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EVALUATION OF PETROLEUM CRUDE OIL PRICE VOLATILITY ON NIGERIA NATIONAL INCOME AND NIGERIA ECONOMY

Adegbie Folajimi Festus., Akintoye Iranola Rufus and Olayinka O. Grace
Babcock University, School Of Management Sciences,
Department Of Accounting, Ilishan-Remo .Ogun State. Nigeria

ABSTRACT: *Oil dependent nations have the potential of economic growth and development in a stable international oil price system. However, the effect of oil price volatility in the evaluation of Nigeria national income and economy is imperative in the face of Nigeria reliance on oil becoming a dream as the negative effect on budget implementation is clearly discovered by researchers. This study evaluated the effect of crude oil price volatility on Nigeria economy and the national income. The study adopted ex-post facto research design. The study covered a period of 22years from 1995 to 2017. Descriptive and inferential (regression) statistics were adopted for the study. The result showed that oil price volatility has significant combined effect on Nigeria's economy (Gross Domestic Product, Gross National Product and Per Capital Income) Adj.R^2 of 0.432;0.449 &0.478, F-Statistics of 7.858, 9.488 ,& 9.238 and p-value 0.004, 0.002 & 0.002.Oil price volatility has no significant negative impact on Gross Domestic Product with β_{22} of -0.004,R^2 of 0.023 t-statistics of -0.630 & p-value of 0.537;oil price volatility has no significant negative impact on Gross National Product with β_{22} of -0.005,$R^2$of 0.027,t-statistics of -0.692 and p-value of 0.498;also oil price volatility has no significant negative impact on Per Capital Income with β_{22} of -0.004,R^2 of 0.027,t-statistics of -0.688 & p-value of 0.500.The study concluded that oil price volatility affects national income and Nigeria economy significantly. The study recommended that Nigeria should adopt policies that will address negative oil price shocks so that the budgetary system and national income will not be affected.*

KEYWORDS: exchange rate, gross domestic product, gross national product, national income, Nigeria economy, oil price volatility

INTRODUCTION

The discovery of oil in Nigeria by Shell D'Archy Petroleum in the oil field of Oloibiri in the Eastern Niger Delta in 1958 changed the fortune of Nigeria economy from agrarian to one of the highest oil producing nations of the world. In the late sixties and early seventies, Nigeria had attained a production level of over 2million barrels of crude oil per day. Studies indicated that though production figures dropped in the 80's due to an economic slump, year 2004 saw a total rejuvenation of oil production to a record level of 2.5 million barrels per day (Ogiri, Amadi, Uddin and Dubon, 2013).Usman, Madu and Abdullahi (2015) posit that Petroleum production and export play a dominant role in Nigeria's economy and account for about 90% of her gross earnings. That as at January 1,2009, the estimated crude oil and natural gas reserve were 36.2 billion and 182.4

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trillion cubic feet (tcf) respectively, and ranked as the 12th biggest oil producing country of the world with a 2.4 million of barrels per day (bpd) or 3.1% of the estimated world total in 2008.Mustapha and Sulaiman (2015) opine that the trend of continuous fall in oil price has been a major concern in the comity of oil producing countries, which led to the agitation for a reduction in production quota due to the political structure of Organization of Petroleum Exporting countries (OPEC). They explained further that the oil glut posed a strong negative signal to revenue generation and developmental activities of the economy of, which Nigeria's fiscal revenue depends largely on revenue from oil, such that in 2013, 73.2% of Nigeria's internally generated revenue came from oil. The fall in crude oil price internationally has hit the economy of Nigeria such that sustaining the economy has become a big challenge. Jawad (2013) averred that the livewire of Nigeria economy is on oil and because of the diverse use, the fluctuation in the price is largely felt in all sector of the economy.

Keji (2018) opines that the persistence squeezing of the world market demand for oil by the developed nations like US, Canada, Japan and others, with invention of less fuel consumption automobiles has further deepened the fortune of oil producing international co,mpanies to industrial crisis, especially in the Sub-saharan African nations. Jhingan (2005) and Thomas Reuters (2015) as cited in Keji (2018) explained that the influence of USA economy through her interventions in alternative source of energy like Shale oil led to excess supply of crude oil in the world market, which could also be traced to oil price collapse in recent years.

Ojikutu and Onelemhemhen (2017) opined that the impact of falling prices on stock market and exchange rates differs from one country to another. The positive impact on net exporting countries as increase in oil price will have an increase in real national income. On the other hand, they continued, for net importing countries, higher petroleum prices could lead to inflation, increased input cost, reduced demand and lower investment in the economy. Olomola and Adejumo (2006) as cited in Ojikutu *et al*(2017) averred that increasing volatility of crude oil prices is a phenomenon that poses a great challenge to policy makers in oil producing nations. According to Evans and Long (2015),the decline of oil prices in late 2014 and early 2015 has caused downward revisions from earlier forecasts for Oklahoma City and the state and this has caused the city to diversify into the other sectors of the economy. Jimenez-Rodriguesz and Sanchez (2004) opined that fluctuations in oil prices affects significantly only a few countries, having a positive impact on the US and UK economies while doing harm to the Canadian economy. Osuji (2015) opined that international oil prices saw a sharp fall during the global economic crisis of 2008 which led to a fall in oil revenues and unfavourable exchange rate movements for major oil-exporting economies especially those that were not well diversified.

Ogiri,Amadi,Uddin and Dubon (2013) opined that volatility is the measure of the tendency of oil price to rise or fall sharply within a period of time, such as a day, a month or a year.That in Nigeria, oil price movements especially up to the mid-1980's and earlier, considered in price increases. There are large price increases and decreases reflecting a substantial rise in the volatility of the real oil price which creates market uncertainties that induce companies to postpone their investments (Sauter & Awerbush,2003). Englama (2010) opined that the absolute dependence of oil export revenue has made the Nigeria economy vulnerable sudden oil price movements more noticeable. That is, when oil prices do fall, there will be a cutback in expenditure, as the

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government tries to reduce its spending so that it does not go beyond its revenue and at such times there will be an upward resistance to wage reductions, primarily because the population feels the entitlement to the oil revenue. Okonju (2009) stated that exploring Nigeria's growth path in the post oil discovery period; it has been difficult relating volatility to the Nigerian economy that oil price volatility has been a major contributory factor to instability in GDP pattern in Nigeria. Olomola (2006) opined that oil price volatility is highly significant in explaining Gross National Product growth and unemployment, and that fall in oil prices will lead to increasing unemployment in society and the once rising economic growth will eventually decline; sometimes beyond its original value. He argued further that increases in oil prices led to favuorable exchange rate movements for oil-dependent economies while at the same time, falling oil prices favoured the exchange rates of non-oil dependent economies. Eagles (2017) opined that oil is one of the few and only production input that have both symmetric and asymmetric effects on macroeconomic performance, such that its fluctuations can lead to a business cycle, and create unpredictable consequences. He was of the opinion that oil price volatility dampens growth through different channels like increase in production cost to inflation expectations. He further averred that oil price increase can translate into higher transportation, production and a country's financial system stability. The impact of oil price shock and volatility on productivity differs between net oil exporting nations and net importing nations. Majority of researchers like Olomola (2006),Ogiri *et al* Englama (2010) opined that oil price fluctuations affects the national income and Nigeria's economy, while others are of the opinion that there is no relationship between them. This research becomes imperative in this present state of Nigeria economy.

Oil price volatility based on various researchers has become a problem for the developed and developing economies. It has a significant impact on balance of payment and economist pays special attention in future anticipation to minimize the loss due to oil price volatility (Jawad,2012). Issues in oil price volatility and how it impacts on economic growth have continued to generate controversies among economic researchers and policy makers. Akpan (2009),Aliyu (2009) and Olomola (2006) argue that it can promote growth or has the potential of doing so. Others such as Darby (1982) and Cerralo (2005) are of the view that it can hinder growth.The former argue that for net-oil exporting countries, a price increase directly increases real national income through higher export earnings, whereas ,the latter cited the case of net-oil importing countries (which experience inflation, increased input cost ,reduced non-oil demand, lower investment, fall in tax revenues and ultimately in increase in budget deficit which will further reduce welfare level) in advancing their argument. Earlier studies focusing on the United States have suggested that on the one hand, rising oil prices led to reduction in output and higher inflation and exchange rate in the 1970s and early 1980s and that oil price declines on the other had an exactly opposite effect (Adeniyi,2009).Oriakhi and Osaze (2014) argue that oil price volatility has been found to have had a more direct effect on the exchange rate of the Naira than probably any other economic variable because crude oil export earnings accounts for a large chunk of Nigeria's foreign exchange (90%) and thus ultimately determines the amount of foreign reserves of the country which is alarmingly low (about $30billion from over $ 60billion in 2008 and continuously keeps depleting. Arinze (2011) stated that upward adjustments of oil price products have resulted in inflation, high cost of living, and inequitable distribution of income in Nigeria and this has caused instability of the prices of goods and services in the country. He also explained that whenever there is an increase in prices of oil products, it affects transportation, cost of good and other services. Nwezeaku (2010) opined

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that economy has been affected by sustained underdevelopment evidenced by poor human developmental and economic indices including poor income distribution, militancy and oil violence in the Niger Delta, endemic corruption, unemployment, relative poverty. Hamilton and Herrera (2003) opined that inexpensive oil is crucial for the world's demand for energy but its availability is scarce, therefore volatility in supply will have substantial economic impact. That volatility in supply can be translated into "Peak oil". With the ever growing demand for oil, OPEC's production capacity in the 2000's was not enough to satisfy the world demand so the price of oil skyrocketed from $11 a barrel in 1999 to all time high in history at $147 a barrel in August 2008. Mustapha and Sulaiman (2015) explained that oil price slid from US$112.27 in June 2014 to US$78.4 in November 2014 and further decline to US$ 59.5 in December 2014 and has continued to fall.From the foregoing explanations, it is still a known fact that oil volatility has not been sufficiently linked to National income and Nigeria's economy. This study was designed to fill this gap.

The study was designed to evaluate the effect of oil price volatility on Nigeria national income and economy. This was further disaggregated to i. examine the impact of oil price volatility on Gross Domestic Product (GDP) of Nigeria; ii. ascertain the impact of oil price volatility on Gross National Product (GNP) of Nigeria; iii. determine the impact of oil price volatility on Per Capital Income (PCI);iv determine the moderating effect of exchange rate on oil price volatility on Gross Domestic Product, Gross National Product and Per Capita Income of Nigeria.

The following questions were answered in this study
i.what is the impact of oil price volatility on the Gross Domestic Product Nigeria of Nigeria? ii..in what way does oil price volatility impact Gross National Product of Nigeria?
iii.to what extent does oil price volatility affect Per Capita Income in Nigeria?
iv.What is the moderating of exchange rate on the volatility of oil price on Gross Domestic Product ,Gross National Product and Per Capital income in Nigeria?
The following hypotheses were tested:

i. Oil price volatility has no significant impact on Gross Domestic Product of Nigeria
ii. Oil price volatility has no significant impact on Gross National Product of Nigeria
iii. Oil price volatility has no significant impact on Per Capita Income of Nigeria
iv. Exchange rate does not have moderating effect on oil price volatility to effect Gross Domestic Product, Gross National Product and Per Capita Income of Nigeria.

LITERATURE REVIEW/THEORETICAL UNDERPINNING

Conceptual Review

The following concepts used in the study are given full explanations below:

Oil Price Volatility: Ogiri,Amadi,Uddin and Dubon (2013) observed that volatility is the measure of the tendency of oil price to rise or fall sharply within a period of time,such as a day, a month or a year.Lee (1998) as cited in Mgbame,Donwa and Onyeokweni (2015) defines volatility as the standard deviation in a given period and noted that volatility has a negative and significant impact on economic growth instantly, while the impact of oil price changes delays until a year. In a

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nutshell, volatility is a measurement of the fluctuations (rise and fall) of the price of commodity. Budina and Wijnbergen (2008) opined that the relative boom of the oil sector encouraged excessive government spending; and this resulted in inflation and real exchange rate appreciation. The Organization of Petroleum Exporting Countries (OPEC) attributed the current global crude oil price volatility to continue uncertainty, stemming from the slow pace of global economic growth, continued Eurozone debt crises, high unemployment in advanced economies and the risk of inflation in developing countries.Eagle (2017)explained that oil price fluctuations can lead to a business cycle which are more pronounced in the 1970s thereby creating increasingly erratic with volatility more erratic since 2002.Keji (2018) opined that oil price collapse is said to be the level of distortions that disrupt the smooth flow of goods and services between the demand and supply across the market; which requires active knowledge of efficient energy policy to reinstate stability.

Gross Domestic Product (GDP): Oriakhi and Osazee (2013) opined that oil price volatility have direct impact on real government expenditure, real exchange and real import ,which in turn have impact on real GDP, real money supply and inflation through other variables notably real government expenditure. This implies that an oil price change determines government expenditure level, which in turn determines the growth of the Nigerian economy. Aremo, Orisadare and Ekperiware (2012) examined that oil prices have significant effect on fiscal policy in Nigeria within the stud between 1980 and 2009,and found out that oil price volatility affects government revenue and GDP first before reflecting on fiscal expenditure. Wilson, David, Inyiama and Beatrice (2014) ascertains that in the short run, changes in the GDP is not influenced by oil price volatility, nor do they find evidence of influence on key macroeconomic variables. Also they found out that there is a positive but insignificant relationship between oil price and the Nigerian Gross Domestic Product. Gross Domestic Product is a monetary measure of the market value of all the final goods and services produced in a period of time,often annually or quarterly.Nominal GDP estimates are commonly used to determine the economic performance of a whole country or region,and to make international comparisons.(Wikipedia,2018)

Gross National Product (GNP): Mork (1989) showed that GNP growth was correlated with the circumstances of the oil market and that oil price declines were not as statistically significant as oil price increases. Olomola (2006) observed that oil price volatility is highly significant in explaining GNP growth and unemployment. Gross National Product is an estimate of total value of all the final products and services turned out in a given period by the means of production owned by a country's residents. Okoro (2014) opined that oil price significantly influenced the levelof economic growth in Nigeria although; the result additionally indicated a negative relationship between oil price volatility and the level of economic growth. Furthermore, the result also showed that the Nigerian economy survived on crude oil, to such extent that the country's budget is tied to particular price of crude oil.

Per Capita Income (PCI): Jawal (2013) stated that world oil price increases had a regressive impact on income (i.e income declines are more significant among the low-income groups) but welfare-decreasing (i.e greter decline in welfare among higher income brackets vis-a vis lower income classes).Hodo, Ekpan and Effiong (2013) opined that oil price shocks drive up the general level of prices, which translate into lower real disposable incomes and thus reduces demand. Previous literatures by Brueckner, Chong and Grandestein (2012) and Hamilton(2009) in their

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findings indicated that the identified oil price shocks have permanent effects on the level of GDP per capita. Blanchard (2009) with evidences from United States, France, Germany, United Kingdom, Italy and Japan economies concludes that effect of oil price shocks have changed over time. Impacts of oil price changes have become smaller on wages and employment overtime. This means that the volatility of oil has lesser effect on wages and employment of the economies.

Theoretical Review and Framework: The two theories that this study hinged to are**:**

The Linear/Symmetric Relationship Theory: As propounded by Hamilton(1983), supported by Gisser(1985),Hooker(1986) and Laser (1987),symmetric relationship theory postulated that volatility in GNP growth is driven by oil price volatility. They hinged the theory on the happenings in the oil market between 1948 and 1972 and its impact on the economies of oil exporting and importing countries respectively. Hooker (2002),after the empirical study demonstrated that between 1948 and 1972 oil price level and its changes exerted influence on GDP growth significantly. Laser (1987),confirmed the symmetric relationship between oil price volatility and economic growth. This theory relates to the objectives of the study.

The Economic Theory: The economic theory states that changes in oil prices have effect on the economic activities when it comes to supply and demand. Supply by itself is explained since oil is a crucial input in the production process. Hence, increase in oil prices will decrease the demand for oil causing a decrease in the production of other outputs; which will result in a decrease of inputs in a particular company. On the other hand, consumption is indirectly affected by the positive relationship with income. For example, when oil price increases, oil exporting countries transfer their income to oil importing countries. This causes consumption to decrease in the oil importing countries. As a matter of fact, increases in oil prices have a negative effect on investment since it increases cost. Moreover, increases in oil prices have a negative effect on investment by increasing the costs of a particular firm. Additionally, changes in oil prices could also affect the economy not only through inflation but also through foreign exchange markets. This theory relates to the research topic in that changes in oil prices have an effect on economic activities.

Empirical Review: Oriakhi and Osazee (2013) used quarterly data and employed the Variance Aggressive Model (VAR) methodology in carrying out their finding, using data from 1970 to 2010.They found out that oil price volatility have direct impact on real government expenditure, real exchange rate and real import, which in turn have impact on real GDP, real money supply and inflation through other variables, notably real government expenditure. This implies that an oil price change determines government expenditure level, which in turn determines the growth of the Nigerian economy. Rebeca and Marcelo (2004) assessed the effect of oil price shocks on real economic activity of some industrialized OECD countries using a multivariate VAR analysis. Their study bound evidence of a non-linear impact of oil prices on real GDP. Also that among oil importing countries, oil price increases are found to have a negative impact on economic activity in all cases but Japan with oil price increases affecting the UK negatively and Norway positively. Alley, Asekomeh, Mobolaji and Adeniran (2014) employed the general methods of moment (GMM) to examine the impact of oil price shocks on the Nigerian economy, using data from 1981 to 2012.The study found out that oil price volatility insignificantly retards economic growth while oil price itself significantly improves it.The significant positive effect of oil price on economic

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growth confirms the conventional wisdom that oil price increase is beneficial to oil-exporting country like Nigeria.Shocks however create uncertainty and undermine effective fiscal management of crude oil revenue;hence the negative effect of oil price volatility. Olomola (2006) observed that oil price volatility is highly significant in explaining GNP growth and unemployment. Ekpan and Effiong (2013) in their study "Asymmetric Effect of oil price shocks on exchange rate volatility and domestic investment in Nigeria" concluded that oil price shocks drive up the general level of prices, which translate into lower real disposable incomes and thus reduces demand. Olomola and Adejumo (2006) examined the effects of oil price shocks on output, inflation, real exchange rate and money supply in Nigeria using quarterly data from 1970 to2003.They found out that oil price shocks significantly affect the money supply in the long run.This simply means that volatility in oil price affects money supply and in turn affects the per capita income of the individuals in the country.

Sascha, Livio and Maurice (2012) stated that positive oil price shocks triggered currency appreciation for oil exporters and ultimately increased accumulated foreign reserves. Englama *et al* in their study on the impact of oil prices on exchange rate volatility in Nigeria found that oil price shocks impacted strongly on exchange rate volatility. Oriavwote and Eriemo (2012) in their study on relationship between oil prices and real exchange rate in Nigeria showed evidence of a long run relationship between oil prices and real exchange rates but also showed a unidirectional causality from oil prices and real exchange rates but showed a unidirectional causality from oil prices to real exchange rate. Mustapha and Sulaiman (2015) applied trend analysis, a pattern recognition procedure by GARCH modeling found out that the crude oil price benchmark for the country can be revised downward and the production can be revised upward to reduce the effect of geopolitics and upside risks amidst the prevailing challenges in the international market.Keji (2018) in his study on nexus between oil price collapse and economic growth in Sub-Saharan Africa oil-based economies found out that there is a negative link between oil price collapse and the economic growth in Angola, Nigeria and Sudan, which confirmed the nexus between oil price collapse and economic growth. This disclosed the unprecedented oil price fall disrupts on economic growth of the selected economies. Ojikutu, Onolemhemhen and Isehunwa (2017) considered the nexus between oil price, exchange rate and stock market performance in Nigeria, and found that fluctuations in oil prices do not directly affect the performance of the stock market, and that crude oil price and exchange rate do not impact All Share Price Index. Eagle (2017) used Structural Vector Autoregressive Model (SVAR) and E(GARCH) to evaluate the relationship between oil price volatility and macroeconomic performance. They found out that oil price volatility has marginal impact on growth rate of GDP in the studied countries. Ogboru,Rivi and Idisi (2017) in their study from 1986 to 2015 on crude oil prices and economic growth of Nigeria adopted Vector Error Correction Model(VECM) on time series data.The study found out that a positive and unidirectional relationship that runs from crude oil prices to GDP growth rates exists; and concluded that crude oil price exert positive influence on the economic growth of Nigeria. From all these empirical studies, none of the studies considered oil prices volatility on GDP, GNP and Per Capita Income using exchange rate to moderate the effect. Therefore this study became imperative.

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METHODOLOGY

The study adopted *ex-post facto* research design because it evaluated repeated observations of the same variable over a period of time from 1995 to 2017 with the use of secondary data obtained from Statistical Annual Bulletins of Organization for Petroleum Exporting Countries (OPEC), Annual Statistical Bulletin of Central Bank of Nigeria (CBN).The study adopted descriptive and inferential (multiple regression) statistics to analyze the data, with the aid of E-View statistical package.

Model Specification

Y= f(X)
Y= y_1,y_2,y_3 (dependent)
X= Independent
Where:
Y= Nigeria's economy
X =Return on Oil Prices (ROP_t)
ROP 100"(Δlog($OILPRICE_t$)]. Where $OILPRICE_t$ denotes oil price in year t and Δ is first difference operator

Exchange rate (control variable)
y_1= log Gross domestic product (GDP_t)
y_2= log Gross national product (GNP_t)
y_3= log Per capita income (PCI_t)

Functional Relationships

$LOGGDP_t$=f(ROP_t)……Equation1
$LOGGNP_t$ = f(ROP_t)…… Equation 2
$LOGPCL_t$=f(ROP_t)…… ..Equation 3
(LOGGDP)(LOGGNP) (LOG PCI) = f(ROP) (EXCH)……Equation 4
Note: All variables are in their natural logarithm form. Equation 1 to 4 are the working functional relationships in this study used to assess the effect of oil price volatility on National income and

Models

LOG GDP =β_0 +β_1ROP +u_t -Model 1
LOGGNP=β_0 +β_2ROP +u_t -Model 2
LOG PCI=β_0 + β_3 ROP +u_t –Model 3
LOG GDP =β_0 +β_1ROP +β_4EXCH + u_t
LOG GNP=β_0 +β_2 ROP +β_5EXCH +u_t Model 4
LOG PCI=β_0 +β_3 ROP +β_6EXCH +u_t
CONCEPTUAL MODEL

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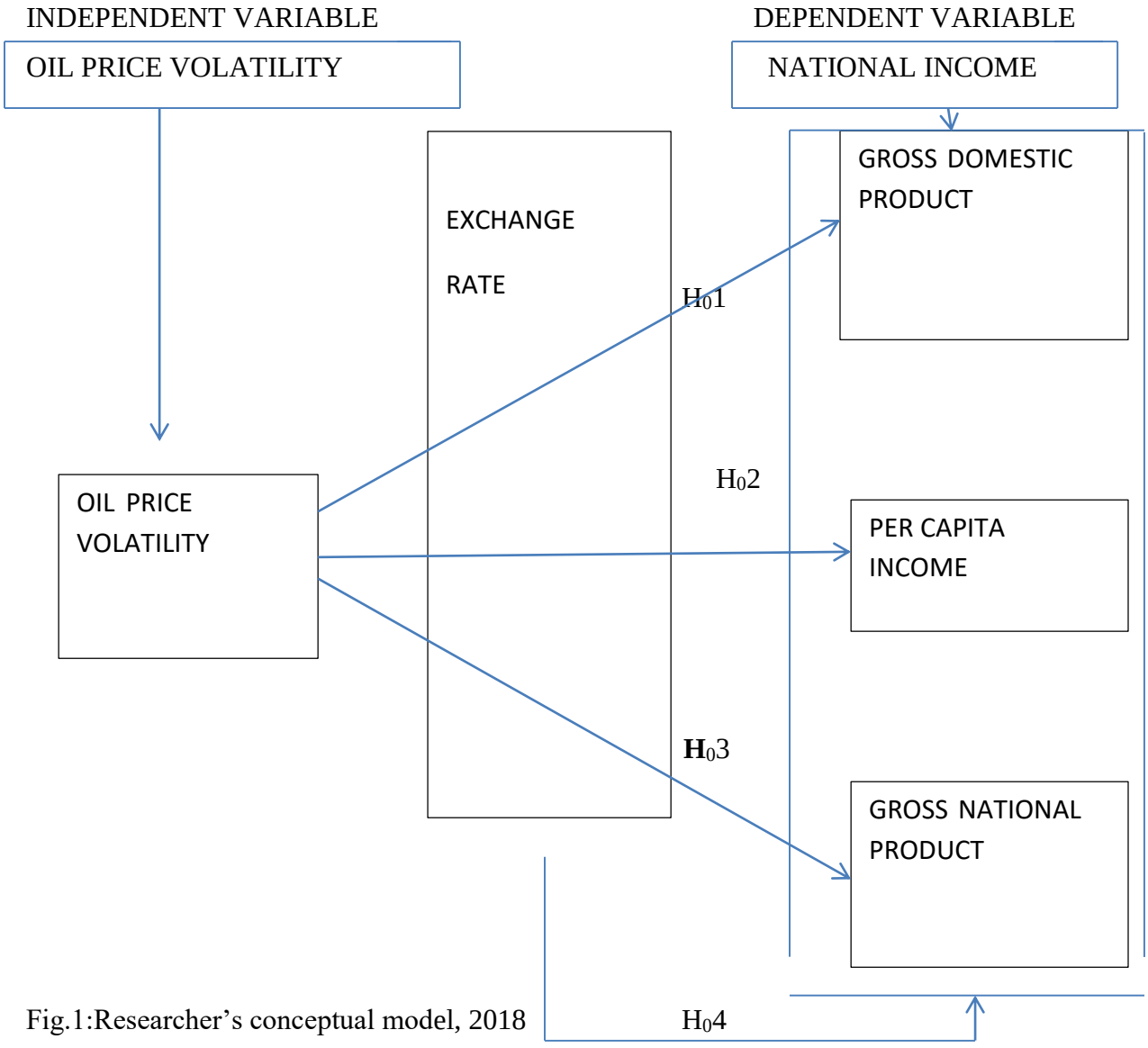

Fig.1:Researcher's conceptual model, 2018

RESULTS/FINDINGS

Descriptive statistics

From Table 1**,** the statistical differences in the minimum, maximum, mean and standard deviation scores and values of Nigeria's economy proxies.LOG GDP shows 7.975000, 11.39688, 9.595656 and 1.1207655 respectively. LOGGNP shows 28.24746, 31.98099, 30.07069 and 1.278753 respectively LOGPCI shows 9.745894,13.00864, 11.33235 and 1.126696 respectively. Exchange rate EXCH shows a minimum of log 0.740000, maximum of 107.0700, mean of 80.02100 while the standard deviation 31.82035.Log oil prices LOGOILPRICES shows a minimum value of log5.633129 while the maximum is log 9.844065 while the mean percentage is log 8.228645

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	LOGOILPRICES	LOGPCI	LOGGNP	LOGGDP	EXCH
Mean	8.228645	11.33235	30.07069	9.595656	80.02100
Median	8.722149	11.34072	30.08190	9.465930	95.80000
Maximum	9.844065	13.00864	31.98099	11.39688	107.0700
Minimum	5.633129	9.745894	28.24746	7.975000	0.740000
Std.Dev.	1.496056	1.126696	1.278753	1.120655	31.82035
Skewness	-0.620721	0.099665	0.082099	0.268254	-1.306119
Kurtosis	1.893840	1.634706	1.635998	1.769849	3.372075
Jargue-Bera	2.303972	1.586467	1.572887	1.500927	5.8011857
Probability	0.316009	0.452380	0.455462	0.472148	0.054972
Sum	164.5729	226.6469	601.4138	191.9131	1600.420
Sum Sq.Dev.	42.52547	24.11944	31.06895	23.86148	19238.16
Observations	23	23	23	23	23

Table 1: Descriptive Statistics

Skewness measures the asymmetry of the distribution of the series around its mean. The skewness for LOGPCI,LOGGNP,LOGGDP are positively signed as 0.09,0.08,0.23 which means that they are positively skewed and the data are normally distributed while LOGOILPRICES and EXCH are negatively signed as -0.62 and -1.306119 which means that they negatively skewed and the data are not normally distributed. Kurtosis measures the peakness or flatness of the distribution of the series.From table 1, LOGOILPRICES,LOGPCI,LOGGNP and LOGGDP are platykurtic i.e below the threshold of 3because the data series have flat distribution relative to the normal. EXCH is leptokurtic i.e above the threshold of 3 because the data series is peaked distribution relative to the normal. The Jarque-Bera test is a test of normality. The null hypothesis for the test is that the series under consideration is normally distributed.Based on the probability values for JB in all the variables,we can see that all the variables are normally distributed.

Test of Volatility: Autoregessive Conditional Heteroskedasticity (ARCH LM)Test

Return on oil price was tested for volatility using ARCH LM test.The result is as shown in table 2.

F-Statitic	10.97923	Prob.F(1.16)	0.0044
Obs *R-squared	7.325122	Prob.Chi-Square (1)	0.0068

Table 2:Hereoskedasticity Test:ARCH

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Based on the null hypothesis of no heteroscedasticity,the result in table 2 indicates that the null hypothesis should be rejected because evidence on p-value 0.0068 shows that the null hypothesis should be rejected because it is below the level of significance 0.05.This implies that the series is volatile or fluctuating. Hence, oil prices are volatile from the period 1995 to 2017.Thus the return on oil prices (ROP) was used in the regression analysis.

Test of Hypotheses

4.3.1 Hypothesis 1: Oil price volatility has no significant impact on Gross Domestic Product of Nigeria

Model 1

Variables	Coefficient	Std Error	t-Stat	Prob.
C	9.754545	0.278340	35.04541	0.000
ROP	-0.003681	0.005843	-0.629931	0.5371
R^2	0.022810			
Ad.R^2	-0.034672			
S.E of Reg	1.101216			
F.Statistic	0.396814			
Prob.(F.Stat)	0.537115			
Obs	23			

Dependent Variable:Log (GDP) *significance at 5%

Table 3 Regression Estimate on Oil Price Volatility and Gross Domestic Product

$LOG(GDP) = \beta_0 + \beta_1 ROP + u_0$
LOG(GDP) =9.7545 -0.00337ROP

The coefficient in table 3 showed that one unit change in Return on Oil Price (ROP) will a 3% negative change in LOG(GDP).The R-squared 2.3% showed the amount of variations in LOG(GDP) can be attributed to Return on Oil Price (ROP) while the remaining 97.7% variations are caused by other factors not included in this model. This shows a low explanatory power of the model. This is confirmed with the t-statistic of -0.629931 while the p-value of the t-statistic is 0.5371 which is more than 0.05level of significance. Therefore the study does not reject the null hypothesis meaning that Oil price volatility has no significant impact on Gross Domestic Product of Nigeria.

4.3.2: Hypothesis 2: Oil price volatility has no significant impact on Gross National Product of Nigeria

$LOG(GNP) = \beta_0 + \beta_2 ROP + u_t$
LOG(GNP) =30.25888 -0.004613

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Model 2

Variable	Coefficient	Std Error	t-Stat	Prob.
C	30.25888	0.317438	95.32211	0.0000
ROP	-0.004613	0.006664	-0.692264	0.4981
R^2	0.027417			
Adj.R^2	-0.029794			
S.E. of Reg	1.255903			
F.Statistic	0.479230			
Prob.(F.Stat)	0.498119			
Obs	23			

Dependent Variable: LOG(GNP) *significance at 5%

Table 4.Regression Estimate on Price volatility and Gross National Product

Table 4 shows that β_2ROP has a negative coefficient of 0.004613 indicating one unit change in LOGROP will cause a reduction of 0.5% in LOGGNP .The R-squared of 2.74% variations in LOGGNP can be attributed to Return on Oil Price (ROP) while the remaining variations are caused by factors not included in this model. This shows a low explanatory power of the model. From the regression table, the t-statistic is -0.692264 while the p-value of the t-statistic is 0.4981 which is greater than 0.05 level of significance. This study did not reject the null hypothesis, which means that Oil price volatility has no significant impact on Gross National Product of Nigeria

Hypothesis 3 Oil price volatility has no significant impact on Per Capita Income of Nigeria

Model 3 Table 5 Regression Table

Variables	Coefficient	Std Error	t-Stat	Prob.
C	11.49679	0.280173	41.03459	0.0000
ROP	-0.004049	0.005882	-0.688359	0.5005
R^2	0.027117			
Adj.R^2	-0.030111			
S.E of Reg	1.108468			
F-Statistic	0.473838			
Prob.(F-Stat)	0.500513			
Obs	23observations			

Table 5 Regression Estimate on Oil Price Volatility and Per Capita Income

Dependent Variable: LOG(PCI) *significance at 5%

$LOG(PCI)=\beta_0 +\beta_3 ROP +u_t$
LOG(PCI)=11.49679 -0.00405ROP

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Table 4 shows that one unit change in LOG(ROP) will cause 0.4% negative change in LOG(PCI).The R^2 showed that 2.7% variations in LOG(PCI) can be attributed to Return on Oil Price (ROP) while the remaining variations are caused by factors outside this model. This shows a low explanatory power of the model. The regression estimate shows that the t-statistic is -0.688359 while the p-value of the t-statistic is 0.5005 which is greater than 0.05 level of significance. This study did not reject the null hypothesis, which means that Oil price volatility has no significant impact on Per Capita Income of Nigeria

Hypothesis 4 Exchange rate does not have moderating effect on oil price volatility to affect Gross Domestic Product, Gross National Product and Per Capita Income of Nigeria.

	Dependent Variable: LOG(GDP)				Dependent Variable LOG9GNP)				Dependent Variable: LOG(PCI)			
Variables	**Coefficient**	**Std Error**	**t-Stat**	**Prob.**	**coefficient**	**Std Error**	**t-Stat**	**Prob**	**Coefficient**	**Std Error**	**t-Stat**	**Prob.**
C	7.411752	0.6392	11.595	0.000	27.463	0.6959	39.466	0.000	9.0448	0.6185	14.623	0.0000
ROP	-0.06217	0.0043	-4202	0.175	-0.008	0.0047	-1.603	0.128	-0.007	0.0042	-1.5826	0.1331
EXCH	0.028428	0.0073	3.872	0.001	0.0339	0.0079	4.2445	0.001	0.0298	0.0071	4.1880	0.0007
R^2	0.495503				0.542533				0.535890			
Adj.R^2	0.432441				0.485350				0.477876			
S.E.of Reg	0.815599				0.887844				0.789165			
F-Statistic	7.857385				9.487618				9.237285			
Prob.(F-Stat)	0.004196				0.001918				0.002153			
Obs	23											

Model 4 *significance level at 5%

Table 6 Regression Estimate on Oil Price volatility on GDP,GNP and PCI

$LOG(GDP)=\beta_0 +\beta_4 ROP +\beta_5 EXCH +u_t$
LOG(GDP)=7.411752 – 0.006217 +0.02842EXCH (i)

$LOG(GNP) =\beta_0 +\beta_6 ROP +\beta_7 EXCH+u_t$
LOG(GNP)=27.463 -0.008ROP + 0.0339EXCH (ii)

$LOG(PCI) =\beta_0 +\beta_8 ROP +\beta_9 EXCH +u_t$
LOG(PCI) =9.0448 -0.007ROP +0.0298EXCH ((iii)

From table 6,the regression model shows a negative relationship between oil price volatilityROP (-0.06217) and LOGGDP; also negative relationship between oil price volatility ROP (-0.008) and

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LOGGNP and negative relationship between oil price volatilityROP (-0.007) and LOGPCI. However, a positive relationship exists between Exchange rate EXCH (0.028428) and LOGGDP; also positive relationship between exchange rate EXCH (0.0339) and LOGGNP and there is exists a positive relationship between exchange rate EXCH (0.0298) and LOGPCI. The multiple regression estimates show adjusted R^2 of 43%,48.5% and 47.8% variations in LOGGDP,LOGGNP and LOGPCI respectively which can be attributed to Return on Oil Price(ROP) and Exchange Rate (EXCH) while the remaining 57%,51.5% and 53.2% variations in the respective dependent variables were caused by other factor not included in the model.The coefficients showed that one unit change in return on oil price (ROP) and exchange rate (EXCH) will cause a negative 0.62% and a positive 2.8% change in LOGGDP. Also one unit change in return on oil (ROP) and exchange rate (EXCH) will cause a negative 0.8% and a positive 3.39% change in LOGGNP. Furthermore, one unit change in return on oil price (ROP) and exchange rate (EXCH) will cause a nagatice 0.7% and a positive 2.98% change in LOGPCI.

Following all the aforementioned, the F-Statistics showed 7.857385, 9.487618 and 9.237285 respectively while the p-value of the F-Statistics showed 0.004196, 0.001918 and 0.002153 respectively which are all less than the 0.05 level of significance adopted for this study. Therefore, the null hypotheses were all rejected, which means that: Exchange rates have moderating effect on oil price volatility to affect Gross Domestic Product, Gross National Product and Per Capita Income of Nigeria.

DISCUSSION OF FINDINGS

The correlation result suggested that natural logarithm of Oil Prices (LOG(OILPRICES) have a significant relationship with LOGGDP, the regression result shows that the return on Oil Prices (ROP) a measure of oil price volatility alone has an insignificant negative effect on LOG(GDP).However, when exchange rate (EXCH) was introduced as a control variable in the model, the multiple regression estimate shows that while ROP has a negative effect on LOG(GDP),Exchange rate has a positive effect on LOG(GDP),and on the overall the model is statistically significant. Thus, oil price volatility measured by return on oil price (ROP) on its own does not significantly affect LOG (GDP) but it has a negative effect on LOG(GDP) when the model is controlled by exchange rate. This is in line with the findings of Oriakhi and Osaze (2014) and Ito(2010) who affirmed that there is a crucial negative relationship of oil price volatility on national income and Nigeria's economy. This may be as a result of negative return on oil price on Log gross domestic product in Nigeria because policies had not been established and implemented into Nigeria's system in managing negative oil price shock. Alley, Asekomoh, Mobolaji and Adeniran (2014) also agreed with the findings of return on oil prices having a negative impact on gross domestic product. Aremo, Orisadare and Ekperiware (2012) in their findings concluded that return on oil prices affect GDP negatively.That is the unsteady trends of oil prices did not affect gross domestic product in Nigeria positively due to the non-establishment of policies in managing negative oil price volatility. Raguindin and Reyes (2005) examined the effects of oil price shocks on the Philippine economy over the period of 1981 to 2003.Their impulse response functions for the symmetric transformation of oil price shocks showed that oil shock leads to a prolonged reduction in the real GDP of the Philistines. These findings can be related to the negative impact of oil price volatility on gross domestic in Nigeria. Wilson, David, Inyiama and Beatrice (2014)

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ascertain that in the short run, changes in the gross domestic product(GDP) is not influenced by oil price volatility, nor do they find evidence of influence on key macroeconomic variables but this study concludes that return on oil prices promotes changes in gross domestic product.

Further,the correlation result suggested that Logarithm of oil prices(LOG(OILPRICES) have a significant relationship with LOG(GNP),the regression result shows that return on oil prices (ROP) a measure of oil price volatility alone has an insignificant negative effect on LOG(GNP).However, when exchange result was introduced as a control variable in the model, the multiple regression estimate shows that while ROP has a negative effect on LOG(GNP),exchange rate has a positive effect on LOG(GNP) and on the overall model is statistically significant. Thus oil price volatility measured by return on oil price (ROP) on its own does not statistically affect LOG(GNP) but it has a negative effect on LOG(GNP) when the model is controlled by exchange rate. According to Bharat Trehan (1986),fluctuations to the price of oil have a relatively large impact on real GNP. The evidence from this work suggests that the large decline in oil prices is not likely to provide as big a boost to real GNP. This can be seen in the findings of this study. Tatom (1987) "The Macroeconomic Effects of the Recent Fall in Oil Prices" is of the opinion that oil price becomes volatile, the Gross National Product will be affected negatively. That is, when there is an increase in oil price, there will be a decrease in Gross National Product. This is in line with the findings of this study. Karras (1993) in his findings concludes that oil price shock accounts for a small variation in gross national product.This is because the study was carried out in United States of America.The findings of this study is carried out in Nigeria and the study concludes that oil price shock account for a large variation in gross national product.Olomola (2006) observed that oil price volatility is highly significant in explaining GNP and this is in line with the findings of this study.

The correlation result suggested that Logarithm of oil prices (LOG(OILPRICES) have a significant relationship with LOG(PCI),the regression result show that return on oil prices (ROP) a measure of oil price volatility alone has an insignificant negative effect on LOG(GNP).However when exchange result is introduced as a control variable in the model,the multiple regression estimate shows that while ROP has a negative effect on LOG(PCI), exchange rate has a positive effect on LOG(PCI) and on the overall model is statistically significant. Thus oil price volatility measured by return on oil price (ROP) on its own does not statistically affect LOG9GNP) but has a negative effect on LOG(PCI) when the model is controlled by exchange rate. Jawad (2013) in his findings concluded that world oil price increases had a regressive impact on incomes which means that return on oil prices have a negative impact on per capita income.This is shown in the findings of this work. Hodo, Ekpan and Effiong (2013) in their findings concludes that oil shocks drive up general level of prices, which translates into lower real disposable incomes which is the same results gotten for this study. Brueckner, Chong, and Gradstein (2012) and Hamilton (2009) in their findings indicate that the identified oil price shocks have permanent effects on the level of GDP per capia. Blanchard (2007) with evidence from United States, France, Germany, United Kingdom, Italy and Japan economies concludes that effect of oil price shocks have become smaller on wages and employment overtime which means that the volatility of oil has lesser effect on wages and employment of the economies. This is not the same for the findings of this study.

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Ogbona and Appah (2012) from their findings concluded that OPEC members experienced an average decrease in their per capita national income.This can also be deduced from the findings of this study.Olomola and Adejumo (2006) found out that oil price shocks significantly affect the per capita income of the individuals in the country which is in line with the findings of this study.The linear/symmetric theory agrees in respect the results of this work. The linear theory claims that confirms the symmetric relationship between oil price volatility and the economy (Laser,1987).This simply means that an increase in oil prices necessitates a decrease in GDP,while the effect of an oil price decrease on GDP is ambiguous. From this study, it is obvious that fluctuations in oil price affect the Nigerian economy variables of GDP,PCI and GNP respectively.

Implication to Research and Practice
Based on the findings the following are the implications;

To Research: The results of this study serve as a data base for research in various economies. That oil price volatility has negative effect on the indices for measuring economies, and the impact of exchange rate is positively related to all the indices of measuring any economy in the world. The study is evidence to research that oil price volatility affects national income as fluctuations in oil prices have negative impact on Nigerian economy. Research should take the effect of the fluctuations to other sectors of the economy which may be affected by the volatility in oil prices.

To Practice
Government will have to introduce a policy that will take care of shocks from oil prices and other macro-economic variables that are volatile that will make appropriate budget planning and expenditure for the utilization of revenue realized from the oil shocks for developmental objectives.

Government must guide against fluctuations in exchange rate by diversifying the economy from a mono product for stable foreign exchange inflow, and enhance the values of Gross Domestic Product. Gross National Product and Per Capital Income. The government policies must have to protect the income of citizens when a negative shock occurs.The government should either privatize the countries refineries or reposition them ane ensure crude oil is adequately supplied for local refinery to resolve the fluctuations experienced in the international oil market.Another implication is the consideration of diversifying the economy to have other sources on income that will reduce shocks in oil price fluctuations. Diversification will make the economy more productive and reduce the inherent risks export prices.

CONCLUSION

The linear regression results showed return on oil price (ROP) does not have positive relationship with LOGGDP, LOGGNP and LOGPCI. However, when exchange rate was introduced as a moderating variable, there exists positive relationship between return on oil price moderated by exchange rate and LOGGDP, LOGGNP and LOGPCI. The study therefore concluded that return of oil price and exchange rates have strong relationship with gross domestic product (GDP), gross national product (GNP) and per capita income (PCI). The study provided insight into the effect of oil price volatility on national income and Nigeria's economy surrogates by Gross Domestic

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Product, Gross National Product and Per Capital Income. The study concluded further that oil price volatility affects national income and Nigeria's economy significantly due to the fact that as oil price fluctuates, there is a negative impact on the Nigerian economy. That is, Gross Domestic Product, Gross National Product, Per Capita Income are negatively affected by the volatility in oil price in Nigeria.

Future Research

This study found negative association between oil price volatility, national income and Nigeria economy variables. Future research should make use of other proxies not considered in this study on oil price volatility so as to contribute to literature and knowledge. Other studies are imperative to carried in Nigeria and other African countries to determine the effect of oil price volatility on other macroeconomic variables.

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