¹Ogunsakin Sanya^(Ph.D), ²Oloruntuyi Ayodeji^(Ph.D) ¹Ekiti State University, Ado-Ekiti Department of Economics Faculty of the Social Sciences Telephone No: 08035821082

²Federal University of Technology, Akure Department of Economics *Corresponding Author: ¹Ogunsakin Sanya

ABSTRACT:- This study employed Vector Autoregressive Distributive model (VAR) to estimate the relationship among crude oil price, inflation and exchange rate in Nigeria between 1990q1 and 2017q4. To achieve objective this paper, data were sourced from various publications such as Central Bank of Nigeria Statistical Bulletin, 2018 Edition, United States of America Federal Reserve Economic Data (FRED) database and Energy Information Administration (EIA) database. Findings from the various estimations carried study showed that crude oil price increase has marginal positive effects both on inflation and exchange rate while crude oil price reduction has significant negative impacts on both inflation and exchange rate in Nigeria during the study period. Based on these findings, the study therefore, concludes that the relationship among oil price, inflation and exchange rate in Nigeria during the study period was asymmetric. The study recommends that the behaviour of crude oil price at international oil market should always be monitored in formulating both fiscal and monetary policies in Nigeria.

Keywords: Oil Price, Inflation, Exchange Rate, Asymmetric, VAR and Nigeria.

I. INTRODUCTION

Oil price to some extent determines macroeconomic performance of every nation (developed and developing, oil producing and oil importing). This is because, oil is one of the few commodities or production input that has both symmetric and asymmetric effects on macroeconomic variables. Since first oil price shocks of 1970s, the international oil price has experiences series of fluctuations. These fluctuations in oil price impacts macroeconomic variables through different channels. At times, it manifest through production cost which invariably generates inflationary pressure. Also, it can impact through exchange rate.

In Nigeria, oil production usually responsible for large share of GDP and increasing in its price directly at times stimulates the value of Nigeria currency and increase the level of production which eventually brings about inflation pressure. Since oil price in being determined exogenous, fluctuations in its price impact exchange rate. Oil exporting country is likely to have her exchange rate been appreciated when there is an increase in oil price at international oil market and have her exchange rate been depreciated when oil price falls. This is because, mostly, the transmission channels of oil price changes on macroeconomic fundamentals are through exchange rate and general price level. While the effect of oil price changes (increase or decrease) on GDP is at times marginal.

Furthermore, Nigeria as a nation, has witnessed series of oil price boom yet her exchange rate continue to depreciate. From available records, as at 1980 CBN, (2012) the dollar was being exchange for less than naira. However, the exchange value of naira to dollar was equal as at 1986. But sad to note that since, 1986, the exchange value of naira to dollar has been depreciating and this depreciation has been so erratic and majorly determines by activities in international oil market. To curb this, several policies were introduced and implemented. Among which we have guided deregulation through pegging naira to dollar at №21.86, and this was further increased to №86.322 between 1994, and 1999, despite an increase in oil price which increased revenue from oil in 2005, the naira exchange values to US stood at №117.97 in December, 2007. The global financial and economic crisis of 2008 influenced the naira exchange rate to depreciate by 13.2% from №116.20 in November 2008 to №131.5 in December 2008 and later to №197 against the dollar as at December, 2015 CBN (2015). The worst of it all was in 2014, 2015 and 2016. Due to 2014 oil price reduction, Nigerian economy went into economic recession and exchange value of naira to dollar was an average of №370 to №500.

Furthermore, before oil was discovered at commercial quantity in 1970, inflation was never a treat to Nigerian economy. But, as a result of increased in oil price in the late 1970s, there was a corresponding increase in general price level. Therefore, in Nigeria, general price level and oil price are co-related. When oil price increases, general price level rises and reduction in oil price does not always bring about reduction in general price level. In Nigeria specifically, Akpan, (2010) concluded that oil prices increase appreciate the exchange rate value of naira and reduction in oil price depreciates the exchange value of naira. However, in the studies conducted by Akinbola, (2016), Abdul, (2013) and Iyoha and Ohiakhin, (2013) found a different results. Their

finding was that decrease in oil price has an appreciating impact on real effective exchange rate, implying a loss of competitive of the naira while increase in oil price found to be of no importance to movements in the real effective exchange rate.

The remainder of the paper is structured thus. This section one is followed by section two that presents theoretical issues and empirical review. Section three deals with methodology, section four centers on results and discussion while section five concludes the paper.

II. THEORETICAL ISSUE

The debate on the causes of inflation has been a perennial topic in the literature and has been so contentious since it started in 1950s as championed by Philips (1958). In this famous study, Philips discovered a statistical relationship between wage inflation and unemployment in the United Kingdom and found a tradeoff between these two variables. However, the outcome of the result obtained using the theory as foundation did not go down well with Friedman in (1968) where he vehemently criticized the theory's basic assumption and provided a new theory which provides more robust explanation on the relationship between inflation and unemployment. This is called Augmented Philips curve, where it was established that inflation is negatively related with deviations of the unemployment rate from its natural rate. He went further by assuming that inflation expectations evolved overtime because of actual past experience (Rational and Adaptive expectation hypothesis). Base on this, there are two major causes of inflation that is, the demand -pull inflation which is inflation that is emanating from demand shocks and positive shocks to aggregating demand which result into unemployment falls below its natural rate that makes the inflation rate to come up. The other one is cost-push inflation. This emanates from supply shocks. Adverse supply shocks increase the production cost and this put firm (producers) to increase their prices as a result of increase in the cost of production. Since 1970s, this theory has been criticized rationally. Several attempts had been made especially Lucas, (1975), Roberts, (1995), Guli and Gertler, (1999) to construct models that take care of rational expectation and give room for a micro economic justification for monetary policy to have at least short-run effects.

Despite the fact that several medications were introduced into both Philips model of (1958) Friedman (1968) and later by Lucas (1975), Roberts (1995), Guli and Gertler (1999) neither the initial, non the later theories were able to measure the dynamic effect of oil price as one of the major sources of foreign exchange earning to oil producing countries particularly developing countries (Nigeria inclusive).

Therefore, to correct this and particularly to incorporate monetary policy as one of the instrument of macroeconomic policy objective, a theory that says inflation is not just being determined by money supply is required. In this regards, mankind and Reis (2002, 2003) developed macroeconomic rationale put forward has been sticky prices. Incorporated oil price into their model as one of determinant of exchange rate. To test run their model, Russia economy was used between 2005-2010 within new Keynesian sticky price paradigin as a tradeoff between inflation and exchange rate. The justification for the incorporating oil price has been that the effect of oil price changes on gross domestic Product especially in developing countries has been marginal. The transmission channel of oil price on the overall economy has been exchange rate. This is because the expectations that the apex bank can introduce unexpected currency devaluation policy of domestic currency which can bring about increase in general price level. However, as a result of sticky prices, the market will clear only after some time. This however, brings about a combination of below equilibrium real exchange rate and above average inflation with stick prices, increase in money stock in real spending power and this accelerates real GDP.

EMPIRICAL LITERATURE

Studies have been conducted on the relationship between oil price dynamics (shocks/volatility) macroeconomic variables both in oil producing, oil importing, developed and developing economies. Some of these studies are presented here empirically to guide the model of this present study.

Alessandro and Metto, (2005) studied the relationship among oil prices, inflation and interest rate for 7 developing countries. The study employed vector autoregressive distributive lag as estimation technique. Findings from this study showed that impact of unexpected oil price on interest rate suggesting a contractionary monetary policy response directly to curb inflation. The study equally found that the transmission channel of interest rate to the economy comes through reduction in output growth rate and inflation. In the same line of study, Brahmasrene et.al, (2014), studied the United States crude oil imports from five countries. The study made use of monthly data which was estimated by VAR. The study cut across Canada, Mexico, Colombia, the United Kingdom and Venezuela. The period considered by the study was between January 1996 and December, 2009. The study employed Granger causality to test for the causal relationship between oil price and exchange rate. Finding from this study showed that exchange rate granger-caused crude oil prices in the short-run while the crude oil granger caused exchange rate in the long run. Also, Olukorede, (2014) investigated the effects of oil price shocks in U. S Norway and South Africa between 1980 and 2010. The study employed structural VAR

*Corresponding Author: Ogunsakin Sanya

114 | Page

as estimation technique. Findings from this study revealed that in developed nations among selected countries (United States and Norway) stick to the non-linear oil-price shock. However, this was not so in developing countries (South Africa). Zied et. al, (2016), investigated the relationship between oil price and economic growth in selected OPEC countries between 2000 and 2010. The study made used of Co-integration and error correction as estimation technique. The findings from this study revealed that oil price shocks during fluctuation period (Business cycle) and financial crisis, affect the economies of the selected OPEC members.

Atems et. al, (2015), studied the asymmetric effect of oil price increase on exchange rate in selected oil importing countries. The study employed VAR as estimation technique. Finding from this study showed that exchange rates responded to shocks emanating from oil price asymmetrically. In the same line of study, Chou and Tseng, (2015) studied the relationship between oil price and exchange rate fluctuations on retail gasoline prices in Taiwan between 1990 and 2013. The study employed autoregressive distributed lag model as estimation technique. Finding from the study showed that the response of gasoline to shocks emanating from oil price shocks was slow and complex exhibited reverse adjustment.

Olomola (2008) examined the effects of oil price on some macroeconomic variables in Nigeria between 1990 and 2016. The study employed Co-integration and error correction as estimation technique. Finding from this study showed that oil price shock did not affect exchange rate in Nigeria during the study period. Kamel and Ahderrazak, (2015) studied the impact of oil prices on macroeconomic fundamentals in eight Middle East and North Africa countries between 1994q1 and 2015q2. The study employed panel ARDL as estimation technique. Result revealed that there were short-run dynamics and cross sectional relationships between oil price and macroeconomic variables, such as GPP growth rate, consumer Price index, oil price, money supply, market capitalization and oil price. Omolade and Nigalawa, (2014) investigated the growth of the manufacturing sector and oil price in African countries between 1970 and 2010. Static and Dynamic panel data were used as estimation technique. Finding showed that there was negative relationship between oil price and growth of manufacturing sector of the selected countries during the study period. Bal and Rata (2015) examined the relationship between oil price and exchange rate in China and India between January 1994 to March 2013 using granger causality test as estimation techniques. Finding from this study revealed that exchange rate did not linearly granger cause oil price in China and India in the same line of study. Olomola and Adejumo (2009) studied the effect of oil price shocks on some macroeconomic variables (output, real effective exchange rate and money supply). The study employed vector autoregressive distributive lag as estimation technique finding from this study showed that in the short run, both inflation and output did not react to the shocks from oil price but responded positively and significantly to the shocks from oil in the long-run. Aliyu (2009) investigated the relationship between oil price shocks and macroeconomy in Nigeria between 1986q₁ to 2007q₄ using Vector error correction as estimation technique. Result from this study showed that output growth rate responded positively and significantly to the shocks from oil price. Also, the result from granger causality test showed unidirectional relationship between oil price and output but bi - directional relationship between exchange rate and oil price. Madaeme and Nwosu (2010) studied the relationship between crude oil price and macroeconomic performance in Nigeria between 1970 to 2008. The study employed eagle Granger and Augmented Engle Granger as estimation technique. Finding from this study showed that all the macroeconomic variables employed in the study reacted to the shocks emanating from oil price change.

Ogundipe and Ogundipe (2013) Investigated the relationship between Nigerian economy and oil price between 1970 to 2011. The study employed granger causality test as estimation technique. Finding from this study showed that oil price change either increase or decrease has significant negative impact on the Nigerian macroeconomic performance.

Riman et al. (2013) studied the asymmetric effects of oil price on exchange rate and domestic investment in Nigeria using reduced form of unrestricted VAR as estimation technique. Besides that, finding from this study showed that there was long-run relationship between oil price and macroeconomic variables, domestic investment and exchange rate showed reactions to shocks emanating from oil price.

Uma and Ikpe (2015) examined the relationship between exchange rate and oil price using VAR and VEC as estimation techniques. Finding from this study, showed that both negative and positive oil price change have effect on exchange rate.

Obioma and Eke (2015) studied the interactions between oil price and exchange rate in Nigeria between 2007 to 2013 using VAR as estimation technique. Finding from this study revealed that there was negative and significant interaction between oil price and exchange rate in Nigeria during the study period.

Conclusively, the issue of relationship between oil price and macroeconomic variable has become perennial and contentious but not exhaustive. Going through the studies, majority of these studies only considered the relationship between oil price and macroeconomic variables at aggregate level. Very few studies only considered relationship between oil price and individual macroeconomic variables. It is essential to actually study the channel of transmission of oil price to Nigerian Economy. This study therefore is out for this purpose.

III. METHODOLOGY

The theoretical underpinning for this study is based on the new Keynesian Phillips curve. The new Keynesian Philips curve is an offshoot of the augmented Philips curve emanating from the basic original Phillips Curve. In the original Philips curve, there is negative relationship between inflation and unemployment. (Philips, 1950).

$$\Pi_{\rm t} = \alpha - y U_{\rm t} \longrightarrow 3.1$$

Where

 Π_t and U_t are unemployment and inflation

 α is the inflation when unemployment equals zero and

y is the rate at which inflation responds to unemployment.

However, the basic assumption of this original Philips curve was criticized by Friedman (1968) for the neglect of expectations where he argued that inflation expectations evolved overtime because of actual past experience that expectations were formed adaptively. Therefore, the correct formulation of inflation – unemployment trade off according to Friedman (1968) is an expectations Augmented Philips curve of the form.

$$\Pi_{t} = -y (U_{t} - U^{*}) + \Pi^{e}_{t}$$

3.2

Where inflation, Π_t is negatively correlated with deviation of unemployment rate U_t from its natural rate U and the entire shifts up or down one-for-one with changes in expected inflation rate Π^e_t . According to Friedman, (1968) predicted that any attempt to keep unemployment low at the expense of higher inflation would bring about higher inflation.

MODEL SPECIFICATION

In line with the theoretical undefining presented in equation 3.1 and 3.2, equation 3.3 is presented to examine the relationship among oil price, inflation and exchange rate in Nigeria.

 $INF_{t} = \beta_{0} + \beta_{1}EINF_{t} + \beta_{2}WOP_{t} + \beta_{3}RIR_{t} + \beta_{4}FIR_{t} + \beta_{5}MS_{t} + \beta_{6}hDPgr_{t} + \beta_{7}EXR_{t} + U_{t} \qquad 3.3$ Where:

CP represent consumer price index (Inflation)

EXPINF: Expected inflation rate in period t

REXR: represents the real effective exchange rate in period t

WOP: stands for world oil price in period t,

RIR represents real interest rate in period t

FIR: stands for foreign interest rate at time t.

MS: represents broad money supply

 $\ensuremath{\mathsf{GDP}_{\mathsf{gr}}}\xspace$: represents output growth rate

Lastly, Et represent the error term in period t.

The equation 3.9 is obtained from equation 3.7

Where Z_{It} is the vector of endogenous variables a Get variables vector of world oil price, foreign interest rate, inflation rate, the expected inflation rate and real interest rate and money supply, A is taken to be the matrix of

lagged interaction, C is the matrix of external time interaction, X is the vector of constants, X_t is the vector of exogenous variables.

ECONOMETRICS ANALYSIS:

The estimation technique for this study is structural vector Auto regressive model. In this analysis three tests are essentially required:

Unit root test, impulse response function and variance decomposition.

IV. EMPIRICAL RESULTS

To guide against spurious regression which may bring about misleading and incorrect conclusion on time series data, we subject the variables of interest to unit root test to establish the stationary characteristics of our variables of interest. This is done by both augmented dickey fuller and Philips Peron stationary tests.

Table 4.1: Unit Root Test							
VARIABLES	FIRST D	IFFERENCE					
	AUGMENTED	DICKEY FULLER	PHILIPS PERON				
	INTEREST	TRENDS AND INTEREST	INTEREST	TRENDS AND INTEREST			
EXPINF	-6.33456	-5.66245	-2.334561	-1.673412			
CPI	-8.33456	-6.62412	-3.432141	-2.31245			
REXR	-4.521462	-4.123451	-1.462413	-1.123422			
WOP	-7.456221	-6.331221	-2.6112331	-1.352131			
RIR	-3.562211	-3.345621	-1.923121	-1.432161			
FIR	-8.45562	-7.21456	-2.442131	-1.672113			
UIP	-6.332145	-6.122111	-1.723411	-1.46214			
MS	-7.332145	-4.562214	-1.645622	-1.123112			

From unit root test results on table 4.1, using both augmented dickey fuller and Philips Peron all the variables of interest became stationary at first difference. This shows that the variables of interest are integrated of order, I (1).

TABLE 4.2 VAN Lag Length Selection Criteria							
LAG	LR	FPE	AIC	SC	HQ		
0	NA	1.16e+27	87.04038	81.7723	87.11332		
1	164.7721	1.55e+24	80.24262	78.413	780.23412		
2	93.06421	5.44e+21	78.2451	79.184	86.23413		

TABLE 4.2 VAR Lag Length Selection Criteria

LR: sequential modified LR test statistics

FPE: final prediction error.

AIC: Akaike information criterion

SC. Schwarz information criterion and

HQ: Hanna- Quinn information criterion

Presented in table 4.2, the optimal lag length selection for the VAR estimation is 2, given lowest statistics of 78.2451, 79,18423 reported for Akaike information criterion (SC) and Hanna-Quinn information (HQ) for lag 2, therefore this study estimated VAR with lag length of two.

Note ** indicates lag order selected by the criterion

IMPULSE RESPONSE OF THE ANALYSIS OF OIL PRICE ON INFLATION AND EXCHANGE RATE

To actually know the position of the relationship among these variables, we fragmentize oil price series into an increase and decrease. This is essential to establish the asymmetric effect of oil price on both inflation and exchange rate.

Results on figure 4.1 showed that the respond of inflation to an increase in oil price in the first quarter to fourth quarter of the analysis was negative but significant. Thereafter, positive change in oil price generates an increase in inflation till last quarter of the analysis. This shows that oil price determine in large extent by the behaviour of general price level in Nigeria. Also, based on the result obtained, an increase in oil price brings about corresponding increase in general price level. However, this increase in general price level might not only be responsible by an increase in oil price, it might also be as a result of excessive importation of refined oil product into the country.

*Corresponding Author: Ogunsakin Sanya

As regards the response of inflation to a reduction in oil price, this was negative and insignificant right from first quarter of the analysis up to third quarter. Thereafter, the response of inflation to oil price reduction became positive and significant till last quarter of the analysis. At initial stage, when the response of inflation to reduction in oil price was negative and insignificant, this might be attributed to reduction in revenue that reduces consumption of goods of ostentation or luxurious commodity. The response of inflation to expected inflation was positive and significant from first quarter up to sixth quarter, thereafter, the response commence to increase steadily till last quarter of the analysis. The response of inflation to output growth, this was in an oscillatory manner. The response of output to shocks emanating from oil price seems not to be sensitive to output at first two quarters, thereafter, the response became large, positive significant till last quarter of the analysis. However, a positive oil price shock leads to relative increase in output but negative oil price brings a large decrease in output. The response of domestic interest rate to a positive and negative oil price brings positive but insignificant response. The response foreign interest rate to positive change in oil price was initially positive and significant but after the fifth quarter the response was negative and insignificant.

The response of exchange rate to a positive change in oil price was positive and significant in the first and second quarters. Thereafter, the response of exchange rate to a positive change in oil price became negative and insignificant. However, the response of real effective exchange rate to a negative change in oil price was positive and significant right from the first quarter. The implication of this finding is that increase in oil price brings marginal appreciation in exchange rate but reduction in oil price brings large and high depreciating value of exchange rate in Nigeria during the study period. The response of money supply to both negative and positive oil price was positive and significant right from fifth quarter till fifteenth quarter when it started oxilating.



Impulse Response (IRF) Analysis

Variance Decomposing

The variance decomposition indicates the amount of information each variable contributes to the other variables to the auto-regression. It determines how much of the error variance of each of the variables can be explained by exogenous shocks to the other variables.

*Corresponding Author: Ogunsakin Sanya

118 | Page

Result on table 4.5 revealed that in Nigeria, inflation is internally determined as about 80% of variation in inflation is attached to other variables in the model. The implication of this finding is that inflation is not only a monetary phenomenon as championed by monetarist. This is to say that money supply expected inflation, world oil price, exchange rate, interest rate; output and even foreign interest rate contribute in a large extent to inflation in Nigeria. However, within the first to two quarters of the analysis, both positive and negative changes in oil price responsible for about 5% and 4% variation in inflation rate. However, narrowing down to variables of interest that is, oil price, inflation and exchange rate. The contribution of asymmetric oil prices was relative and small to the variation in inflation. The contribution of exchange rate to variable that contributed to inflation is output though the contribution was minimal. Also, the contribution of both negative and positive oil prices asymmetric to expected inflation was much and higher than the contribution of oil price to inflation itself. The percentage contribution to variation was equally minimal. However, the contribution of exchange rate.

		Table 4.14 Variance decomposition of each of the variables to exchange rate									
Period S.	S.E	FIR	EINF	MS	CPI	DRI	WOP	GDPgr			
1 11	1.53149	100.0000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000			
2 15	5.56676	87.54586	6.603632	0.211949	4.168747	0.346177	1.223648	8.600000			
3 10	6.29132	87.20262	5.906419	0.394220	4.023251	0.387830	1.086592	167.7743			
4 21	1.69763	71.17040	12.61556	11.43632	3.457954	0.709945	2.610823	43.60201			
5 22	2.42471	63.36817	12.08673	15.58145	4.844987	2.109985	3.104176	42.06900			
6 25	5.20083	61.48921	9.576524	14.49874	3.410107	5.591853	3.733311	1.344904			
7 26	6.92894	65.33770	8.494107	13.84719	2.911466	6.877494	4.524972	4.324661			
8 28	8.40789	67.01391	8.137912	12.44791	3.033712	8.027283	1.269320	31.72593			
9 30	0.71783	68.21533	7.257416	10.83004	3.353617	8.441099	1.012500	7.600011			
10 32	2.10808	69.11557	7.194308	10.53850	3.149763	8.144337	1.861534	167.7740			

Summary of Variance Decomposition (VDC) Results

Source: Author's Computation (2020)

Table 4.6 Variance decomposition of each of the variables to inflation rate

Perio	Variance	Variance	Variance	Variance	Variance	Variance	Variance	Variance
d	Decomposition	Decompos	Decompo	Decompo	Decomposition	Decomposition	Decomposition	Decompositio
	of EXINF	ition	sition	sition	of CPI	of DIR	of EXR	n of FIR
		of GDPgr	of WOP	of MS				
1	30.14562	5.45621	2.82311	30.62111	34.13412	57.33456	40.3342	21.3
2	30.6121	6.362913	9.752313	22.71518	20.31955	32.81372	40.24123	30.12
3	27.91169	8.64114	8.876552	21.66742	15.14772	18.32175	38.33456	18.4422
4	25.28801	9.690011	11.31783	25.38541	15.62063	211.6664	21.21134	21.5662
5	24.73959	12.19192	16.13472	24.39237	17.24183	3.100111	25.9252	30.1614
6	30.12122	13.83591	22.23441	21.21672	14.95392	24.19604	36.8324	20.14562
7	31.10574	14.1140	21.40481	24.63801	21.55719	1.199493	23.23457	19.14113
8	31.41790	13.14246	24.37841	21.43018	25.41313	3.146121	23.21113	20.1332
9	31.61872	16.52211	20.04207	24.37454	23.88484	31.82374	31.4244	22.2224
10	29.43014	15.81194	35.20143	22.71784	24.61576	19.34075	17.34564	16.411

Source: Author's computation (2020)

V. DISCUSSION AND FINDINGS

The analysis of this study started with unit root test which showed that all the variables of interest were integrated of the same order. That is, I(1). Thereafter, impulse response function and variance decomposition were carried out. From impulse response function, inflation rate which was captured with consumer price index showed that the response of inflation to shocks emanating from oil price was positive and significant though it varies according to positive and negative asymmetric oil price. The finding is consistent with the findings of

*Corresponding Author: Ogunsakin Sanya

Nazarian and Amiri, (2014) whose result for Iran showed that asymmetric oil price pass-through to consumer prices. Also, compatible with the finding of Sek, Teo and Wong (2015) where their study showed that the behaviour of oil price determines the levels of domestic inflation to some extent. From impulse response function result, the response of exchange rate to shocks emanating from both positive and negative changes in oil price was positive and significant. This finding is consistent with finding of Ogundipe and Egbetokun (2013) which revealed that some of the most important inflation rate determinants in Nigeria are exchange rate and crude oil price. The finding also showed that response of both exchange rate and inflation rate to positive and negative asymmetric oil price was negative but insignificant before it became stable. This finding correlates the submission of Huag and Sissoko (2014), Chen and Chen (2007) where they discovered that in the medium and long-run, crude oil price shocks have positive and significant influence on exchange rate.

VI. SUMMARY AND CONCLUSION

The broad objective of this study is to investigate the linear relationship among oil price, exchange rate and inflation in Nigeria between 1990q1 and 2018q4. To achieve this objective, data were sourced from the Central Bank of Nigeria Statistical Bulletin, 2018 Edition, US Federal Reserve economic data (FRED) database and energy information administration (EIA) database. These data were estimated by Vector Autoregressive model. Finding from the study revealed that there were asymmetric effects of oil price on both inflation and exchange rate during the study period. The result further showed that though the effect of increase in oil price on both inflation and exchange rate was marginal but effect of reduction in oil price on inflation and exchange rate was large and significant. Based on these findings, the study therefore concludes that the relationship among inflation, oil price and exchange rate is asymmetric in Nigeria during the study period.

The study recommends that the behaviour of oil price at international oil market should always be observed in formulating fiscal and monetary policies in Nigeria

REFERENCES

- [1]. Nazarain, R. Amiri, A. (2009), "Asymmetry of the Oil Price Pass-Through" Econ. Aplic.
- [2]. Ogundipe, A.And Ogundipe, O. (2013), "Oil Price and Exchange Rate Volatility in Nigeria".
- [3]. Munich Personal RePec Archive, MPRA Paper No. 51668.
- [4]. Olagbaju, I. O. And Akinbobola, T. O. (2016), "A Non-Linear Analysis of The Oil Price-
- [5]. Exchange Rate Nexus In Nigeria", Journal Of Economics And Behavioural Studies Vol. 8, No. 4, Pp. 79-91.
- [6]. Shaari, M. S. and Hussain, N. E. (2012), "The Effects of Oil Price Shocks and Exchange Rate
- [7]. Volatility On Inflation: Evidence From Malaysia", International Business Research.
- [8]. Johansen, S. (1988). Statistical analysis of cointegration vectors, J. Econ. Dyn. Control 12, 231–234.
- [9]. Johansen S.,&Juselius K. (1990). Maximum Likelihood Estimation and Inference on Cointegration with Applications to the Demand for Money, Oxford Bulletin of Economics and Statistics 52.
- [10]. Johansen, S. (1991).Estimation and Hypothesis Testing of Cointegration Vectors in Gaussian Vector Autoregressive Models), Econometrica, 59: 1551–1580.
- [11]. Kapetanios, G., &Tzavalis, E. (2010).Modeling structural breaks in economic relationships using large shocks, Journal of Economic Dynamics and Control 34 (3), 417–436.
- [12]. Kilian, L. (2008b). The economic effects of energy price shocks, Journal of Economic Literature 46 (4) , 871–909.
- [13]. Kilian, L., Rebucci, A., &Spatafora, N., (2007). Oil shocks and external balances, IMF Working Paper 07/110.
- [14]. Lardic, S., & Mignon, V. (2006). The impact of oil prices on GDP in European countries: An empirical investigation based on asymmetric Cointegration, Energy Policy 34,3910–3915.
- [15]. Lee, K., & Ni, S. (2002). On the dynamic effects of oil price shocks: a study using industry level data, Journal of Monetary Economics 49 (4), 823–852.
- [16]. Lee, K., Ni, S., &Ratti, R. A. (1995). Oil price shocks and the macroeconomy: the role of price variability, Energy Journal 16, 39.
- [17]. Lin, B., Presley Jr, W. K., & Micheal, A. O. (2014). Oil price fluctuation, volatility spillover and the Ghanaian equity market: Implication for portfolio management and hedging effectiveness, Energy Economics 42, 172–182.
- [18]. Lorde, T., Jackman, M., & Thomas, C. (2009). The macroeconomic effects of oil price fluctuations on a small open oil-producing country: the case of Trinidad and Tobago, Energy Policy; 2708e16.
- [19]. Market Report, February, (2012). IEA: http://www.iea.org. Accessed on June 8, 2013.
- [20]. Ministry of Energy, Ghana 2012, 2013 report: http://www.energymin.gov.gh. Accessed December 30, 2013.

- [21]. Mork, K. A. (1989). Oil and the macro-economy, when prices go up and down: an extension of Hamilton's results, Journal of Political Economy 97 (3), 740–744.
- [22]. Mork, P., Oslen, O., &Mysen, H. (1994). Macroeconomic responses to oil price increases and decreases in seven OECD countries, Energy Journal 15, 15–38.
- [23]. Mory, J. F. (1993). Oil prices and economic activity: is the relationship symmetric? The Energy Journal 14, 151–161.
- [24]. Nakov, A., & Pescatori, A. (2010). Oil and the great moderation, Economic Journal 120 (543), 131–156.
- [25]. Nnadikwe, K. (2011). High Oil Dependence in Ghana: To What Extent is Ghana Vulnerable to Oil Price Shock?
- [26]. Library Resource for CEPMLP, University of Dundee.
- [27]. Olomola, P. A., &Adejumo, A.V. (2006).Oil price shock and macroeconomic activities in Nigeria, International Research Journal of Finance and Economics 3, 28–34.
- [28]. Omojolaibi, J. A., &Egwaikhide, F. O. (2013). A panel analysis of oil price dynamics, fiscal stance and macroeconomic effects: the case of some selected African countries. Central Bank of Nigeria Economic and Financial Review.51(1).
- [29]. Oriakhi, D. E., &Iyoha, D. O. (2013). Oil price volatility and consequences on the growth of the Nigerian Economy: An examination (1970-2010): Asian economic and financial review, 3(5): 683-702.
- [30]. Papapetrou, E. (2001). Oil price shocks, stock market, economic activity and employment in Greece, Energy Econ. 23, 511–532.
- [31]. Quagraine, F. (2012). Is Ghana's value capture from petroleum sector fair? Case study of the Jubilee FieldsGhana, CEPMLP Annual Review-CAR Volume 16 (2013).
- [32]. Rafiq, S., Salim, R., & Bloch, H. (2009). Impact of crude oil price volatility on economic activities: an empirical investigation in the Thai economy, Resources Policy; 121–32.
- [33]. Rasche, R. H., &Tatom, J. A. (1981). Energy price shocks, aggregate supply, and monetary policy: the theory and international evidence, In: Brunner, K., Meltzer, A.H. (Eds.), Supply shocks, Incentives, and National Wealyh, Carnegie-Rochester conference Series on Public Policy, vol. 14. North-Holland, Amsterdam.
- [34]. Rasmussen, T. N., &Roitman, A. (2011). Oil Shocks in a Global Perspective: Are they really that Bad? IMF Working Paper No: WP/11/194.
- [35]. Rautava, J., (2004). The role of oil prices and the real exchange rate in Russia's economy cointegration approach, Journal of Comparative Economics 32 (2), 315–327.
- [36]. Raymond, J. E., & Rich, R.W. (1997). Oil and the macroeconomy: a Markov state-switching approach, Journal of Money, Credit and Banking 29, 193–213.
- [37]. Rodriguez, R. J., & Sanchez, M. (2005). Oil price shocks and real GDP growth: empirical evidence for some OCDE countries", Applied Economics 37, 201–228.
- [38]. Romer, C. D., &Romer, D. H. (1989). Does monetary policy matter? A new test in the spirit of Friedman and Schwartz, NBER Macroeconomics Annual.
- [39]. Sanchez, M. (2011) Welfare effects of rising oil prices in oil-importing developing Economies", The Developing Economies 49 (3), 321–346.
- [40]. Tatom, J. A. (1993). Are there useful lessons from the 1990–1991 oil price shock"? The Energy Journal 14 (4), 129–150.
- [41]. Trung, L.V., &Vinh, N. T. (2011). The Impact of 0il Prices, real effective exchange rate and inflation on economic activity. Novel Evidence foe Vietnam, Research Institute for Economic and Business Administration, Knobe University. Online available at: http://www.rieb.kobeu.ac.jp/academic/ra/dp/English/DP2011-09.pdf.
- [42]. (Accessed on January 8, 2013.
- [43]. Tullow Oil 2012 Report: http://www.tullowoil.com/ghana (Accessed on December 12, 2013)
- [44]. UNDP/ESMAP (United Nations development programme/world Bank Energy Sector Management Assistance Program), 2005. The Impact of Higher Oil Prices on Low Income Countries and on the Poor: <u>http://www.worldbank.org</u> (Accessed on June 4, 2013)
- [45]. Uri, N. D. (1996). Crude oil price volatility and unemployment in the United States", Fuel Energy Abstracts 37, 91.
- [46]. Zhang, D. (2008). Oil shock and economic growth in Japan: A nonlinear approach, Energy Economics 30, 2374–2390.

*Corresponding Author: ¹Ogunsakin Sanya ¹Ekiti State University, Ado-Ekiti Department of Economics Faculty of the Social Sciences Telephone No: 08035821082

*Corresponding Author: Ogunsakin Sanya

121 | Page