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Oil Price-Stock Market Nexus: A Study of Nigeria and South Africa Economies

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***Abstract*— This paper examines the oil price-stock market nexus in Nigeria and South Africa as the two leading economies in Africa. The study applied econometrics method using ARDL/Bound test approach. Secondary data which consists of quarterly time series between 1st quarter 2003 and 4th quarter 2018 were used. Examination of the time series properties of the variable data results show that all the variables, apart from CPI, are I (1) series. CPI is I (0) series. the Bund/ARDL cointegration shows the existence of a long-run relationship between excess stock market returns and oil price changes in Nigeria, but no long run oil price- stock returns**

in South Africa. Estimate of the ARDL model shows that oil price changes have positive and significant effect on stock market returns in Nigeria in the short-run, but positive and insignificant long run effect. However, oil price changes have positive, but insignificant effect on stock returns in South Africa. The study conclude that oil price shocks contributes to more variability in Nigeria stock market returns than in south Africa, and therefore recommends that the government put in place appropriate policy to reduce sensitivity of the capital market to oil price volatility in Nigeria.

***Index Terms*— Bound Test, Oil price, Sensitivity , Stock Market, Volatility.**

I. INTRODUCTION

Oil is the engine that powers the modern economies, either developed or developing economies. Oil is key as countries or economies develop or modernize. There is a direct relationship between modernization and the demand for oil (Basher & Sadorsky, 2006). Although, forecasting oil demand for future consumption is not easy, but it can be said that the demand for oil and the industrial development are highly correlated.

The study of oil prices and its impacts on macroeconomic variables is practically indispensable, given the high volatility that has characterized the price of oil in the last three decades. Oil is demanded for production Therefore, the demand for oil is a derived demand. This implies that oil is not demanded for its immediate use but for the need of satisfying other purposes. The need for oil cuts across every sector of the economy and fluctuation in oil prices would definitely affect both the exporting and importing countries. Fluctuations in oil price, oil price shocks could result to high cost of production of oil derivatives, inflation,

transfer of wealth from oil consumers to oil producers, and on financial markets and exchange rates among others (Blanchard & Gale, 2007; Turhan et al, 2013).

The cash flow hypothesis by Jones and Kaul (1996) posit that oil price can affect stock price directly by impacting on the future cash flows or indirectly through the interest rate used to discount the future cash flows (Basher et al. (2004). This fact is further illustrated by taking oil as one of the inputs in heavy firms' production. It is expected that cash flows can be impacted by fluctuations in the oil price, which ultimately, lead to changes in costs, affecting earnings and dividends and hence stock price (Rafailids & Katrakilidis,2014; Salius & Isah, 2017). According to Jones et al., (2004), stock values reflect the markets' best estimate of the future profitability of firms, so the effect of oil price shocks on the stock market is a meaningful and useful measure of their economic impact.

There is, therefore a nexus between oil price variations and financial market performance. It is anticipated that oil prices shocks will correlate with volatility in prices of stocks. Since asset prices are the present discounted value of the future net earnings of firms, both the current and expected future prices oil price shock are absorbed fairly quickly into stock prices and returns, without having to wait for these impacts to actually occur. It therefore implies that changes in oil price is quickly transmitted to stock prices. For an oil importing country as in the case of South Africa, a rise in oil price will put a decreasing pressure on exchange and returns on the financial market and a rise on the domestic inflation resulting from oil derivatives and the reverse is the case in an oil exporting country like Nigeria, (Zebende, 2014).

On the basis of the foregone, the aim of the study is to examine the oil price-stock market nexus in Nigeria and South Africa. The choice of the two countries are informed by some factors. Firstly, Nigeria and South Africa are two major economies in African energy markets i.e. major exporter (Nigeria) and major importer (South Africa) and their stock markets are vulnerable to fluctuations in oil prices. Secondly, a good amount of work (literature) has been done in this area, especially for both importing and exporting countries across the globe, continents and regions, (Afees & Kazeem, 2017; Adenikinju & Musibau, 2012). To our best of knowledge, this is the first work to examine the impact of changes in oil prices on the stock market behaviour of the two leading economies in African market. Furthermore, several studies have reported a negative relationship between oil prices and stock prices (Jones and Kaul 1996; Ciner 2009) and others also posit that there is positive relationship between oil price and stock prices (Adenikinju & Musibau, 2012, Chen et al, 1996).

The present study is justified by the need to provide empirical understanding of the impact of oil price fluctuations on stock markets movement and sound theoretical guide to policy that will cushion the effect of oil price volatility on financial market performance. The rest of

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the paper is structured as follows; the section 2 is literature review, section 3 is the methodology of the study. Section 4 presents the empirical results and discussion of findings. In section 5, we summarise the study and draw conclusion from the study.

II. LITERATURE REVIEW

Enormous studies have been carried out on the impacts of oil price shocks on the stock markets of various economics. Some prominent papers published relating to this study include Park and Ratti, 2008; Kilian and Park, 2009; Filis et al., 2011; Basher et al., 2012; Antonakakis and Filis, 2013; and Wang et al.,2013. Most of their study were however focused on developed countries especially US and China where a consensus showed a negative relationship between oil price and stock returns.

However, Wang et al, 2013 in their study of impacts of oil price shocks observed that the response of the stock market to oil price shocks depends on the country's net position in the oil market, that is, if the country is an oil-importer or oil-exporter. Filis et al (2011) in their study of the dynamic correlation between oil price and stock market observed that the responses of stock markets differ with respect to the type of oil price shocks. They separated oil price shocks into various types including: oil supply shocks, aggregate demand shocks and other oil-specific market shocks. The percentage contributed by each shock type is based on the economy's dependence on oil.

Tajudeen and Terfa (2010) in their study using autoregressive Distributed Lag model found that the impact of oil prices shocks on the Nigerian stock market performance small, though is positive. Analysis of the model showed a unit increase in oil prices in the global economy, will result in a 0.0507unit increase in the Nigerian stock market all share index and vice versa.

In the same view, Aye (2016) who examined the effect of oil price shocks on the Johannesburg Stock Exchange observed that oil price shocks create a negative and marginally significant effect on the Johannesburg Stock Exchange From the study, an oil price increase will result in a reduction of the stock market returns from 50% to 20%. He further noted that the impact of oil price shocks on the South African stock is asymmetric.

Adebiyi and Abeng (2009) analysed the impact of oil price shocks on the real stock returns in Nigeria between 1985-2008 using a multivariate VAR analysis approach. The results show that oil prices shocks have negative impact on real stock returns in Nigeria and causality from oil price to stock market. They concluded that the Nigerian real stock return responds instantly and negatively on oil price shocks.

Bjornland(2009) analysed the effect of oil price shocks on stock returns in Norway which is an oil exporting country using SVAR methodology. He observed that an increase of 10% in oil price is followed by a 2.5% in stock returns. The conclusion of the study indicates that a positive oil price shock will invariably have a positive effect on stock returns for oil exporting economies and a negative effect for oil importing countries.

Talukdar and Sunyaeva(2011) examined the impact of oil price shocks in 11 OECD countries between 1986 and 2010. The result revealed that except for Canada and Norway, oil price shocks have negative impact on the stock returns. They, therefore concluded that the impact of oil shocks depends on the net position of the country in the international oil market.

Bredin and Elder (2011) examined the exposure of 18 industries stock returns to oil shocks in the U.S. using the linear factor model (Arbitrage Pricing Theory). The result reveals a weak direct exposure of majority of the industry returns to oil price changes.

Yurtsever and Zahor (2007) analysed the reaction of stock returns to oil price shocks as well as the symmetry of this shock on firms and industries in the Netherlands. They employed standard market model, augmented by the oil price factor framework for the analysis. The result shows a significant negative effect of oil price shock on the stocks of some industries and individual firms (including banks and chemical industries)20

Horng and Wang (2008) used Dynamic Conditional Correlation (DCC) and bivariate assymetric-IGARCH (1,2) to examine the relationship of the U.S. and the Japan's stock markets under positive and negative of the oil prices' volatility rate. Their result revealed that the U.S. and Japan's stock markets have positive relationship and have asymmetrical effects. The variation risks of the two stock markets returns also receive the positive and negative of the oil prices' volatility rate

Anugerah(2016) carried out a study of several oil exporting and importing countries using the ARDL model approach between 2006 and 201. The results revealed that oil price shocks have a positive, long run coefficient effect on the stock market in all oil exporting countries including Nigeria and notably South Africa despite being an oil importer while a negative, long run relationship exists for oil importing countries.

Despite the numerous studies carried out, existing literature has not focused on the time-varying relationship between the individual oil price shocks types and stock market returns for both economies, as well as the different responses of the various sectors to oil price shocks. This will be the main contribution of this study to the body of existing literature

III. METHODOLOGY

In this section, we provide explanation for the method employed for collection and analysis of the study data. The methodology is organised as follows:

A. Model Specification

To examine oil price-stock market nexus requires a well-structured model underlying relationship. The two-factor model as adopted in studies such as Fall and Brailsford, 1999; Sadorsky, 2001; Sadorsky and Henriques, 2001; El-Sharif et al., 2005 is the most prominent in the literature. The two-factor model is generally stated as:

$$Rs_t = \alpha + \beta_1 Ro_t + \varepsilon_t \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots(1)$$

Where α and β are intercept and coefficient terms respectively, Rs_t is excess returns, Ro_t is the return on oil prices ,and ε_t is the error term.

However, the two-factor model appeared to be underspecified because the exchange rates between the home currency and the US $ for which oil price is traded is not included (Sadorsky, 2001; Ramos et al., 2011). Exchange rate and inflation rate (price level) stand as a proxy for foreign exchange risk and also as control variables in studies to investigate oil price- stock prices return in each of the country (Sadorsky, 2001; Ludek, 2013; Anugerah, 2016).Consequently, the appropriate model for each of the country is stated as follows:

$$Rs_t = \alpha + \beta_1 Oil_t + \beta_2 Exc_t + \beta_3 CPI_t + \varepsilon_t \ldots\ldots\ldots\ldots\ldots(2)$$

All variables are as earlier defined except EXC which represents exchange rate variable and CPI which stands for price level. According to the CAPM, only the return in excess of the risk-free rate is of concern. So, excess stock return is used in this study. Real exchange rate is added to reflects the purchasing power. Inflation was added as control variable for the study and to indicate impact of oil prices on domestic price level. The datasets of the study span from 1st quarter 2003 to 4th quarter 2016 for countries- Nigeria (exporter) and South Africa (importer). All the data for the variables used for analysis for the study were collected from Central Bank of Nigerian Statistical bulletin and Reserved Bank of South Africa. Supplementary data were sourced from the U.S. Energy Information Administration (EIA) for oil price data.

B. *Method of Analysis*

In econometrics, there are several methods available to test for the existence of the long-run equilibrium relationship among time-series variables. The most widely used methods include Engle and Granger (1987) test, fully modified OLS procedure of Phillips and Hansen's (1990), maximum likelihood based Johansen (1988,1991) and Johansen-Juselius(1990) cointegration tests. However, these methods require that the variables in the system are integrated of order one I(1). In addition, these methods suffer from low power and do not have good small sample properties.

Due to these problems, Pesaran, Shin and Smith(2001) developed autoregressive distributed lag (ARDL) approach to cointegration. The ARDL has become popular in recent years. This study employs Autoregressive Distributed Lag Approach. This methodology is chosen as it has certain advantages over other cointegration procedures. For example, it can be applied regardless of the stationary properties of the variables in the sample, provided there is no I(2) series among the variables. Secondly, it allows for inferences on long-run estimates which are not possible under alternative cointegration procedures. Finally, ARDL Model can accommodate greater number of variables in comparison to other Vector Autoregressive (VAR) models. The ARDL has four important stages of unit root analysis, cointegration test, estimate of ARDL- the long run and short run model, and diagnostic tests. The following procedure were adopted for the four stages.

C. *Unit Root Tests*

Econometrics theory suggest that time series variables should be stationary in order to avoid spurious regression. Augmented Dickey Fuller (ADF) is employed to test for presence of unit root. The null hypothesis is that the series contains unit root and thus not stationary. While, if the null hypothesis is rejected, a stationary characteristic can be concluded. the ADF was complemented with the Phillips-Perron (1978) test approach to ensure accuracy of results

D. *Cointegration Test-ARDL/Bound Test*

To examine whether there is a cointegration or long-term relationship among variables of interest, the bounds test procedure, developed by Pesaran et al. (2001) was used. Unlike other cointegration test, bound test is applicable regardless of whether the variables in the model are *I(0)* or *I(1)* or a mixture of both. However, the method is invalid in the presence of *I(2)* series. The. ARDL/Bound test cointegration model of our empirical model could be specified as follows:

$$\Delta \log(Rs_t) = \alpha + \beta_1 \log(Rs_{t-i}) + \beta_2 \log(\text{Oil\_Brt}_{t-i}) + \beta_3 \log(\text{Rex}_{t-i}) + \beta_4 \log(\text{Cpi}_{t-i})$$
$$+ \sum_{i=1}^{p} \beta_5 \Delta \log(Rs_{t-i}) + \sum_{i=1}^{q} \beta_6 \Delta \log(\text{Oil\_Brt}_{t-i}) + \sum_{i=1}^{q} \beta_7 \Delta \log(\text{Rex}_{t-i})$$
$$+ \sum_{i=1}^{q} \beta_8 \Delta \log(Cpi_{t-i}) + \varepsilon_t \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots(3)$$

The first part of the model with β_1 to β_4 represents the long-run dynamics of the models; whereas the second part with β_5 to β_8 represents the short-run relationship and ε_t is the error term. Once cointegration is established, optimal lag length is selected based on Schwarz Information Criterion (SIC), then, long run and short run coefficients can be estimated. The conditional ARDL $(p_1, q_1, q_2, q_3,)$ long-run model is established as follows:

$$Rs_t = \alpha + \sum_{i=1}^{p} \beta_1 \log(Rs_{t-i}) + \sum_{i=1}^{q_1} \beta_2 \log(\text{Oil\_Brt}_{t-i}) + \sum_{i=1}^{q_2} \beta_3 \log(\text{Rex}_{t-i}) + \sum_{i=1}^{q_3} \beta_4 \log(Cpi_{t-i}) + \varepsilon_t \quad \ldots\ldots(4)$$

Finally, Short Run Dynamic coefficients are obtained by estimating an error correction model associated with long run estimates. The equation is as follows:

$$Rs_t = \alpha + \sum_{i=1}^{p} \beta_1 \Delta \log(Rs_{t-i}) + \sum_{i=1}^{q_1} \beta_2 \Delta \log(\text{Oil\_Brt}_{t-i}) + \sum_{i=1}^{q_2} \beta_3 \Delta \log(\text{Rex}_{t-i}) + \sum_{i=1}^{q_3} \beta_4 \Delta \log(Cpi_{t-i}) + \beta_5 \text{ECT}_{t-i} + \varepsilon_t \quad \ldots\ldots(5)$$

Where β_1 to β_4, are the short-run dynamic coefficients of the model's convergence to equilibrium, while β_6 represents the speed of adjustment. The null hypothesis of no cointegration is rejected when the calculated F-statistics is greater than critical value of the upper bound or when the calculated t-statistics is lower than critical value of the upper bound. If the calculated value falls within the bound, then the inference is inconclusive.

IV. EMPIRICAL RESULTS AND DISCUSSION

This section presents the empirical results of the study and discussed our findings from the study.

To fully inspect if there is any possible correlation between stock market price index and oil price, we plot the oil price against the countries' stock market index for the two economies. The graphs are presented as figure1 and 2 below.

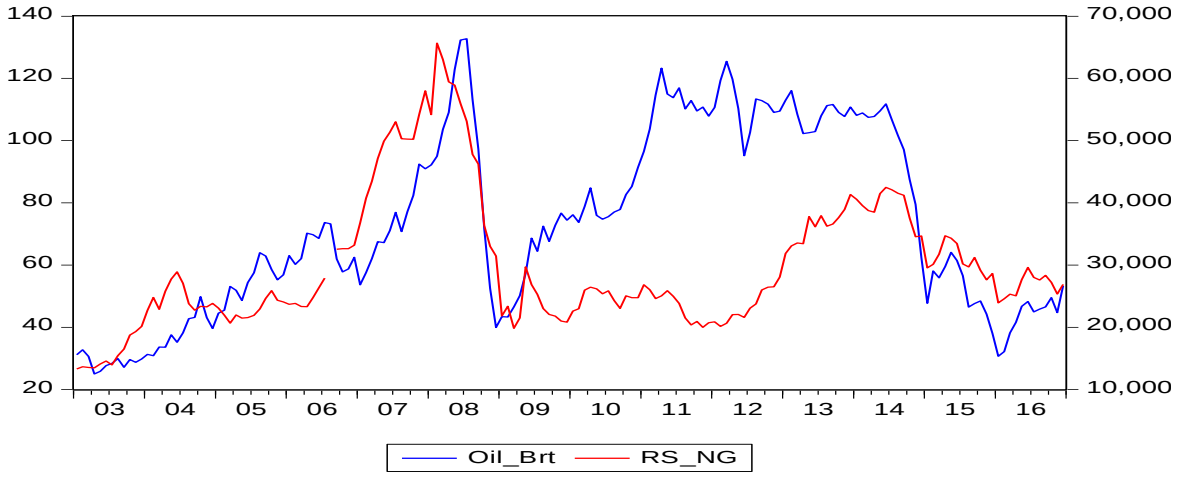

Figure 1: Nigerian stock returns against the oil price (Brent)

The two series in Nigeria appears to comove, apart from 2009 to 2010, when the two series exhibiting an opposite relationship in the early 2011. Hence, the two countries' series demonstrated a very strong positive co-movement with oil price within the study period.

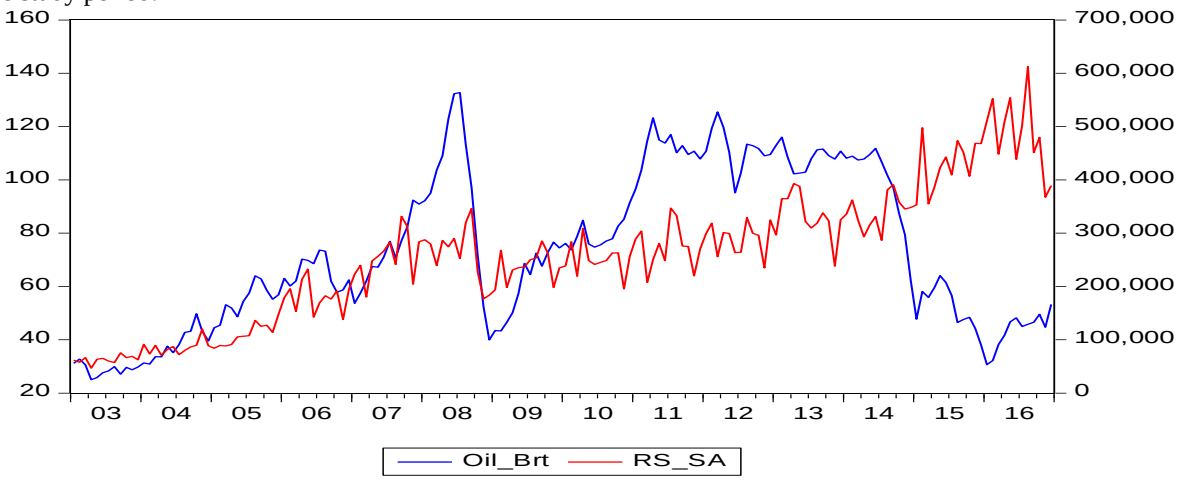

Figure 2: South Africa stock returns against the oil price (Brent)

The evidence of possible interaction between stock price and oil price seems obvious across the two countries. Unlike the, Nigerian case, the South Africa Stock that shows an opposite movement from 2014 to 2018 and from 2007 to 2009. The two series co-move between 2010 and 2013. On the whole, it shows a strong negative interaction between the

two series in South Africa as an oil importing nation.

A. Correlation Matrix and Descriptive Statistics

The correlation matrix and descriptive statistics are of the variables in the model for the two economies are presented in the Table 1.

Table 1: Correlation Matrix and Descriptive Statistics for both countries

	NIGERIA					SOUTH AFRICA			
VARIABLES	RS_NG	OIL_BRT	REX_NG	CPI_NG	Variables	RS_SA	OIL_BRT	REX_SA	CPI_SA
Observations	167	167	167	167	Observations	167	167	167	167
Mean	29857.60	73.10413	101.4734	11.42587	Mean	256886.3	73.10488	89.41143	4.469643
Median	26183.21	68.61000	93.40033	11.40000	Median	259684.5	69.19500	90.73000	5.100000
Maximum	65652.38	132.7200	162.8147	19.40000	Maximum	612552.0	132.7200	105.1100	11.60000
Minimum	13298.80	25.00000	60.88723	5.400000	Minimum	46962.00	25.00000	68.37000	-3.700000
Std. Dev.	10714.73	29.61985	29.34533	3.349209	Std. Dev.	122279.1	29.53103	8.663252	2.856357
Skewness	1.200121	0.181066	0.668823	0.341444	Skewness	0.248085	0.181531	-0.179370	-0.969916
Kurtosis	4.077508	1.749058	2.101875	2.643588	Kurtosis	2.735343	1.759513	2.042012	4.269759
RS_NG	1.0000	0.4260	0.0420	-0.6562	RS_SA	1.0000	0.3120	-0.5981	0.4517
OIL_BRT		1.0000	-0.3370	-0.3283	OIL_BRT		1.0000	-0.0159	0.2336
REX_NG			1.0000	0.2532	REX_SA			1.0000	-0.54360
CPI_NG				1.0000	CPI_SA				1.0000

Source: E-view computer output

As it can be seen in the correlation result, the stock return is positive and weekly correlated with the oil price. it implies a general co-movement between the series in both countries. Also, the correlation between the real exchange rate and oil price (Brent) is weekly negative. It shows that crude oil prices may not significantly impact on the real exchange rate. It has more negative impact on Nigeria as an oil exporting country than South African as an oil importing country. but weekly correlated with the stock return. stock return and inflation show a strongly negative relationship in Nigeria, but positive relationship in South Africa.

The Table 2 also display the group summary of descriptive statistics of excess returns of each country's stock indices. The sample means, standard deviations, skewness and kurtosis are presented. It can be seen that both countries series display positive skewness characteristics suggesting most of the excess returns in the series have more possibilities of increasing. Similarly, the mean of both countries is positive but South Africa average mean appears to be higher than Nigeria as an oil importing nation. Also, the standard deviation of the stock series appears to be more volatile in South Africa than Nigeria.

B. Unit Root Test

To test for stationarity features of all variables, the Augmented Dickey-Fuller (ADF) and Philips-Perron test approach were employed. From the unit results in the Table 2 and 3, CPI, display stationary at level in both ADF and PP. It implies that it has no unit root in the countries' series. Meanwhile, the rest of the variables showed non-stationarity at level. However, they be stationary after 1st differencing.

Table 2: Unit Root Test for Nigeria

NIGERIA	Augment Dickey Fully				Philips-Perron			
	WITHOUT TREND		WITH TREND		WITHOUT TREND		WITH TREND	
VARIABLES	LEVEL	DF	LEVEL	DF	LEVEL	DF	LEVEL	DF
ΔRS_NG	-1.781	-13.566***	-1.090	-13.632***	-2.514	-11.308***	-2.280	-11.374***
ΔOil_Brt	-1.641	-12.700***	-1.874	-12.702***	-2.090	-9.583***	-1.690	-9.607
ΔREX_NG	-1.309	-15.699***	-1.613	15.861***	-2.281	-11.839***	-2.742	-11.816***
ΔCPI_NG	-3.6327**	-3.962**	-3.3773**	-3.947**	-2.182	-3.685**	-2.096	-3.701**

Table 3: Unit Root Test for South Africa

SOUTH AFRICA	Augment Dickey Fully				Philips-Perron			
	WITHOUT TREND		WITH TREND		WITHOUT TREND		WITH TREND	
VARIABLES	LEVEL	DF	LEVEL	DF	LEVEL	DF	LEVEL	DF
ΔRS_SA	-2.158	-3.534**	-2.000	-3.815**	-2.084	-29.694***	-4.503***	-29.060***
ΔOil_Brt	-2.153	-9.558***	-1.919	-9.597***	-2.090	-9.583***	-1.690	-9.607***

ΔREX_SA	-1.886	-10.879***	-2.835	-10.857***	-2.273	-11.263***	-3.338*	-11.329***
ΔCPI_SA	-2.974**-	-15.396***	3.690**	-15.398***	-2.821	-15.400***	-3.690**	-15.410***

* Significant at 10% level.
** Significant at 5% level.
*** Significant at 1% level

Having establishing that the variables in model two are mixture of I(0) and I(1), with none show the existence of I(2) variables, it is possible now to run ARDL (Autoregressive Distributed Lag) analysis to investigate the existence of a long-run as well as short-run dynamics among the variables in the model.

Table 4: ARDL/ Bound Cointegration Tests Results for South Africa and Nigeria

	F-Statistics value	Significance Level	Bound Critical Values	
			I(0)	I(1)
SOUTH AFRICA	1.864942	1% 5% 10%	8.74 6.56 5.59	9.63 7.3 6.26
NIGERIA	4.692443	1% 5% 10%	5.17 4.01 3.47	6.36 5.07 4.45

The results of the ARDL/ bound cointegration test result is presented in the Table 4. The show that the calculated F-statistics for South Africa is 1.86, which is less than the upper and lower levels critical values at all levels of significance. One may conclude that the null hypothesis of no co-integration cannot be rejected (Pesaran et al., 2001). There is no stable long run relationship among the variables in South Africa. Hence, only short run model will be estimated for South Africa.

The F-Statistics for Nigeria (4.69) is high than the upper bound critical values at all 5% level of significance. We therefore reject the null hypothesis of no cointegration for Nigerian series. Thus, having found that there is no long-run relationship for South African series, we have applied ARDL method to estimate the short-run model for South Africa, but both short-run and long-run models for Nigeria (Pesaran et al., 2001 and Narayan, 2005].

Estimated Long-Run Result ARDL for Nigeria

$$LOG(RS\_NG_t) = 7.599*** + 0.0561LOG(\text{OIL\_BRT}_t) + 0.833**\text{LOG}(\text{REX\_NG}_t) - 0.697***\text{LOG}(\text{CPI\_NG}_t)$$

Std.Error (1.918) (0.146) (0.356) (0.186)

t statistics in parentheses
* p<0.10, ** p<0.05, *** p<0.01

The long run coefficients estimated are based on the corresponding ARDL (4, 0, 0, 0) selected by SIC The estimated coefficients of the long-run relationship show that oil prices(oil_brt) returns have positive and but insignificant long-run effect on stock market returns in Nigeria. The insignificance of the oil price could be attributed to Nigeria being an oil exporting nation that is solely dependent on imported petroleum products. This, however, tends to cancel out proceeds from oil that would have benefitted the country in the long-run. This implies that a 1% rise in oil price will on average, lead to 0.056% increase in excess returns of stock indices in Nigeria, all things being equal. Also, exchange rates and inflation used here as control variables show a positive and negative relationships respectively, with the stock returns in Nigeria.

Short-run Estimates for Nigeria

Table 5: The ARDL Error Correction Model for RS_NG (Nigeria)

VARIABLES	Coefficients (Std. Error)	Diagnostic Test
$\Delta LOG(OIL\_BRT_t)$	0.1356** (0.0614)	**Linearity** = RAM-SET-Test: F-Stat [0.001]
$\Delta LOG(OIL\_BRT_t(-1))$	0.1712** (0.0616)	**Autocorrelation** = LM Test (2): F-Stat [0.2790]
$\Delta LOG(REX\_NG_t)$	0.1331 (0.1018)	= LM Test (4): F-Stat [1.6725]
$\Delta LOG(REX\_NG_t(-1))$	-0.3494*** (0.1008)	**Heteroscedasticity** = ARCH (2) F-Stat: [6.2453]
$\Delta LOG(CPI\_NG_t)$	-0.0704*** (0.0239)	= ARCH (4) F-Stat: [9.1794]
ECT_{t-1}	-0.1010*** (0.0251)	**Normality Test** = JB – F-Stat [60.2141]
		R2-squared = 0.9599
		Adjusted R2-squared = 0.9576
		SC = -2.3246
		Durbin-Watson = 1.9266
		F-Stat (Prob) = 410.4280(0.0000)

Note: t- statistics in parentheses
**Significant at 5% level.
***Significant at 1% level.

The dynamics of the short-run equilibrium are different from those of the long-run. In the short-run, deviations from the long-run equilibrium can occur due to shocks in any of the variables in the model. The results of the dynamic model and the various diagnostic tests are presented in the Table 6. In case of Nigeria, all variables except (REX_NG) are found statistically significance at 5% level and the error correction term which is -0.1010 has the expected sign a and statistically significant.

The reported diagnostic results show that there is no evidence of diagnostic problem with the model. The Lagrange multiplier (LM) test of autocorrelation suggests that the residuals are not serially correlated. According to Jarque-Bera (JB) test, the null hypothesis of normally distributed residuals cannot be rejected. The ARCH heteroscedasticity test proved that the disturbance term in the model is homoscedastic. The Ramsey RESET test indicates no specification error.

Measuring the explanatory power of the model by the adjusted R-Squared, about 96% of the variation in stock returns is explained. At lag 1, if oil price increases by 1%, excess stock returns will rise by 0.1712%. Also, at lag 0, 1% increase in Real Exchange rate (REX_NG) will lead to 0.1331% rise in stock returns but insignificant. At lag 1, 1% rise in the (REX_NG) will on average, lead to 0.3494% fall in the stock returns. Meanwhile, 1% increase in inflation will lead to 0.0704% decrease in excess stock returns.

Short-run Estimates for South Africa

Table 6: The ARDL Error Correction Model for RS_SA (South Africa)

Variables	Coefficients (Std. Error)	Diagnostic Test
C	0.8320 (0.0007)	
ΔLOG(RS_SA(-1))	0.3550*** (0.0770)	Linearity = RAM-SET-Test: F-Stat [3.1016]
ΔLOG(RS_SA(-2))	0.1323 (0.0812)	Autocorrelation = LM Test (2): F-Stat [0.3078]
ΔLOG(RS_SA(-3))	0.1564* (0.0812)	= LM Test (4): F-Stat [1.5047]
ΔLOG(RS_SA(-4))	0.2291** (0.0777)	Heteroscedasticity = ARCH (2) F-Stat: [0.1112]
ΔLOG(OIL_BRT)	0.0248 (0.0368)	= ARCH (4) F-Stat: [0.2770]
ΔLOG(REX_SA)	0.1282 (0.1845)	Normality Test = JB – F-Stat [2.1525]
ΔLOG(CPI_SA)	-0.0097** (0.0258)	
		R2-squared = 0.9297
		Adjusted R2-squared = 0.9261
		SC = -0.7052
		Durbin-Watson = 2.2022
		F-Stat (Prob) = 256.2886(0.0000)

Table 6 shows the short-run dynamic results for excess stock return in South Africa. The results show that the South Africa excess stock returns for lags 1, 3, 4 and CPI are significant at 10% in the short-run. The oil price and exchange rate are insignificant, but positive in explaining stock price behaviour in the short-run. From the result, it implies that 1% increase in oil price will lead to about 0.0248 per cent rise in stock prices. Also, 1% rise in exchange rate will cause stock price to rise by 0.1282%. But inflation shows negative relationship with the stock prices. This implies that 1% rise in the general price of goods and services in South Africa will on average, lead to 0.0097% fall in the stock prices. This is infinitesimal and statistically significant in explaining variations in stock prices at 5% significant level.

The reported diagnostic results show that there is no evidence of diagnostic problem with the model. The explanatory power of the model judging by the adjusted R-Squared, shows that about 92.6% of the variation in stock returns is explained. This implies that the excluded variables can only contribute about 7.4% variations in the model. The Lagrange multiplier (LM) test of autocorrelation suggests that the residuals are not serially correlated. According to Jarque-Bera (JB) test, the null hypothesis of normally distributed residuals cannot be rejected. The ARCH heteroscedasticity test suggests that the error term in the model is homoscedastic. The Ramsey RESET test result shows that the calculated X^2-value is less than the critical value at the 5% level of significance, showing an indication of no specification error.

V. SUMMARY AND CONCLUSION

The purpose of this study was to explore if changes in oil prices influence stock returns in Nigeria and South African, as the two leading economies in Africa. The study adopted *ex-post*. Research design approach for investigating the relationship between the two variables. Specifically, the study applied the ARDL method using quarterly data from 1st quarter 2003to 4th quarter 2016. The Augmented Dickey-Fuller (ADF) and Philips-Perron tests approaches to unit root were employed to test for presence unit root properties of all variables and it was found that stock returns , oil price and Exchange rate are stationary at first difference and only inflation was variable that exhibit stationarity at level in the both countries. Moreover, bound test results show the existence of a long-run cointegration relationship between excess stock returns, oil price returns and other explanatory variables in Nigeria. Due to integration order of the variables in the models, the ARDL method was employed and result shows that the coefficients are significant in two countries

with significant positive coefficient indicating the existence of positive oil price-stock market relationship.

The long-run estimated coefficients show that oil price have positive but insignificant long run effect on stock market returns in Nigeria. This contradicts other finding in the literature which concludes that oil price is significant in explaining stock returns Nigeria (Semei and Omar, 2014). This could be attributed to the fact that as oil exporting nation that is dependent on the refined imported petroleum products, may not benefit on the long-run positive effects from oil proceeds. This may be why the oil effect on stock returns appears to be insignificant in the long-run in Nigeria. However, the short-run estimates which captures the speed of adjustment shows that oil price have positive and is significant in explaining excess stock returns in Nigeria. This implies that oil price does not have effect on stock market returns in the long-run.

On the other hand, stock returns in South Africa show no existence of a long-run cointegration relationship with oil price returns and other explanatory variables. The oil price however, is statistically insignificant and positive in explaining variations in excess stock returns in South African economy. Therefore, the study' estimates show that oil price returns have a significant and positive effect on oil Nigerian, but no effect on South Africa. It implies that the Nigerian stock market is more sensitive to oil price shocks than the South African stock market. based on these findings, it is important that the Nigerian authority should put in place sound policies to reduce the sensitivity of the Nigerian stock exchange to oil price shocks.

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