the fact that the impact of the oil price shocks varies from country to country depending on whether the country is an importer of oil or an exporter of oil. The magnitude of the direct effect of a given oil price increase depends on the share of the cost of oil in national income, the degree of dependence on imported oil and the ability of end-users to reduce their consumption and switch away from oil (Marzieh,2006). In Nigeria, where oil is the main stay of the economy, the price of oil significantly shapes the economic status of the country.

Various attempts have been made to explain the behavior of the crude oil price and assess the macroeconomic consequences of its fluctuations.

Since the first oil crisis in 1973, investors and policymakers have partnered in the discussion of oil price shocks. Further, the sudden negative distortions in the price of crude oil in the last and the first quarters of 2014 and 2015 respectively have also raised panic in both oil exporting and oil dependent economies. Distortions in the international crude oil price have effect on both exchange rate and inflation rates of an oil-dependent economy. These in-turn affect the prospects of the economy for investors to invest. Despite the general impressions about the importance of crude oil and the economic consequences of the fluctuations in its price, the studies carried out on the relationship between oil price changes and stock markets are relatively few, especially in sub-Sahara African economies According to. Peter and De-Mello (2011) cited in Soyemi, Akingunola and Ogebe

(2017), this dearth of studies arose from the difficult nature of evaluating stock market activities. The few studies that have examined such interactions were carried out mainly on industrialized net oil-importing countries such as the United States of America, United

Kingdom and Japan (Jones & Kaul 1996;

Sadorsky,1999 cited in Akinlo,2014). Further, the results of the impact of oil price changes on stock market performance differ between countries. This paper aimed to extend the literature by examining the impact of oil price changes on stock market exchange in Nigeria, one of the largest oil producer and exporter in Africa. The cardinal objective of this study, therefore, was to model the movements of market capitalization in Nigeria as a response to the changes in the international oil price. For policy makers, the findings help to clarify the dilemma of whether the government should subsidize or totally depend on global oil prices in ensuring the sustainability and competitiveness of Nigerian companies. In addition, the results may assist businessmen in managing cost structures in the event of rising oil prices in relation to both short term and long term planning and provide investors with a better picture of the exposure to oil price risks when investing in Nigerian companies. The rest of this paper is structured as follows: Section 2 provides literature review while Section 3 presents data and methods. The empirical analysis results are presented in Section 4 while discussion of policy implications of the results is presented in Section 5. Finally, Section 6 presents the conclusion.

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2.0 REVIEW OF RELATED LITERATURE

2.1 Conceptual and Theoretical underpinnings Crude oil has become increasingly important as it is not only a fundamental cost for majority of industries but its price highly oscillates(Zhu & Singh,2016).There is a consensus among recent studies that crude oil price is a significant determinant of stock market returns (Driesprong, Jacobsen & Maat,2008; Ribas, Leiras, & Hamacher, 2010) and firm returns (Pompermayer, Florian, Leal & Soares,2007; Narayan & Sharma,2011.). As a result, oil price volatility creates uncertainties in terms of firm profitability, valuations and investment decisions. Considered from one perspective, oil is an essential input for industries that consume petroleum products made from crude oil. For companies not involved in the oil industry, increasing oil prices increase business costs. In the absence of an offsetting increase in revenues, increasein such costs would result in a reduction in profits. Viewed from another angle, oil is an essential output for oil exploration and production companies. For such companies, an increase in oil price is a potential increase in profits. For this reason, oil price changes play an important role in the strategic investment decisions of the oil exploration and production companies. Soyemi et al. (2017) propose that, among the several basic global commodities, crude oil occupies a perculiar position because every country, one way or another, relies on it either as a producer or a consumer. Consequently, fluctuations in crude oil price ultimately affect the global economy.

Kilian (2009) asserts that the price of crude oil is influenced by changes in global crude oil supply, aggregate demand for all industrial commodities, and oil specific demand. A boost in crude oil price leads to a reduction in domestic demand and stock prices. For oil exporters such as Oil Mineral Producing Countries (OPEC), the reverse is the case. According to Tabar (2013), Angelidis, Degiannakis, and Filis. (2015) and Zhang (2017) oil price fluctuation exerts significant effects on stock markets through a number of channels apart from affecting the world economy. They explain that oil price changes possess incremental ability in predicting the state of the stock market.

According to Chen (2020), market capitalization is the total dollar market value of a company's outstanding shares of stock. Often referred to as "market cap," it is computed by multiplying the total number of a company's outstanding shares by the current market price of one share. The figure is employed by investment community to determine a company's size, as opposed to using sales or total asset figures. Using market capitalization to show the size of a company is important because company size is a basic determinant of various characteristics in which investors are interested, including risk. During an acquisition, the market cap is used to determine if a takeover candidate represents a good value or not to the acquirer. Chen (2020) reports that companies are typically divided according to market capitalization. From the perspective of a nation, market capitalization is also a pointer to its stock market's pattern of growth and development. For instance, in 2019, market capitalization for Nigeria in 2019 was reported to be 43,921 million US dollars.

2.2 EMPIRICAL REVIEW

The relationship between oil price changes and macroeconomic fundamentals such as gross domestic product, inflation, employment, exchange rate and investment have continued to be examined by several studies (Nandha & Hammoudeh 2007 cited in Akinlo ,2014). Several researches have been done on this subject area with different approaches and different results obtained. Most of them which point to the fact that oil price affects stock market and economic growth either directly or indirectly.

It is only few studies that have focused on the interaction between oil price changes and stock markets, especially in developing countries. A majority of such studies have been conducted in developed countries in America and Europe. For instance, Jones and Kaul (1996) examined the reaction of international stock markets to oil price shocks. They found that the reaction of United States (US) and Canadian stock prices to oil price changes could be completely accounted for by their effect on real cash flows in the postwar period. However, the results of similar works for Japan and the United Kingdom (UK) were inconclusive.

While adopting the unrestricted vector autoregressive (VAR) approach, Huang, Musulis and Stoll (1996) carried out a study in the link between oil price and stock return in the US. Precisely, they examined the connection between daily oil future returns and daily US returns. The results of the study show that oil returns affect some individual oil company stock returns but do not have much impact on the general market indices. In a later period,

Cheung and Ng (1998) used the Johansen cointegration technique in their study. The authors established the existence of long-run co-movement between five national stock market indices and real oil price, real consumption, real money and real output.In addition, they found that oil prices are negatively correlated with stock prices. Sadorsky (1999)

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studied the connection between oil changes and aggregate stock returns using American monthly data. The results obtained with VAR and GARCH approaches show that both oil price and its changes play important roles as they affect real stock returns. The results of their study sugget that oil price movements after 1986 accounted for a larger fraction of the forecast error variance in real stock returns than did interest rates. After employing the VAR methodology to find out how oil prices affec the real stock prices, interest rates, real economic activity and employment in Greece, Papapetrou (2001) reports that oil price changes affect real economic activity and employment.In addition, the author found that oil prices account for a significant movement in stock price. Driesprong, Jacobsen and Maat (2003) found that oil price changes significantly predict negative excess returns. The authors propose that financial investors seem to under-react to information in the oil price. They observed a strong connection between monthly stock returns and lagged monthly changes in oil price. In a study conducted by Hammoudeh and Aleisa (2004) Johansen co-integration technique was employed to investigate the relationship between oil prices and stock markets in Gulf Cooperation Council (GCC) countries. The result obtained was that Saudi market is the only market in the group that could be predicted by oil future prices. Using VAR methodology for Gulf cooperation countries, In a related study, Park and Ratti (2008) observed that oil price shocks have a statistically significant negative effect on stock prices for an extended sample of thirteen developed markets. Miller and Ratti (2009) invstigated long-run relationship between the world crude oil price and international stock markets for the sample period 12008:3 using a co-integrated VECM. They found that international stock market indices respond negatively to increases in the oil price in the long run. They also established the existence of a long run co-movement between crude oil price and stock market during 1971:1 – 1980: 5 and 1988: 2- 1999:9 with evidence of break down in the relationship after the period. In the same year, Also, the results of the study by Bhar and Nikolova (2010) show that global oil price returns have significant effect on Russian equity returns and volatility. The outcome of the study by Chen (2010) suggests that an increase in oil prices leads to a higher probability of a bear emerging market. Similar study carried out by Arouri, Lahiani and Bellalah (2010) on the GCC countries show that stock market returns significantly react to oil price changes in Oman, Qatar, Saudi Arabia, and United Arab Emirate (UAE). Results from the same study also indicate that the oil price shocks do not affect stock market returns in Bahrain and Kuwait. These authors also established that the relationship between oil prices and stock markets in these countries are non-linear and switching according to oil prices. The implication is that a particular direction of relationship between oil shocks and stock returns could not be identified since they are changing from regime to regime.

Janor, Housseinidoust and Rahim, R. (2013) examined the impact of oil price volatility on firm performance in the context of an emerging market, Malaysia. The effect of crude oil price on the performance was examined for the period of January 1986 to December 2011 using GARCH and EGARCH models reflecting the evaluation on volatility and asymmetric effects. The results of the study indicate the significant effect of oil price volatility on stock market volatility and also the asymmetric effects. Ramos and Veiga (2014) examined the puzzle of asymmetric effects of oil on international stock markets. Contrary to the documentation of previous work that oil price changes have nonlinear effects in the economy and in stock market returns, the results show that the nonlinear effects are different depending on whether countries are energy dependent or not. The authors found that while price soars seem to have a negative effect in stock markets of oil energy dependent countries, they have a positive effect on stock markets of oil-exporter countries. They also report that stock market returns are negatively affected by oil price volatility in energy dependent countries and positively in oil-exporter countries and some bidirectional effects between oil positive changes and some oil volatility measures that can be reinforced by the presence of volatility feedback. Talbi (2018) investigated the issue of oil and stock market interdependence in importing countries by measuring the interaction between oil price and stock market indices using the asymmetric DCC-GARCH approach. This process applied to the stock market indices of oil-importing countries: United States (NASDAQ 100), Canada (TSX), Finland (Helsinki General), France (CAC 40), Germany (DAX 30), Spain (Madrid General Index, MGI), Denmark (KFX Copenhagen), Australia (All Ordinaries Index, AOI). The results of the analysis show that high oil prices driven by demand-related shocks move in line with stock prices. The author also found that supply shocks cause higher correlation only in importing countries. In terms of potential diversification, oil was found not to be always countercyclical with respect to stock markets, as generally predicted by the previous literature, if the shock originates from the demand of oil. The study also found that stock markets tend to move together with varying degrees of strength in oil importing countries. Alsharif (2020) used daily data from 2000 to 2019 to examine the sensitivity of Saudi market returns and volatility to changes in oil prices. It employed the threshold general autoregressive conditional heteroskedastic in mean model (TGARCH-M) and three multivariate general autoregressive conditional heteroskedastic (MGARCH) models. The results of the study show that oil price changes have a significant positive impact on Saudi stock market returns and that the positive relationship has increased significantly in the last ten years.

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Marathe and Raju (2020) presented a simple framework for understanding the effect of oil prices on BRICS countries' macroeconomic variables over a period of time from January 1, 2000 to December 31, 2019 using the Cointegration, vector error correction model (VECM) and granger causality test. The results of their study show that there is a long-term relationship between the macroeconomic variables and crude Oil, and also suggests that there is a unidirectional and bi-directional relationship between the variables in BRICS.

Some of the other works in this subject area that were conducted outside Nigeria include Chang and Wong (2003), Henriques and Sadorsky (2008), Tweneboah and Adam (2008), Lippi and Nobili (2008), Eryigit (2009), Aspergis and Miller (2009), Korhonen and Juurikkala (2009) and Narayan and Narayan (2010).

For emerging markets, Nandha and Hammoudeh (2007) used weekly data from 1994 to 2004 to examine the sensitivity of stock market returns to changes in oil prices and exchange rates in 15 AsiaPacific countries. The study employed an international factor model. The results show that countries are only sensitive to changes in oil prices in local currency only. In addition, the stock markets in two oil importer countries (South Korea and Philippines) were found to be reacting negatively to oil price changes, while stock markets in two oil importer countries (Indonesia and Malaysia) react negatively only when there is a decrease in oil prices. Ono (2011) employed a multivariate vector autoregressive (VAR) model to examine the impact of oil prices changes on stock market returns in Brazil, China, India and Russia for the period 1999-2010. The results of the study indicate that oil price shocks have a positive impact on stock markets returns in China, India and Russia only and that these shocks contribute significantly to the volatility of stock markets in Russia and China only. Salisu and Isah (2017) investigated the relationship between oil and stock markets in 13 countries by using a nonlinear panel autoregressive distributed lag model over the period 2000-2015. The authors found that there is a positive relationship between changes in oil and stock prices for both oil-exporting and oilimporting countries. However, they found that the former exhibit a larger impact.

Kelikume and Muritala(2019). examined the impact of oil price on African stock markets. With quarterly data from five selected oil producing countries with stock market presence, from Q1:2010 to Q4:2018, the study deployed dynamic panel analysis technique for a model consisting of stock returns, real gross domestic product growth rate, exchange rate and OPEC basket price. One of the the findings show that an adverse effect of oil prices existed on stock markets in Africaa d that the negative impact is attributable to fragmented and underdeveloped capital markets

The works carried out in Nigeria are relatively few.For instance, Akinlo (2014) used the vector error correction modeling approach to examine the relationship between changes in oil prices and market capitalization over the period 1981-2011. The results suggest a long-run relationship between oil price, exchange rate and market capitalization. A unidirectional causality runs from oil price change to stock market capitalization. The study found that impulse response function shows that oil price has a temporary positive impact on stock market capitalization and that market capitalization is very dependent on oil price fluctuation. More recently, Agbo and Nwankwo(2019) examined the effect of oil price volatility on the volatility of Nigeria's market capitalization. The study used monthly frequency data for the period from January,1997 to December 2016 and the EGARCH [1,1] model for data analysis. Average monthly inflation and exchange rates were introduced in the model as control variables. The results suggest that oil price volatility has a positive and weak effect on the volatility of market capitalization. Some other major studies carried out in Nigeria that were directed towards investigating the connection between oil price shocks and stock market indicators include Olomola and Adejumo (2006), Akpan (2009), Mordi and Adebiyi (2010), Umar and Abdulahkeem (2010), Adebiyi, Adenuga, Abeng and Omanukwue(2010) , Adaramola (2012), Asaolu and Ilo (2012), Oriakhi and Osaze (2013), Effiong(2014) and Effiong, Ezepue, Akpan and Moffat(2016).

3.0 METHODOLOGY 3.1 Data description

This study was carried out to ascertain the effect of oil price changes on the Nigerian market capitalization. Monthly data data series covering the period from January 1997 to August 2020 were selected.This was done 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 episode of economic recession in Nigeria as well as the Covid-19 pandemic. Concerning oil price (OP) data, the monthly Brent spot prices were employed as the independent variable. Oil prices were denominated in US dollars and are available from the US Energy Information Administration (EIA) short-term outlook. In order to check for robustness, other crude oil benchmarks such as West Texas Intermediate (WTI) and OPEC spot prices were employed. It was confirmed that those oil prices did not significantly alter the results of our benchmark specifications. Monthly data for market capitalization (MCAP),the dependent variable, in

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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 these series consists of 284 observations. The data sets were entered 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 exported to the Eviews10 software for 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 andMcAleer(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(see Paseran, Shin

4. Empirical Results and discussion

4.1 Descriptive statistics

Table 1: Descriptive statistics

	OP	MCAP
Mean	57.72750	4556.224
Median	55.72500	2214.450
Maximum	133.9000	14027.70
Minimum	9.800000	215.9000
Std. Dev.	32.16818	4238.098
Skewness	0.451290	0.584940
Kurtosis	2.149733	1.882321
Jarque-Bera	18.19500	30.97761
Probability	0.000112	0.000000
Sum	16394.61	1293967.
Sum Sq. Dev.	292846.1	5.08E+09
Observations	284	284

& Smith, 2001).Its merits over the ARDL model is in 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. In addition, 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. Also, NARDL is regaarded as the most appropriate instrument for testing co-integration among the variables in single equation.

In order to capture non-linear and asymmetric relationship among the variables, the NARDL model developed by Hatami (2012) was applied The NARDL model is specified as follows:-

$$\Delta MCAP_t = \alpha_0 + \rho MCAP_{t-1} + \beta_{1+} OP_{+t-1} + \beta_{-2} OP_{-t-1} + \sum{}^{-}{}_{t=1} \quad MCAP_{t-1} + \sum_{t=0}^{-p} \alpha_p \quad \alpha_1 \quad 2 \quad OP^{+}_{t-1} \quad \sum_{t=0}^{-p} \alpha_3 OP^{-}_{t-1} + \mu_t \text{ ....(1)}$$

In the NARDL equation modelled as above, 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

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$MCAP_t$ and OPt in this model stand for market capitalization and Brent spot oil prices respectively;t represent time. Wald test is run to know the long run asymmetry $\beta=\beta+=\beta-$ and short run asymmetry $\alpha=\alpha+=\alpha-$ for the selected variables.

Table 1 presents the descriptive statistics for the price series as well as their stochastic properties. The monthly average oil price is 57.72 US dollars and MCAP has an average of 4556.22 million US dollars. On a monthly basis, the MCAP and Oil Prices reach their maximum value of 14027 million US dollars and 133.9 US dollars respectively. The two series are positively skewed with a flattened distribution than a normal distribution. The Jarque-Bera test indicates the non-normality of MCAP and OP oil price series.

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.

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

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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

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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-statistic)	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.

Concerning MCAP, its unit root tests (Table 2.2a and b) have results showing that MCAP also became stationary at first difference.. The finding reveals that the order of integration for both OP and MCAP series is I(1) and none is I(2).

Table2. 2a. Unit Root Test for Stationarity for Market Capitalization (MCAP) At level

Null Hypothesis: MCAP has a unit root
Exogenous: Constant
Lag Length: 1 (Automatic - based on AIC, maxlag=4)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-1.723941	0.4181
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(MCAP)
Method: Least Squares
Date: 10/30/20 Time: 11:18
Sample (adjusted): 1997M03 2020M08
Included observations: 282 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
MCAP(-1)	-0.025395	0.014731	-1.723941	0.0858
D(MCAP(-1))	-0.238134	0.058100	-4.098661	0.0001
C	120.7032	91.56059	1.318288	0.1885

R-squared	0.072650	Mean dependent var	3.503865
Adjusted R-squared	0.066003	S.D. dependent var	1075.288
S.E. of regression	1039.197	Akaike info criterion	16.74086
Sum squared resid	3.01E+08	Schwarz criterion	16.77961
Log likelihood	-2357.462	Hannan-Quinn criter.	16.75640
F-statistic	10.92869	Durbin-Watson stat	2.030040
Prob(F-statistic)	0.000027		

Figure 4

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Result of unit root test for MCAP (At Level Form)

1. The Null Hypothesis: MCAP has a unit root and it is not stationary
2. t-statistic is -1.723941
3. P-value = 0.4181. P-value is greater than 0.05, therefore we will not reject the null hypothesis
4. MCAP does have unit root. That is, it is not stationary at level

Table 2.2.b. Unit Root Test for Stationarity for Market Capitalization (MCAP) at first difference

Null Hypothesis: D(MCAP) has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on AIC, maxlag=4)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-21.61498	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(MCAP,2)
Method: Least Squares
Date: 10/31/20 Time: 22:10
Sample (adjusted): 1997M03 2020M08
Included observations: 282 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(MCAP(-1))	-1.250544	0.057855	-21.61498	0.0000
C	4.368925	62.10111	0.070352	0.9440

R-squared	0.625271	Mean dependent var	0.051135
Adjusted R-squared	0.623933	S.D. dependent var	1700.549
S.E. of regression	1042.850	Akaike info criterion	16.74437
Sum squared resid	3.05E+08	Schwarz criterion	16.77020
Log likelihood	-2358.956	Hannan-Quinn criter.	16.75473
F-statistic	467.2072	Durbin-Watson stat	2.036177
Prob(F-statistic)	0.000000		

Result of unit root test for MCAP at First Difference

1. The Null Hypothesis: MCAP has a unit root and it is not stationary

T t-statistic is -21.61498

p-value = 0.0000. P-value is less than 0.05, therefore we reject the null hypothesis

MCAP does not have unit root. That is, it is stationary at first difference

This result shows that Market Capitalization is stationary at first difference. i.e I (1) order integration**.**

4.3 ARDL Optimal Lag Selection

The ideal lag length was obtained as displayed in table 3 by estimating the regressions separately and following consecutive modified LR t-statistic. Each test was conducted at 5% level of significance. This was achieved using various lag order selection criteria comprising the Hannan-Quinn Information criterion (HQ), Akaike Information Criterion (AIC), Final Prediction Error (FPE) and Schwarz Information Criterion (SIC). They According to Raza,Shahbaz and Nguyen(2015), it is mandatory to take them into consideration whenever the NARDL estimating technique is used. Lag length 3 was considered suitable for the variables as it provides the least criteria for the value of FPE, AIC, SIC, and HQ.

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Table 3: The ARDL Optimum Lag Selection Criteria

VAR Lag Order Selection Criteria
Endogenous variables: LINR
Exogenous variables: C LOP
Date: 11/03/20 Time: 13:51
Sample: 1997M01 2020M08
Included observations: 276

Lag	LogL	LR	FPE	AIC	SC	HQ
0	-160.8748	NA	0.190591	1.180252	1.206487	1.190780
1	260.8082	834.1989	0.009040	-1.868175	-1.828823	-1.852384
2	365.1733	205.7051*	0.004275	-2.617198	-2.564728*	-2.596142*
3	366.4210	2.450169	0.004267*	-2.618992*	-2.553406	-2.592674
4	366.8113	0.763688	0.004286	-2.614575	-2.535870	-2.582992
5	366.8192	0.015356	0.004317	-2.607385	-2.515564	-2.570539
6	367.5964	1.509315	0.004324	-2.605771	-2.500832	-2.563660
7	367.6116	0.029474	0.004355	-2.598635	-2.480578	-2.551261
8	367.6850	0.141539	0.004384	-2.591920	-2.460746	-2.539283

* indicates lag order selected by the criterion
LR: sequential modified LR test statistic (each test at 5% level)
FPE: Final prediction error
AIC: Akaike information criterion
SC: Schwarz information criterion

4.4 The NARDL Regression Model

Table 4 shows the estimation of the NARDL (short run). The regression model that underlies the NARDL equation, shown in (1) above fits well and appropriately. The model is statistically significant at 5% level.

Asymmetric effect: the response of market capitalization to positive and negative shocks in oil price

The estimation results in table 4 show that one unit increase in oil price (LOP_POS) (positive shocks) is associated with 0.127130 or (12.7%) increase in market capitalization on average ceteris paribus. Positive changes in oil price have a statistically significant effect on the market capitalization since the p-value is 0.0025. Since the p-value is less than 0.05, the null hypothesis that there is no significant effect of positive oil price shocks on market capitalization is rejected.

In addition, the results in table 4 indicate that one unit decrease in oil price (LOP_NEG) (negative shocks) is associated with 0.137352 or (13.7%) decrease in market capitalization on average ceteris paribus. Negative changes in oil price have a statistically significant effect on the market capitalization since the p-value is 0.0018. As the p-value is less than 0.05, the null hypothesis that there is no significant effect of negative oil price shocks on market capitalization is rejected.

In summary, the positive and negative changes of oil price in the current period has a significant effect on the market capitalization. In other words,oil price changes have significant and positive effects on market capitalization of the Nigerian capital market.

Table 4: Dynamic Estimation of NARDL (Short Run

ARDL Long Run Form and Bounds Test
Dependent Variable: D(LMCAP)
Selected Model: ARDL (3, 0, 0)
Case 2: Restricted Constant and No Trend
Date: 11/08/20 Time: 17:10
Sample: 1997M01 2020M08
Included observations: 281

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Conditional Error Correction Regression				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.378111	0.131877	2.867148	0.0045
LMCAP(-1)*	-0.053147	0.020165	-2.635558	0.0089
LOP_POS**	0.127130	0.041627	3.054033	0.0025
LOP_NEG**	0.137352	0.043484	3.158662	0.0018
D(LMCAP(-1))	-0.378409	0.058517	-6.466676	0.0000
D(LMCAP(-2))	-0.152205	0.057906	-2.628484	0.0091

* 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	2.392064	0.620595	3.854466	0.0001
LOP_NEG	2.584399	0.732071	3.530255	0.0005
C	7.114501	0.634573	11.21148	0.0000

EC = LMCAP - (2.3921*LOP_POS + 2.5844*LOP_NEG + 7.1145)

F-Bounds Test		Null Hypothesis: No levels relationship		
Test Statistic	Value	Signif.	I(0)	I(1)
			Asymptotic: n=1000	
F-statistic	3.010892	10%	2.63	3.35
K	2	5%	3.1	3.87
		2.5%	3.55	4.38
		1%	4.13	5
			Finite Sample:	
Actual Sample Size	281		n=80	
		10%	2.713	3.453
		5%	3.235	4.053
		1%	4.358	5.393

4. 5: Testing for Short-Run Asymmetries

We determined if the difference between the coefficient of the positive and negative changes is statistically significant with the intention of concluding, if found to be significant, that the relationship between market capitalization and oil price is asymmetric.The result of Wald test in table 5 shows that both positive and negative changes in oil price have significant impact on Market Capitalization .The next step taken was to find out if the two shocks are of the same magnitude (symmetric effect) or different (asymmetric effect). As the p-value is 0.0983, the implication is that the the null hypothesis that both the POS and NEG shocks in the oil price are the same should be accepted. Consequently, the conclusion is that there is no short run asymmetric effect between oil price and market capitalization.

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Table 5:
Wald Test:
Equation: NARDL04

Test Statistic	Value	Df	Probability
t-statistic	-1.658883	275	0.0983
F-statistic	2.751893	(1, 275)	0.0983
Chi-square	2.751893	1	0.0971

Null Hypothesis: C(4)=C(5)
Null Hypothesis Summary:

Normalized Restriction (= 0)	Value	Std. Err.
C(4) - C(5)	-0.010222	0.006162

Restrictions are linear in coefficients.

4.6 Bounds test

The result of the bound test in table 4 shows that at 5 % level of significance, the F-Statistic is 3.010892 while the Critical Value of the lower bound I(0) is 3.1 at 5%. Since 3.010892 is less than the critical values of I(0), the Null hypothesis should not be rejected.Therefore,there is no cointegration between the variables. This result implies thate there is no long run relationship between the variables.

4.6: Heterskedasticity Test

The p-value of 0.479 shown in the heterskedasticity test(table 4.6) implies that the null hypothesis that residual is homoskedastic should be accepted. This means that the residual is homoskedastic

Table 6: Heterskedasticity Test

Heteroskedasticity Test: Breusch-Pagan-Godfrey

F-statistic	0.902980	Prob. F(5,275)	0.4795
Obs*R-squared	4.538889	Prob. Chi-Square(5)	0.4747
Scaled explained SS	114.3141	Prob. Chi-Square(5)	0.0000

Test Equation:
Dependent Variable: RESID^2
Method: Least Squares
Date: 11/09/20 Time: 08:49
Sample: 1997M04 2020M08
Included observations: 281

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-0.215462	0.233945	-0.920994	0.3579
LMCAP(-1)	0.141344	0.104134	1.357327	0.1758
LMCAP(-2)	-0.068435	0.117400	-0.582923	0.5604
LMCAP(-3)	-0.029242	0.102723	-0.284666	0.7761
LOP_POS	-0.136085	0.073845	-1.842851	0.0664
LOP_NEG	-0.142872	0.077139	-1.852127	0.0651

R-squared	0.016153	Mean dependent var	0.060818
Adjusted R-squared	-0.001736	S.D. dependent var	0.441847

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S.E. of regression	0.442231	Akaike info criterion	1.227151
Sum squared resid	53.78119	Schwarz criterion	1.304838
Log likelihood	-166.4147	Hannan-Quinn criter.	1.258308
F-statistic	0.902980	Durbin-Watson stat	1.676505
Prob(F-statistic)	0.479538		

4.7 Serial Autocorrelation LM Test

Table 7 indiates that the F-statistic has a p-value of 0.4466 Consequently**,** the null hypothesis that there is no serial autocorrelation issue is accepted.

Table 7: Serial Autocorrelation LM Test

Breusch-Godfrey Serial Correlation LM Test:

F-statistic	0.808578	Prob. F (2,273)	0.4466
Obs*R-squared	1.654744	Prob. Chi-Square (2)	0.4372

Test Equation:
Dependent Variable: RESID
Method: ARDL
Date: 11/09/20 Time: 08:50
Sample: 1997M04 2020M08
Included observations: 281
Presample missing value lagged residuals set to zero.

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LMCAP(-1)	-0.226357	0.263689	-0.858423	0.3914
LMCAP(-2)	0.318170	0.271839	1.170435	0.2428
LMCAP(-3)	-0.091918	0.129341	-0.710662	0.4779
LOP_POS	0.004266	0.048394	0.088146	0.9298
LOP_NEG	0.005575	0.050902	0.109528	0.9129
C	0.005099	0.157514	0.032372	0.9742
RESID(-1)	0.231511	0.269712	0.858362	0.3914
RESID(-2)	-0.211124	0.170540	-1.237972	0.2168

R-squared	0.005889	Mean dependent var	1.26E-15
Adjusted R-squared	-0.019601	S.D. dependent var	0.247054
S.E. of regression	0.249463	Akaike info criterion	0.089046
Sum squared resid	16.98931	Schwarz criterion	0.192629
Log likelihood	-4.511013	Hannan-Quinn criter.	0.130589
F-statistic	0.231022	Durbin-Watson stat	2.002302
Prob(F-statistic)	0.977580		

4.8 Discussion of results

This study examined the impact of oil price changes on the market capitalization of the Nigerian capital market between the period from January 1997 and August,2020. It employed the Nonlinear autoregressive lag model to capture the possible short, medium-, and long-term causal effects between the variables of interest as well as the asymmetric nature of their relationship. The NARDL estimation was done after ensuring the stationarity of the variables. Equation (1) is estimated with oil price as exogenous variable to market capitalization. This is 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 also show there is the absence of short run asymmetric effect between oil price and market capitalization just as there is no long run relationship between them.

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The results of the study show that the positive and negative changes of oil price have significant impacts on the market capitalization. In other words, whether positive or negative, innovations in international oil price oil would have significant and direct impacts on market capitalization of the Nigerian capital market, especially in the short run.

These results alligns with theoretical a priori expectation for an oil exporting country like Nigeria that an increase in the international oil price should have a significant and positive effect on market capitalization. The confirm the findings of several empirical studies that propose a significant and 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), Bhar and Nikolova (2010), Bellalah (2010) and Chen (2010). 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 short run asymmetric effect and no long run relationship oil price between and market capitalization some earlier works like Janor,Housseinidoust and Rahim(2013) report asymmetric connection between them .For Marathe and Raju (2020) , there is a long-term relationship between the macroeconomic variables and crude oil, and a uni-directional and bi-directional relationship between the variables.One of the policy implication of the findings is that short term energy policy would be appropriate for oil price- market capitalization relationship in Nigeria.In addition , the negative relationship exhibited by some stock markets and the oil price has an immediate implication of shifting foreign direct investments in and away from stock markets in African economies that are oil dependent.

5. Conclusion

This study investigaqted the impact of oil price changes on the market capitalization of the Nigerian capital market using mothly secondary data for the period from January 1997 io August,2020. The two variables were tested and found stationary at first difference or I(1) but not at second difference or I(2). The results of the study show that the positive and negative changes of oil price have significant impacts on the market capitalization. In other words, whether positive or negative, innovations in international oil price oil would have significant and direct impacts on market capitalization of the Nigerian capital market,especially in the short run..

For policy relevance, the findings suggest that policymakers should be cognizant of oil prices .When oil price changes take place, relevant monetary policy measures should be employed to stabilize the unanticipated impacts on market capitalization that may distort the economy. In addition,based on the empirical findings oil-exporting developing countries should devise strategies that can ensure stability in their capital markets by vigorously pursuing progrowth policies irrespective of the shocks in oil price and other exogenous macroeconomic indicators.

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