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An Empirical Investigation into the Effects of Crude Oil Price on Government Revenue in Nigeria

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Abstract

Nigeria's vulnerability to crude oil price fluctuations is a phenomenon which has become reoccurring effects and there was the need for emphasis on the need to establish the relationship effects of crude oil price on the Nigeria government revenue. This study, therefore, examined the impacts of oil price shock on government revenue in Nigeria, and, also analyzed its trend within the period under study (1983 – 2016). This study employed Vector Autoregressive (VAR) model to examine the short and long-run effects of crude oil price distortions on revenue in Nigeria. The impulse response analysis was carried out, the trend analysis was demonstrated and the time series properties of the data were tested by ADF unit root. The study found that government revenue was characterized with trended swing movements in same directions as the world oil price. The government revenue was negatively and significantly impacted by the world oil price in the first period and second period (-9.59006 and -9.82006 respectively). However both in the short run and long run, government revenue declined as a result of the impact of the world oil price shock. Consequently, the study suggested that the policy makers should focus on policy that will strengthen and stabilize the macroeconomic structure of the Nigerian economy with specific focus on alternative sources of government revenue (reduction of dependence on oil proceeds and diversify) and ensure fiscal discipline in governance.
Keywords: Crude oil; Price shock; Fiscal discipline; Dependence and vector autoregressive (VAR).

1. Introduction

Nigeria, the most populous black nation situated in western Africa is popularly known for her dominant source of revenue; Crude oil. Thus, Nigeria became increasingly dependent on oil revenue; this in the last few decades has experienced shocks in its price per barrel and production. With crude oil revenue as the mainstay of the Nigerian economy, shocks in oil prices are definitely of prime interest to economists in order to predict the effects of a drastic change (increase or decrease) in crude oil price on the Nigerian economy as a whole. Crude oil shock can be described as a sudden and unexpected change in oil price or production (Akpan E. O., 2009).

Evidences from past decade show that crude oil price per barrel rose from US$25 in 2002 to US$55 in 2005 and an outrageous US$147 in mid-2008, declining sharply to US$46 (Akpan E. O., 2009). Persistent oil fluctuation such as this could have extensive effects on the macro economy, thus inducing challenge for policy making – fiscal or monetary in both crude oil exporting and crude oil importing countries over the past forty years (Olomola, 2006). Recent events following sustained decline in global crude oil prices once again accentuate the vulnerability of the Nigerian economy while amplifying other related and non-related risk factors. This has also amplified investors' apathy and aggravated the rate of fund outflows in search of safety. The vicious circle, which began with the slowdown in inflow of easy money amidst expectations of political and security headwinds in 2014, appeared under control as the monetary policy committee further tightened its monetary instrument to ensure exchange rate and price stability (World Bank, 2015).

Crude oil production usually accounts for a large share of the GDP of oil-exporting countries like Nigeria, and, crude oil price increase directly increases the country's revenues vice versa. However, the total effect of oil price fluctuations on economic performance depends on what the governments do with the past and present revenues accrued. Hence, when crude oil price is high it increases the real national income through higher export earnings (Kornonen and Juurikkala, 2007). As a result, wealth is transferred from crude oil-importing countries to crude oil-exporting countries, leading to greater purchasing power for economic agents of crude oil-exporting countries (Hakan et al., 2010). Therefore, crude Oil price fluctuations are a major source of disturbance for the economies of crude oil-exporting countries given the relative importance of the crude oil sector in production and exports and uncertainty in the world crude oil markets (Behbudi et al., 2010; Mehrara, 2008).

Crude oil revenue is the major part of government income and it has played an important role in reimbursing government expenditures in Nigeria. The Nigerian economy is heavily dependent on crude oil revenues, with about

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15% of nominal GDP originating from the crude oil sector during the period 2000 to 2009. Moreover , about 50% of the government's revenues and 70-75% of exports are derived from the oil sector (IMF, Country Reports; (Mehrara *et al.*, 2010). Oriakhi and Iyoha (2013) state that in 2008 when crude oil price fell from a peak of $147 to about $37.81 per barrel, the budget witnessed significant cuts in budgeted revenue and expenditure. These cuts had attendant effect on all aspects of the Nigerian economy which is as a result of the strong link of budgetary operations in Nigeria to happenings (price, demand and supply) in the international crude oil market.

On May 29, 2007, crude oil was trading at $67.2pb and foreign exchange reserves which were then at a dismal level of $4.72bn as at 1999, stood at $43bn. Nigeria's economy looked very healthy (Nigeria National Petroleum Company NNPC, 2009). Apparently, Nigeria had enough fiscal buffers, with the excess Crude Account in double figures and foreign exchange reserves recorded at $62.08bn as at September 2008. External Reserves were threatened during the global economic crisis, falling to $40bn as at April 2010, reaching a bottom balance by September 2011 was $31.74bn (Economy Watch, 2014). However, after 41 consecutive months of crude oil prices above US$100 (boom period), one wonders why Nigeria still struggles to record savings of US$37bn. Why did Nigeria's reserves fail to rise significantly during the oil price boom times? World Bank (2015) the Nigerian external reserves have been predicted to come under continuous pressure as payments in foreign currency might slow down with falling of oil prices. Economists are projecting that Nigeria may have to borrow to pay salaries, with extra deficit of ₦600bn if oil prices stay at $70 per/barrel. If oil prices keep plunging low, Nigeria's external reserves will continuously be under pressure due to declining dollar receipts (World Bank, 2015).

1.1. Problem of the Study

The fact that Nigeria is vulnerable to crude oil fluctuations and shock is a phenomenon which has made the country severely affected by the fluctuations of the international crude oil prices, a situation which has in turn contributed greatly to fluctuations in government revenue and expenditure (Omisakin, 2012). On the contrary, the developed nations rely more on the real sector activities in generating their revenues like; income tax and often supplemented by borrowing from the public. Olomola (2006), in his study, reveals that crude oil revenue is the key source of government revenue that directs the course of spending in Nigeria. So, instability in price of oil in the international market would lead to unstable implementation of government projects accurately being financed with crude oil money. It is no more news that the Federal allocations to states has remained lean as government continues to cut down on expenditure in the light of the current realities (Meristem, 2014).

In some states that made up federating unit like Osun, Kogi, Benue, Niger, Oyo, Ebonyi States, etc, as a result of the dwindled allocations from the federation account, find it difficult to pay their workers' salaries for more than eight (8) months. Some that are managing to pay have suspended or reduced the approval of funds for the on-going and new developmental projects. As a result, the businessmen and traders are also not left out in sharing in the spillover effects of the dwindling crude oil revenue. This, therefore, necessitated the 2017 bail-out funds being approved by the Federal government led by President Mohammudu Buhari to all States to off-set salary arrears.

Most previous studies, Olomola (2006), (Odularu G. O., 2007) Omisakin (2012), Oriakhi and Iyoha (2013), Akpan S. S. and Nnamseh (2014) etc., discussed the effect of crude oil price shocks on mainly economic growth or on any one of macro-economic variables. None of these studies also have fully explored the consequences and magnitude of crude oil price fluctuations on the government revenue, which have regarded them as one-sided. Therefore, this study exists to fill this identified gap in literature. This study will not only add to the extant literatures, but will seek to determine the effects of crude oil price on the government revenue and the Nigerian economy as a whole.

2. Literature Review

Sharp changes in crude oil price affect different countries differently, depending on whether the country in question is an exporter of crude oil or an importer. For an importer or a consumer nation, rise in price of crude oil, an input of production, raises the cost of production, and hence can lead to (cost-push) inflation, lower economic growth, and even recession (Barsky and Kilian, 2004; Mordi and Adebiyi, 2010; Sauter and Awerbuch, 2002).

Also, Oriakhi and Iyoha (2013) found that issues in crude oil price volatility and its effects on economic growth have continued to generate controversies among economic researchers and policy makers. They further stated that some researchers (such as Akpan E. O. (2009), Aliyu (2009), Olomola (2006), etc) argued that it can promote growth or has the potential of doing so, others (such as Darby (1982), Cerralo (2005) etc) are of the view that it can inhibit growth which concurred with the likes of Sauter and Awerbuch (2002), Barsky and Kilian (2004), and Mordi and Adebiyi (2010). The former argued that for net- crudeoil exporting countries, a price increase directly increases real national income through higher export earnings, whereas, the latter cite the case of net-oil importing countries (which experience inflation, increased input costs, reduced non-oil demand, lower investment, fall in tax revenues and ultimately an increase in budget deficit which will further reduce welfare level) in advancing their argument. Thus the effect (positive or negative) which crude oil price fluatuations could have on any economy, depends on what part of the divide such economy falls into and of course the nature of such price change (rise or fall).

Crude oil price rise is costly for the importing economy, and neither does its decline benefit them (Atukeren, 2003). That is, price decline does not significantly improve the economy; whereas, crude oil price rise negatively impacts on the economy (Sauter and Awerbuch, 2002). This asymmetry is due to constraints placed on firms' adjustment to oil price shocks by resource reallocation effect. When crude oil price rises, sectors that use oil-intensive production processes decline. On the other hand, sectors that are less dependent on crude oil relatively expand. The engendered reallocation of resources, coupled with market imperfection constrains reverse adjustment

when crude oil price falls. Factors of production do not readily move between sectors, despite falling crude oil price and declining costs of production; and consequent expansion in the energy-intensive sector. The sector could thus not fully expand in response to a unit fall in crude oil price as much as they shrank when the oil price had risen by a unit. This shows that crude oil price changes (rise and fall in price) lead to overall output loss for importing countries (Jimenez and Sanchez, 2005).

According to BudgiT (2014), the story of Nigeria's economy since the 1970s is incomplete without recounting the swings in crude oil prices. The huge revenue we have earned from crude oil and gas and a simultaneous lack of investment in infrastructure and sustainable projects remain a challenge for Nigeria. As at now, capital expenditure is wholly financed through debt and the entire oil revenue for the Federal Government is used for recurrent items. Aliyu (2009), the global financial meltdown in 2009 left Nigeria's oil revenue sliding to ₦4.84tn, representing a 39% reduction in revenues at the end of the year. This showed the weakness of the Nigerian economy but the fault lines were not very visible, due to prior robust savings in the Excess Crude Account. The global economy recovered in 2010, as did crude oil prices, resulting in government revenue rising to ₦7.3tn and ₦11.1tn in 2010 and 2011 respectively. It is believed that to continuously depend on crude oil and gas revenue is unsustainable, considering its fluctuation.

As an oil exporter and importer of refined petroleum product, any volatility or fluctuations in the oil prices will adversely affect the Nigerian economy either positively or negatively. Several empirical studies have been undertaken to investigate the effect of oil price volatility on macroeconomic variables in different economies. Although, the literatures are mixed on the causality between the oil price volatility and the macroeconomic variables, most studies show that oil price directly impacts on macroeconomic variables (Aliyu, 2009; Joseph, 2013).

2.1. Review of Emperical Literatures

Rautava (2004) examined the impacts of oil price shock in the Russian economy using VAR model and shows that crude oil has played a significant impact on the Russian GDP. He found out that increase in crude oil price led to increase in GDP, in both short and long runs. Also, Anshasy *et al.* (2005), in their examination of the effects of oil price shock on the performance of Venezuela between 1950 and 2001, investigate the relationship between crude oil prices, government revenues, government spending, GDP and investment by employing VAR and VECM. They found that 2 long run relationships were consistent with economic growth and fiscal balance and that this relationship is important not only for the long run performance but also for short term fluctuations.

Jin (2008) discovered that the oil price increases exerts a negative impact on economic growth in Japan and China and a positive impact on economic growth of Russia. Specifically, a 10% permanent increase in international oil prices is associated with a 5.16% growth in Russian GDP and a 1.07% decrease in Japanese GDP. On the one hand, an appreciation of the real exchange rate leads to a positive GDP growth in Russia and a negative GDP growth in Japan and China.

Aremo *et al.* (2012) examined the effect of crude oil price on fiscal policy in Nigeria using structural vector autoregressive (SVAR) model to analyze the impacts of crude oil price fluctuations on two major key fiscal policy variables [government expenditure (GEXP) and government revenue (GREV)], money supply (MS_2) and GDP. The results showed that crude oil prices have significant effect on fiscal policy in Nigeria within the study period of 1980:1 to 2009:4. The study also revealed that oil price shock affects GREV and GDP first before reflecting on fiscal expenditure.

Alley (2014) investigated the impacts of oil price shocks and Nigerian economic growth between 1981 and 2012 using General Methods of Moment (GMM). They found out that crude oil price shocks insignificantly retarded economic growth while crude oil price itself significantly improved it. The significant positive effect of crude oil price on economic growth confirmed the conventional wisdom that oil price increase is beneficial to oil-exporting country like Nigeria.

Oriakhi and Iyoha (2013) argued that the Nigerian economy uniquely qualifies as both crude oil exporting and importing economy, by reason of the fact that she exports crude oil, but imports refined petroleum products. Making a conclusive and authoritative statement on the impact of oil price volatility on the Nigerian economy and her revenue inflow as difficult. However, as an open economy, it has no real influence on the world price of crude oil, whereas, it is greatly influenced by the effect of crude oil price volatility both as an exporter of crude oil and importer of refined petroleum products. It thus implied by simple reasoning that oil price volatility, whatever the nature (either a rise or fall), can both benefit and hurt the economy at the same time. Basically, the crux of the problem lies in the fact that the country has extremely relied on this commodity over the years. This over-reliance has made the economy a mono-product economy and also triggered severe structural difficulties for the economy.

Taking an analytical view of the impact of crude oil on the Nigerian economy, Odularu O. G. and Okonkwo (2009) soughed to evaluate the impact of the development in the crude oil sector on the Nigerian economy through government finances and income. They found that the effect of crude oil on government revenue was positive. That is, there was a positive relationship between crude oil price and government expenditure, claiming that this relationship was significant and have fiscal implications and linkages. These linkages arise from the use of increasing crude oil revenue by the government to develop other sectors of the economy such as agriculture, education, infrastructures, etc which are components of various government capital and recurrent expenditures.

Oriakhi and Iyoha (2013) argued that the fact that crude oil price volatility has significant impacted on economic aggregates of any economy was not in doubt; however, it was the channel through which the impact was transmitted and nature/severity of the impact that has been argued by researchers. Obioma (2006) further explained that Nigeria became more exposed to crude oil price fluctuations the moment she started importing refined petroleum products

due the collapse of local refineries in the late 1980's. Thus, the country could not grapple with the enormous subsidy it committed itself to, so that between 1999 and 2010, the Federal Government had adjusted its subsidy on petroleum products back and forth approximately 8 times. This has negatively affected production, consumption, general welfare and hence the pace of economic growth.

The effects and impacts of crude oil on Nigerian economy have been double-edged. It has benefited the country in some ways, and has in many other ways turned out to be a curse (Ogwumike and Ogunleye, 2008). Crude oil's contribution to GDP rose from 1.6% in 1960 to 11% in 2001 (Adenikinju, 2006). This contribution consists of proceeds from crude oil export, local sale of crude oil for domestic refining and local sale of natural gas. However, the contributions have been limited due to substantial involvement of foreign investors in the crude oil sector, and consequent repatriation of the sector's profits and dividends abroad (Odularu G. O., 2007).

Aremo *et al.* (2012). present an analysis of the oil price shocks and fiscal policy management in Nigeria, using time series data from 1980 to 2009. The Structural vector autoregressive (SVAR) model was employed to analyze the data. The findings that emerged show that variables like money supply, GDP, exchange rate, government revenue, and inflation contributed to the variance of government expenditure more than that of oil price at least in the long run.

More so, Oriakhi and Iyoha (2013) found that crude oil price at the prevailing exchange rate determines the level of government spending, which in turn determines real GDP, using the Granger-causality tests and the Vector Autoregressive (VAR) techniques. The study concluded that there was a significant relationship between oil price volatility and economic growth. And as a result of Nigerian economy's high vulnerability to oil price changes, expected growth targets are hardly met. Mahmud (2009) in his work titled ''Oil Price Shock and Monetary Policy Aggregate in Nigeria" made use of the Structural VAR Approach and found that GDP growth, balance of payment ratio and exchange rate responded negatively to shock in crude oil price throughout the periods and only interest rate had a positive responses to the oil price shock in all periods.

Monetary Policy Report (February, 2015) argued that the effects of the lower crude oil price on the development of an economy depend not only on whether the lower price is expected to be temporary or persistent but also on the causes of the crude oil price fall. A price fall due to reduced demand for crude oil will not have the same positive effects on the economy as a price fall due to an increased supply of crude oil. This was because a demand-driven price fall is symptomatic of worsened growth prospects. From various arguments, it was crystal cleared that scholars agreed on the causes and the effect of fall in the world crude price of crude oil on any economy, whether exporting or importing. But, the extent of the effects depends on how such an economy or a country can adjust her fiscal and monetary policies in response to the fall in prices.

3. Methodology

This section addressed the issues that relate to the methodology of the study with emphasizes been led on the theoretical framework, model specification, method of data analysis and sources of data for the purpose of the paper.

3.1. Theoretical Framework

The aggregate production function approaches to petroleum price change adopt an essential micro analysis and specify gross output as a function of energy and other factors. The concept of the potential growth effect of petroleum price change is that, with a fixed budget constraint and a higher price of petroleum, the length of the constriction depends on the severity of price increase while the length of the expansion depends on the strictness of the price fall. Production function contraction will lead to decrease in real output while a forward shift will increase output. The decrease in output, ceteris paribus, result in an excess demand for goods and an increase in interest rate, while increase in output will result in excess supply and lower interest rate. Real cash balance (Revenue) are then influenced by these changes, therefore, decrease in output and high interest rate reduce the demand for real cash balance that is revenue and given a nominal quantity of money, the price level rises (Adejumo and Olomola, 2006).

According to neo-classical theory of production function which is expressed as;

$$Q = f (K, L, N, t) \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots.. (1)$$

Where; Q is the net output or net nation income, K is the capital, L is the labour force, N is land and natural resource and while *t* is time signifying technical progress (Jhingan, 2012)

3.2. Model Specification

This work adopted the model used by Adejumo and Olomola (2006) with special modification. They employed index of industrial production as proxy for output to measure aggregate economic activity. But, this study considered government revenue along with other important variables (i.e. exchange rate and interest rate) so as to achieve the objectives of the study. The international spot price of bonny light crude oil, exchange rate and interest rate are major macroeconomic variables adopted from the work of Adejumo and Olomola (2006). To reflect the effects of crude oil price on government revenue, the model is specified thus;

$$GR = f (OIL, EXR, INT)\text{---}(2)$$

Where,

OIL was crude oil price; EXR was Exchange rate; INT was Interest rate and GR was Government revenue.

Explicitly in linear form;

$$GR = \beta_0 + \beta_1 OIL + \beta_2 EXR + \beta_3 INT + U_E \text{ --}(3)$$

Expressing equation (3) in VAR form, we have

$$GR_t = \beta_0 + \beta_1 OIL_{t-1} + \beta_2 EXR_{t-1} + \beta_3 INT_{t-1} + \beta_4 GR_{t-1} + V_1 \text{---------------------(4)}$$

$$OIL_t = \beta_0 + \beta_1 OIL_{t-1} + \beta_2 EXR_{t-1} + \beta_3 INT_{t-1} + \beta_4 GR_{t-1} + V_2 \text{----------------------(5)}$$

$$EXR_t = \beta_0 + \beta_1 OIL_{t-1} + \beta_2 EXR_{t-1} + \beta_3 INT_{t-1} + \beta_4 GR_{t-1} + V_3 \text{----------------------(6)}$$

$$INT_t = \beta_0 + \beta_1 OIL_{t-1} + \beta_2 EXR_{t-1} + \beta_3 INT_{t-1} + \beta_4 GR_{t-1} + V_4 \text{----------------------(7)}$$

Where;

$\beta_0, \beta_1, \beta_2$ and β_3 are parameter co-efficients/estimates
U_E is the stochastic error term.

Equations (4) to (7) show the structure of the Vector Auto-regression (VAR) model used in the study to capture the linear interdependencies among the variables used. All the variables are treated symmetrically; each variable has an equation explaining its evolution based on its own lags and the lags of all the other variables in the models.

3.3. Method of Data Analysis

This paper employed the use of the Vector Autoregressive (VAR) model. Vector Auto-Regression (VAR) is an econometric model of stationary time series in which the equation has the same right-hand side variables consisting of endogenous variables and the lagged values of all endogenous variables in the system. The VAR methodology superficially resembles simultaneous equation modeling in that it considers several endogenous variables together and the VAR uses less prior information (Gujarati and Porter, 2009). VAR is used to investigate the external shocks or effects on the endogenous variables, using the impulse response function. All variables in a VAR are treated symmetrically by including each variable and its own lags and the lags of all the other variables in the model and without priori distinction between the endogenous and exogenous variables (Gujarati and Porter, 2009).

The Augmented Dickey-Fuller (ADF) is an approach for testing the existence of unit root in the time series. The objective of applying the Augmented Dickey-Fuller unit root test (ADF) for individual series included in the model was to provide evidence as to whether or not the variables used in the regression process are stationary and to indicate the order of integration. The unit root test was conducted for better grasp of the relationship that exists among the variables.

3.4. Data

This study was designed to cover a period of 34 years (1983 - 2016). The time series data used for this study are entirely secondary data. The data were sourced from the Central Bank of Nigeria (CBN) (2014), National Bureau of Statistics (NBS), International Monetary Fund, International Financial Statistics and World Bank data archive.

4. Empirical Results

This section of the paper presents the results and interpretations of the analyses. The empirical analysis of the study began by analyzing the trends of crude oil price and government revenue. The stationary (unit root test) of the variables was examined, and then followed by the VAR (Vector Autoregressive).
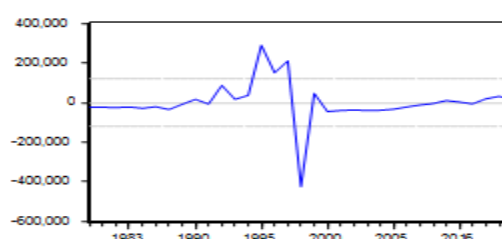
4.1. Trends of Crude Oil Prices and Government Revenue

Fig-1.
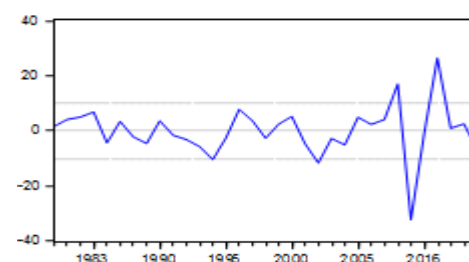
Source: Author's Computation

Fig-2.

From Fig. 1, the trend of world crude oil price plotted above is highly cyclical. The trend exhibited an upward movement to the upper right corner at the early year (1983) at $36 per barrel. From the trend, it was revealed that oil price dropped in the 1984 to $35 per barrel and maintained a relative downward trend till 1995 at $17 per barrel, picked up in 1996 at $20 and afterwards exhibited a negative swings till the end of 20th century. In 2000s, the crude oil price was relatively high, maintained an increasing trend over the years with incessant fluctuations and price shock which positively affected the revenue of oil producing countries, Nigeria inclusive. In the early year 2000, crude oil price was $28, $54 in 2005 and a record high of $111.2 in year 2012 before its continuous slide to between $96 and $60 in 2014. In 2015, the crude oil price ended the year above $50 then later down to $43 in 2016 but on the average price of $52 in the later year of 2017. These findings go to explain the dwindled crude oil price.

From Fig. 2, government revenue was responsive to dwindled oil price over the years. The government revenue was characterized with trended swing movements in same directions as the world oil price. In 1983, government revenue recorded about as ₦6.27 billion, ₦10.00 billion in 1985 and negative downward swings to ₦7.27 billion in 1986 just as the oil price in the same periods. In 1999, it was ₦662.59 billion then fell to ₦597.28 billion in 2000; it reached it highest ceiling of ₦6,031.83 trillion in 2013 and years after, it began downward swings to ₦3,751.71 trillion in 2014 and ₦3,431.07 trillion in 2015. These, therefore, explained the effects of oil price fluctuations (positive/negative) on the government revenue over the years. The economic implication of this was that crude oil price fluctuations affected the government revenue and the shock was being sustained over the same periods as the movement overtime shows more prominent fluctuations.

4.2. Unit Root Test

Table 4.2. ADF Unit Root Test

Variable	Augumented Dickey Fuller Test	1% Level Critical value	5% Level Critical value	Probability value	Level of Integration
GR	-5.766924	-3.646342	-2.954021	0.0000	I(1)
OIL	-6.102686	-3.646342	-2.954021	0.0000	I(1)
EXR	-5.449313	-3.646342	-2.954021	0.0001	I(1)
INT	-3.380936	-3.689194	-2.971853	0.0205	I(1)

Source: Author's computation

The Augmented Dickey Fuller (ADF) Unit root test on the above table shows that all the variables are stationary at their first difference. However, the result reveals the ADF values are greater than the critical t-values at 95% level of significance for the four (4) variables (GR, OIL, EXT and INT) at their first difference, 1(1). The implication of this is that any shock on oil price, government revenue, exchange rate and interest rate may be sustained for a short period of time.

4.3. Vector Auto-Regression (Var) Result

Table-4.3. Var Result

GR(-1)	**0.387830**	**0.755924**	**-9.59006**	**-8.36005**	**1.41006**
GR(-2)	0.343699	-0.186229	-9.82006	0.000110	1.20006
OIL(-1)	-12063.00	-729.8079	0.426213	0.331377	-0.006335
OIL(-2)	9882.388	-1564.668	-0.105740	-0.087526	0.056583
EXR(-1)	-522.2209	-1134.031	0.052050	1.121121	-0.38195
EXR(-2)	-3857.708	392.7367	-0.026202	-0.081396	0.025936
INT(-1)	391.8117	-8004.590	-0.079474	-0.664565	0.003025
INT(-2)	-7019.899	2543.744	-0.354871	0.716806	0.119759
C	-162160.3	152320.6	2.097691	6.437565	20.45720
R-squared	0.931678	0.579994	0.920738	0.990338	0.467856
F- statistic	30.00032	3.038022	25.55618	225.5064	1.934216

Source: Author's computation

The result in the table above (Table 4.3) shows the endogeneity property of the variables and it also indicated a strong relationship amongst the endogenous variables. The table portrayed the level of exogeneity levels or direction of casualty of the variables. From the values of the coefficient of multiple determination (R^2) and F- statistics, it could be concluded that OIL (crude oil price) with R^2 of 92% and EXR (Exchange rate) with R^2 of 99% are more endogenous. That is, they are systematically affected more by changes in other variables of the system than GR (government revenue) R^2 of 58 percent and INT (interest rate) with R^2 of 47%. These simply implied that the values of OIL, EXR, GR and INT are been determined by the states of other variables within the system or by one of the functional relationships in the model. The Nigerian government revenue (GR) was negatively and significantly impacted by the world crude oil price (OIL) in the first period and second period (-9.59006 and -9.82006 respectively). This was be further analyzed using the impulse response.

4.4. Impulse Response

The impulse response analysis traced the effect of one standard deviation shock to one of the innovation on current and future values of the endogenous variables that is, the impulse responses tell us how macro variables respond/react to shocks in the policy variables.

Table-4.4. Response of GR

	GR	OIL	EXR	INT
1	121036.3	0.000000	.0.000000	0.000000
2	93110.78	-10762.29	-589.1960	-24570.47
3	40460.45	-52579.96	-6876.040	8039.219
4	-327507.3	-732275.4	-34863.04	1334.604
5	-7123672.	-14312303	-561770.8	107691.8
6	-1.43008	-2.86008	-11096844	2118668
7	-2.86009	-5.730009	-2.220008	42368783.
8	-5.730010	-1.150011	-4.44009	8.48008
9	-1.150012	-2.300012	-8.900010	1.70010
10	-2.290013	-4.600013	-1.780012	3.400011

Source: Author'scomputation

The shock responses of GR (government revenue) to a possible shock to OIL (Crude oil price) are reported in the table above (Table 4.4). The response forecast period of ten (10) years was to enable the study to capture both the long term and short term shock responses. The responses function showed that shock to oil price led to a sharp decrease in GR and EXR from the second period to the tenth (10th) period indicating the short and long term period. Whereas, interest rate had a positive response to oil price shock (OIL) over the period, which means that interest rate was raised marginally in response. These outcomes are in line with the findings of Mahmud Hassan (2009). It can, therefore, be concluded that over a longer period, GR declined as a result of the impact of world crude oil price shock. The exchange rate also declined (depreciation against the US Dollar and other major world currencies).The result strongly supports the findings of the trends witnessed between government revenue (GR) and oil price (OIL). The results indicated that oil price shock could indeed have distortionary impact on the government revenue in Nigeria.

5. Conclusion and Policy Recommendations

The study investigated the effect of crude oil prices on government revenue in Nigeria. A trend analysis of the world crude oil price and government revenue was first to identify the relationships and effect of the crude oil price fluctuations on the government revenue. It was revealed that the crude oil price shock affected the government revenue and this shock was being sustained over the same periods as the movement overtime showed more prominent fluctuations. The Vector Auto-regression (VAR) and the impulse response analysis further established the relationships amongst the variables. This exhibits some unique characteristics which, in some cases, negate the a-priori theoretical expectations, but depicts the structural fundamentals of the Nigerian economy as the economy responds to world crude oil price shock having a distortionary impact on the government revenue and the exchange rate with the depreciation of the Naira.

The finding of the paper is actually an evidence of the current situation of the Nigerian economy where the dwindling world crude oil price is currently biting hard on the nation. As a result, government revenue and finances are seriously being affected, making it difficult for the governments at various levels to meet up with their promises, financial obligations and political responsibilities. This implied that the economy is gradually into recession. The Nigerian economy is very vulnerable to crude oil price shocks with exchange rate at its highest rate in history, exchange rate falls significantly (domestic currency depreciates) for the entire period.

Nigeria does not have control over the world crude oil price at the international market, the policy of government to undertake subsidy of petroleum products accentuates the severity of the effects of crude oil price shocks on the economy which is also the revenue base of government and making it difficult to manipulate prices to maximize gains. However, on the whole, the picture paints an unstable future for the Nigerian economy following crude oil price fluctuation. There is a strong need for policy makers to focus on policy that will strengthen and stabilize the macroeconomic structure of the Nigerian economy with specific focus on alternative sources of government revenue (reduction of dependence on crude oil proceeds and diversify). In view of this, governments at all levels, especially the states and local governments need to wake up to the present economic realities that their complete dependence on federal allocations earned from crude oil are over. There should be focus on increasing their non-oil revenue and building their internally generated revenue level. There is need for reduction in monetization of crude oil receipts (fiscal discipline) and aggressive savings of proceeds from oil booms (if that ever happens again) in future in order to withstand vicissitudes of oil shocks in future.

References

Adejumo, A. and Olomola, A. (2006). Oil price shock and macroeconomic activities in Nigeria. *International Research Journal of Finance and Economics Euro Journals Publishing, Inc,* 11(6):

Adenikinju, A. (2006). Macroeconomic and distributional consequences of energy supply shocks in Nigeria, African economic research consortium (AERC) Research Paper, 162.

Akpan, E. O. (2009). Oil price shocks and Nigeria's. *Macro Economy*:

Akpan, S. S. and Nnamseh, M. (2014). Managing risk of petrol scarcity in nigeria: A test of the efficacy of strategic management approaches. *Global Journal of Human-Social Science: E-Economics,* 14(15): 1.

Aliyu, S. (2009). Oil price shocks and the macro economy of Nigeria: A non-linear approach. *Research Journal of International Studies,* 10(2): 4-18.

Alley (2014). Oil price shocks and Nigerian economic growth. *European Scientific Journal,* 10(19):

Anshasy, E. A., Bradley, M. D. and Joutz, F. L. (2005). Evidence on the role of oil prices in Venezuela's economic Performance: (1950-2001). University of Washington, Working paper, 21.

Aremo, A. G., Orisadare, M. A. and Ekperiware, C. M. (2012). Oil price shocks and fiscal policy management: Implications for Nigerian economic planning (1980-2009). *International Journal of Development and Sustainability,* 1(3): 1121-39.

Atukeren, E. (2003). Oil prices and the swiss economy. KOF swiss economic institute, ETH Zurich, KOF Working Papers, 77. Available: https://doi.org/10.3929/ethz-a-004605486

Barsky, B. and Kilian, L. (2004). *Economic growth: Determinants, issues and lessons.* Chukizak printings: Bangladesh.

Behbudi, D., Mamipour, D. and Karami, A. (2010). Natural resource abundance, human capital and economic growth in the petroleum exporting countries. *Journal of Economic Development,* 35(3): 81-103.

BudgiT (2014). Falling Oil Prices: An Opportunity for Reforms. *Policy Document*:

Central Bank of Nigeria (CBN) (2014). Statistical bulletin 21.

Cerralo, J. (2005). Do oil price shocks matter? Evidence from some European countries. *Energy Economics,* 3(3): 137-54.

Darby, M. (1982). The price of oil and world inflation and recession. *American Economic Review,* 72: 738-51.

Economy Watch (2014). Managing the impact of declining oil prices.

Gujarati, D. N. and Porter, D. C. (2009). *Basic econometrics pearson education international.* 5th edn: McGraw-Hill: New York.

Hakan, R., Torleif, D. and Virginie, L. (2010). An evaluation of the potential of the geoeletrical resistivety method for mapping gas migration in landfills. *American Journal of Geology,* 137(4): 50-52.

Jhingan, M. L. (2012). *Macroeconomic theory.* 10th edn: Vrinde publications Ltd: New Delhi.

Jimenez, R. R. and Sanchez, M. (2005). Oil price shocks and real gdp growth: Empirical evidence from some OECD countries. *Journal of Applied Economics,* 37(2): 201-28.

Jin, G. (2008). The impact of oil price shock and Exchange rate volatility on economic growth: A comparative analysis for Russia Japan and China. *Research Journal of International Studies,* 8(3): 98-111.

Joseph, A. O. (2013). Crude oil price dynamics and transmission mechanism of macroeconomic indicators in Nigeria. *OPEC Energy Review,* 38(3): 341-55.

Kornonen, I. and Juurikkala, T. (2007). Equilibrium exchange rate in oil dependent countries. BOFIT discussion paper, 8. Available: http://dx.doi.org/10.2139/ssrn.1001626

Mahmud, H. (2009). Oil price shock and monetary policy aggregate in Nigeria: A structural var approach. Available: http://mpra.ub.uni-muenchen.de/25908/

Mehrara, M. (2008). The asymmetric relationship between oil revenue on economic activities. *Energy Policy,* 36(3): 1164-68.

Mehrara, M., Maki, M. and Tavakolian, H. (2010). The relationship between oil revenues and economic growth, using threshold methods (the case of Iran). *OPEC Energy Rev.,* 34(1): 1-14.

Meristem (2014). Nigeria at USD73pb: Pass-Through effects and implications, economic commentary.

Mordi, C. N. O. and Adebiyi, M. A. (2010). The asymmetric effects of oil price shocks on output and prices in the Nigeria using a structural VAR model. *Central Bank of Nigeria Economic Review,* 48(1): 1-32.

Nigeria National Petroleum Company NNPC (2009). The Nigerian oil and gas report, Q2. Business monitor international, R3025940.

Obioma, R. (2006). An examination of oil prices and its changes on the Nigerian economic growth. *Journal on Welfare Economics,* 4(2): 25-28.

Odularu, G. O. (2007). Crude oil and the nigerian economic performance oil and gas business.

Odularu, O. G. and Okonkwo, C. (2009). Deos energy consumption contribute to economic performance? Empirical evidence from Nigeria. *Journal of Economics and International Finance,* 1(2): 044-58.

Ogwumike, F. and Ogunleye, E. (2008). Resource-led development: An illustrative example from Nigeria. *African Development Review,* 20(2): 200-20.

Olomola, P. (2006). Oil price shocks and aggregate economic activity in Nigeria. *African Economic and Business Review,* 4(2):

Omisakin, O. O. (2012). Oil price shock and the nigeria economy: A forecast error variance decomposition analysis. *Journal of Economic Theory,* 2(4): 118-23.

Oriakhi, D. E. and Iyoha, D. O. (2013). Oil price volatility and its consequences on the growth of the Nigerian economy: An examination (1970-2010). *Asian Economic and Financial Review,* 3(5): 683-702.

Rautava, J. (2004). The role of oil prices and the real exchange rate in Russian's economy: A cointegration approach. *Journal of Comparative Economics,* 32(2): 315-27.

Sauter, R. and Awerbuch, S. (2002). Oil price volatility and economic activity: A survey and literature review. International energy agency research paper, 6. Available: http://www.awerbuch.com

World Bank (2015). *Monetary policy report, Feb 2015; Falling oil price on the global economy.* Oxford University Press: USA, New York.