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# Oil Price Shocks and Foreign Direct Investment (FDI): Implications for Economic Growth in Nigeria (1980-2014)

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**Abstract**
High Oil price fluctuations have been a common feature in Nigeria and these have considerably constituted a major disturbance in the foreign direct investment (FDI) to the Nigerian economy despite various reforms introduced and implemented by Nigerian authorities to attract FDI. The over-reliance on oil production for income generation combined with local undiversified revenue and export bases is an issue for concern. The linkage amongst foreign direct investment (FDI), oil price and export and economic growth are still a vital subject in the developing economies. In practice, FDI inflows consider a one of the source of a long run economic growth (Bosworth, Collins et al. 1999) and as a crucial source for increasing the capital stock of a country (Barro and Sala-i-Martin, 1995). An increase in the level of aggregate export is also a significant policy towards the reinforcement level of economy (Tyler, 1981). The study is to examine the effect of oil price shock on foreign direct investment (FDI) in Nigeria. Furthermore to examine the extent to which the interaction of oil price and FDI affect Nigeria's economic growth in the long-run Nigeria.Using structural vector autoregression (SVAR) methodology, the effects of crude oil price fluctuations on foreign direct investment (FDI) and economic growth were examined. After appropriate robustness checks, the study finds out that oil price shocks insignificantly retards economic growth while oil price itself significantly improves it and FDI. The significant positive effect of oil price on FDI and economic 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 shocks. The study suggests strongly that diversification of the economy to other minerals resources as a source of revenue.
**Keywords:** Oil price shock, FDI, GDP.

## 1.0 INTRODUCTION

Oil price shocks are not a new phenomenon. It has been a dominant feature in the oil market during the last two decades (Baumeister and Peerman, 2009). The market has been characterised with erratic movement of oil price since the 1970. Moreover, there have been very large and sharp swings in the nominal price of oil since the collapse of oil price in 1986 (Sauter and Awerbuch, 2003). These shocks have been traced to many sources or origins. Understanding these origins will help in policy making against oil shocks. The main source of revenue for government is oil exports revenue, which it has no control of because crude oil is a publicly traded commodity by OPEC and its price is determined by the forces of demand and supply worldwide. When the government is faced with abrupt fluctuations in oil prices, her budget becomes complicated and often imprecise. The volatility and uncertainty that now plague oil earnings have resulted in unpredictable investment climate in the country. This uncertainty has even affected the risk that investors face in non-oil activities. World Bank report has also confirmed that oil price shocks are one of the main factors limiting private investment in developing economies. "With high oil prices and high revenues, project selection criteria became very lax. Belief in the oil boom encouraged Nigeria to finance large public expenditure programs. But the qualities of most of the investments were so poor that many investments did not pay for themselves. Some projects that might have become viable had oil prices remained high turned non-viable when oil prices fell. With the discovery of oil in 1956 and its exportation in 1958, Nigeria ranked 4th amongst OPEC producing countries in 2007. Oil has since been the dominant factor in income generation in Nigeria since the past 50 years, accounting for one third of the GDP, more than 90 percent of the exports and 80% of government revenues (Umar, G. (2010)). The fact that Nigeria is particularly vulnerable to oil shocks is a phenomenon which has unfortunately made the country severely affected by the fluctuations of the international oil prices, a situation which has in turn contributed greatly to fluctuation in foreign direct investment (FDI) and GDP.

Giraud (1995) highlights political and economic decisions in the oil industry as causes of oil price movements. While many writers focus on the economic factors, Mabro (1991a), as reported by Giraud (1995), states that the day-to-day prices of oil may be determined by free market forces, but sharp shifts in price level are essentially motivated by political factors, an example of which is the politically motivated civil strives and

 

unrests in the Middle East from where the bulk of crude oil supply emanate. Hamilton (2009) agrees with Mabro (1991) that supply disruptions are a significant factor of oil price volatility. Oil price shock leads to Capital flight, which discourages investment, inflation and higher future taxes. Umar, G. et al. (2010) oil price fluctuations affect the economic cycle.

This study will add to the extant literatures, provides updated knowledge on the effect of oil price shocks on foreign direct investment (FDI) episodes in Nigeria. Structural Vector Autoregession (SVAR) technique is applied to extended time series data to examine the link between the fluctuations in oil price, foreign direct investment (FDI) and Economic growth. The objective of the study is to analyze the impacts of oil price shock on foreign direct investment (FDI) and economic growth in Nigeria in the past 34 years and also assess the magnitude of such impacts. This paper is structured as; Introduction in section1, the stylized facts of oil price, foreign direct investment (FDI) and GDP in section 2. Section 3 theoretical framework and literature review. Section 4 model specification. Section 5 data analysis and discussion of result while section 6 concludes the paper with policy implications.

## 2.0 SYLIZED FACTS

Figures 1, 2 and 3 show a clear positive trend in oil prices, FDI, GDP, such that fluctuation in oil price corresponds to fluctuation in FDI and GDP. The relationship oil prices, FDI, GDP are closely linked and positive from the late 1990s up till the end of the study period. Crude oil is a publicly traded commodity by OPEC and its price is determined by the forces of demand and supply worldwide. Oil (petrol) demand has been so high in Nigeria due to collapse of electricity and gas sector. Nigerians and investors depend heavily on oil for powering their engines and to generate electricity. This leads to high demand of oil, thereby leading to scarcity and increase in oil price locally. The fact that Nigeria is particularly vulnerable to oil shocks is a phenomenon which has unfortunately made the country severely affected by the fluctuations of the international oil prices, a situation which has in turn contributed greatly to fluctuation in foreign direct investment (FDI) and GDP.

 

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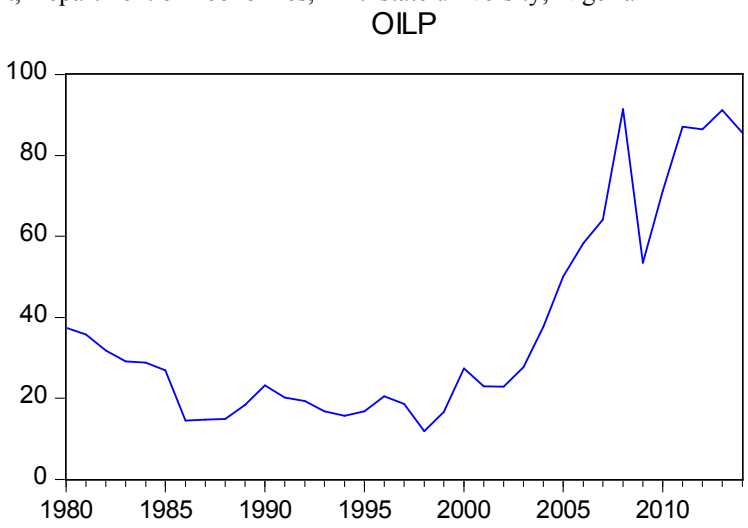


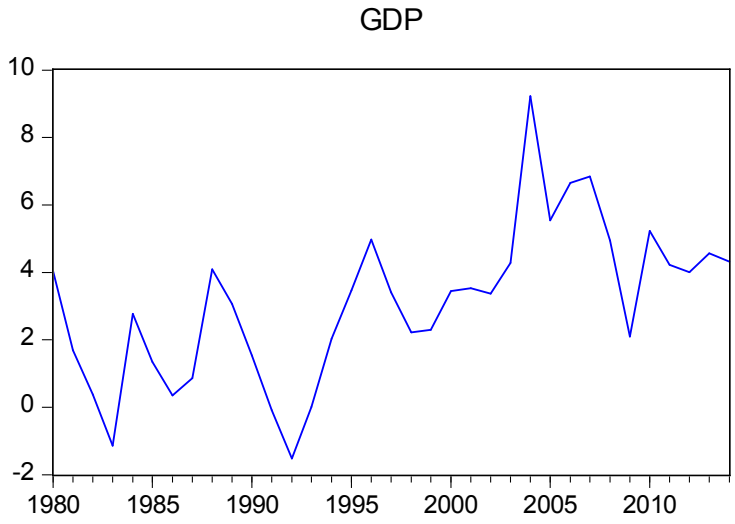


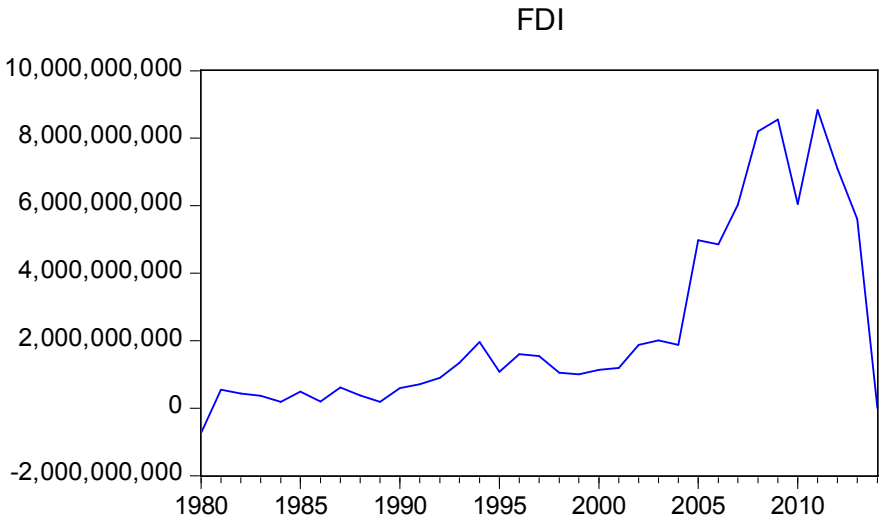

## 3. THEORETICAL MODEL AND LITERATURE REVIEW

The study applied the theory of Solow model as applicable to oil price shocks. The Solow model focuses on four variables: output ($Y$), capital ($K$ ), labor ($L$), and "knowledge" or the "effectiveness of labor" ($A$). At any time, the economy has some amounts of capital, labor, and knowledge, and these are combined to produce output. The production function takes the form

$$Y(t) = F(K(t), A(t)L(t)) \quad (1.1)$$

where $t$ denotes time. Time (t) does not enter the production function directly, but only through $K$, $L$, and $A$. That is, output changes over time only if the inputs to production change. In particular, the amount of output obtained from given quantities of capital and labor rises over time—there is technological progress—only if the amount of knowledge increases. $A$ and $L$ enter multiplicatively. $AL$ is referred to as *effective labor,* and technological progress that enters in this fashion is known as *labor-augmenting* or *Harrod-neutral*. This way of specifying how $A$ enters, together with the other assumptions of the model, will imply that the ratio of capital to output, $K/Y$, eventually settles down. In practice, capital-output ratios do not show any clear upward or downward trend over extended periods. In addition, building the model so that the ratio is eventually constant makes the analysis much simpler. Assuming that $A$ multiplies $L$ is therefore very convenient.

The central assumptions of the Solow model concern the properties of the production function and the evolution of the three inputs into production (capital, labor, and knowledge) over time. The k which is capital can be derived through the foreign direct cashflow (investment).

$$FDI = f(K) \quad (1.2)$$

We want to extend our analysis to include natural resources (proxied by crude oil for the study).Thus the production function (1.1), becomes

$$Y(t) = K(t)^{\alpha}R(t)^{\beta}T(t)^{\gamma}[A(t)L(t)]^{1-\alpha-\beta-\gamma},$$

$$\alpha > 0,\ \beta > 0,\ \gamma > 0,\ \alpha+\beta+\gamma < 1. \quad (1.3)$$

Here $R$ denotes resources used in production, and $T$ denotes the amount of land.

The dynamics of capital, labor, and the effectiveness of labor are the same as before:

$$K(t) = sY(t) - \delta K(t) \quad (1.4)$$

$$L(t) = nL(t) \quad (1.5)$$

$$A(t) = gA(t) \quad (1.6)$$

Where L is Labor and A is knowledge or level of technology, $n$ and $g$ are exogenous parameters and t denotes time.

The new assumptions concern resources and land. Since the amount of land on earth is fixed, in the long run the quantity used in production cannot be growing.

Thus we assume

$$T(t) = 0. \quad (1.7)$$

Similarly, the facts that resource endowments are fixed and that resources are used in production imply that resource use must eventually decline. , even though resource (crude oil) has been rising historically

$$R(t) = bR(t),\ b > 0. \quad (1.8)$$

Thus, even though resource (crude oil) has been rising historically. This is due to high investment in technology (A), we assume

$$gY(t) = gA(t) \quad (1.9)$$

The equation above implies that the increase in crude oil production in Nigeria is as a result of increase in technology in the sector.

The presence of resources and land in the production function means that $K/AL$ no longer converges to some value. As a result, we cannot use our previous approach of focusing on $K/AL$ to analyze the behavior of this economy. A useful strategy in such situations is to ask whether there can be a balanced growth path and, if so, what the growth rates of the economy's variables are on that path.

By assumption, $A$, $L$, $R$, and $T$ are each growing at a constant rate. Thus what is needed for a balanced growth path is that $K$ and $Y$ each grow at a constant rate. The equation of motion for capital, $\dot{K}(t) = sY(t) - \delta K(t)$, implies that the growth rate of $K$ is

$$\frac{\dot{K}(t)}{k(t)} = \frac{Y(t)}{k(t)} - - \delta \quad (1.10)$$

Taking logs of both sides of (1.2) gives us

$$\ln Y(t) = \alpha \ln K(t) + \beta \ln R(t) + \gamma \ln T(t) + (1-\alpha-\beta-\gamma)[\ln A(t) + \ln L(t)] \quad (1.11)$$

We can now differentiate both sides of this expression with respect to time (t). Using the fact that the time derivative of the log of a variable equals the variable's growth rate, we obtain

$$gY(t) = \alpha gK(t) + \beta gR(t) + \gamma gT(t) + (1-\alpha-\beta-\gamma)[gA(t) + gL(t)] \quad (1.12)$$

where $gY$ denotes the growth rate of $Y$. The growth rates of $R$, $T$, $A$, and $L$ are $-b$, 0, $g$, and $n$, respectively. Substitute (1.6), (1.6), (1.7) and (1.8) in (1.12)

Thus (1.13) simplifies to

 

$gY(t) = \alpha gK(t) + \beta gbR(t) + (1-\alpha-\beta-\gamma)(n+g)$ (1.13)

for output of crude oil exportation to increase, it therefore means that oil extraction was high. This was possible when there was increase in technology (gA). It therefore means that $gY$ and $gA$ must be equal. Imposing $gA = gY$ on (1.9) and solving for $gY$ gives us

$$gY = \frac{\alpha gK(t) + \beta gbR(t) + (1-\alpha-\beta-\gamma)n}{1-\alpha-\beta-\gamma} \quad (1.14)$$

$$gY = \frac{1}{1-\alpha-\beta-\gamma}\left(\alpha gK(t) + \beta gbR(t)\right) + n \quad (1.15)$$

it is clear from equation 1.15 that the effect of oil price shock on FDI and growth rate of output. Specifically, the oil prices and FDI have positive contribution to the economic growth. The resource (crude oil) and land limitations can cause output per worker to eventually be falling, but they need not. The declining quantities of resources and land per worker are drags on growth. But technological progress is a spur to growth. If the spur is larger than the drags, then there is sustained growth in output per worker.

Pieschacon (2009) after using VAR found that the impulse responses of output, the real exchange rate and private consumption to an oil price shock differ greatly between the two countries. Also, fiscal policy is identified as a key transmission channel as it greatly determines the degree of exposure of the domestic economy to oil price shocks.

In Nigeria Olomola and Adejumo (2006) investigated the effect of oil price shock on output, inflation, the exchange rate and the money supply in Nigeria using quarterly data from 1970 to 2003. He employed VAR method of analysis. He concluded that shocks significantly influence the real exchange rate. This could considerably lead to wealth effect capable of appreciating the real exchange rate which could ultimately squeeze the tradable sector giving rise to the Dutch Disease.

## 4. MEASUREMENT AND SOURCES OF VARIABLES

To investigate the effect of oil price shocks on FDI and economic growth in Nigeria, the study used time series data of six variables. The variables are: oil price (OILP), foreign direct investment (FDI), exchange rate (EXR), trade-openness (TRAOP), inflation (INF) and gross domestic product (GDP) for period 1980 to 2014.

*4.2.1. OIL PRICE*

This is the benchmark price allocated per barrel of crude oil at the world market. The prices are agreed upon by OPEC members. The oil price as used by the study to determine the extent at which Nigeria derived her external cash flows from the export of crude oil at the international market. The crude oil price was sourced from the World Bank (2014), Central Bank of Nigeria (CBN) 2014 statistical bulletin.

*4.2.2 Gross Domestic Product (GDP)*

It is the money value of goods and services produced in an economy during a period of time. For the study, the GDP growth was employed as proxied for the change or rate of the economic performance and output.. GDP data were sourced from Central Bank of Nigeria (CBN) 2014 statistical bulletin. The GDP growth was sourced from the World Bank (2014).

*4.2.3. Foreign Direct Investment (FDI)*

Foreign direct investment (FDI) is the cash flow that accrue to a country from her external investments and trade (net export). It does not only provide developing countries (including Nigeria) with the much needed capital for investment, it also enhances job creation, managerial skills as well as transfers of technology and contribute to economic growth and development. The Foreign direct investment (FDI) was sourced from the World Bank (2014).

*4.2.4. Exchange Rate (EXR)*

It means the amount of the Naira that can exchange for one unit of the dollar. The official exchange rate of the Naira is used as the exchange rate as government transactions are based on it. EXR data were sourced from Central Bank of Nigeria (CBN) 2014 statistical bulletin.

*4.2.5 Trade openness (TRAOP)*

This is the average of total exports and imports as a percentage of GDP. It can also be called trade-to-GDP. The *trade-to-GDP ratio* is frequently used to measure the importance of international transactions relative to domestic transactions. This indicator is calculated for each country as the simple average (*i.e.* the mean) of total trade (*i.e.* the sum of exports and imports of goods and services) relative to GDP. This ratio is often called the trade openness ratio, although the term "openness" may be somewhat misleading, since a low ratio does not necessarily imply high (tariff or non-tariff) barriers to foreign trade, but may be due to -factors such as size of the economy and geographic remoteness from potential trading partners. The Trade openness (TRAOP) was sourced from the World Bank (2014).

4.3 Sources of Data

The data for the study are sourced from Central Bank of Nigeria-Statistical Bulletin and World Bank.

 

## 5 Data Analysis and Discussion of Result

5.1. Stationarity test

The Augmented Dickey Fuller (ADF) was used to determine the order stationarity of the data used. Table 1 shows the stationarity results and decision on the order of integration.

Table 1: Stationarity test of variables

| VARIABLES | ADF STATISTICS | Critical value at 5 % LEVEL | DECISION |
|---|---|---|---|
| OILP | -7.490299 | -2.954021 | 1(1) |
| FDI | -3.186436 | -2.971853 | 1(1) |
| EXCH | -4.697598 | -2.954021 | 1(1) |
| TRAOP | -7.969412 | -2.954021 | 1(1) |
| INFL | -7.015477 | -2.957110 | 1(1) |
| GDP | -6.708338 | -2.954021 | 1(1) |

The null hypothesis is that the series is non-stationary. The variables in the model are all stationary at level. The table 1 indicates the rejection of the null hypothesis on non-stationary at the 5% significant level.

Table 2: Johansen Cointegration test

Unrestricted Cointegration Rank Test (Trace)

| Hypothesized No. of CE(s) | Eigenvalue | Trace Statistic | 0.05 Critical Value | Prob.** |
|---|---|---|---|---|
| None * | 0.695976 | 122.8192 | 95.75366 | 0.0002 |
| At most 1 * | 0.602088 | 83.52772 | 69.81889 | 0.0027 |
| At most 2 * | 0.553116 | 53.11740 | 47.85613 | 0.0148 |
| At most 3 | 0.359812 | 26.53733 | 29.79707 | 0.1134 |
| At most 4 | 0.291288 | 11.81957 | 15.49471 | 0.1658 |
| At most 5 | 0.013767 | 0.457456 | 3.841466 | 0.4988 |

Trace test indicates 3 cointegrating eqn(s) at the 0.05 level.

This implies that long run relationship exist between the model variables.

5.2. SVAR impulse response results

Table 3. SVAR Forecast Error Variance Decomposition of FDI

| Forecast Horizon | OILP | FDI | EXCH | TRAOP | INFL | GDP |
|---|---|---|---|---|---|---|
| 1 | 0.000000 | 1.27E+09 | -4.633259 | -2.190015 | -2.107160 | -0.531137 |
| 2 | 0.169535 | 1.54E+09 | -2.580095 | 1.394277 | 21.91369 | 0.231657 |
| 3 | 1.845413 | 2.16E+09 | 0.071690 | 6.561605 | 22.97769 | 0.636364 |
| 4 | 2.309165 | 2.59E+09 | 1.001248 | 13.90014 | 19.06710 | 0.617557 |
| 5 | 2.984324 | 3.03E+09 | 3.560937 | 18.11654 | 19.80904 | 0.505180 |
| 6 | 3.212779 | 3.66E+09 | 9.689952 | 22.95506 | 24.11978 | 0.259261 |
| 7 | 3.334187 | 4.36E+09 | 17.99060 | 27.28794 | 31.58884 | 0.381122 |
| 8 | 4.849783 | 5.26E+09 | 27.90728 | 32.31115 | 39.94859 | 0.792475 |
| 9 | 7.327896 | 6.42E+09 | 39.16293 | 39.09892 | 45.94039 | 1.311424 |
| 10 | 10.74083 | 7.81E+09 | 51.79305 | 47.03403 | 52.54442 | 1.842910 |

Table 3 shows the contributions of oil price on foreign direct investment (FDI) with a low variance ranging between 1.27 and 7.81 per cents. Oil price contributed between 0.00 and 10.7 per cent to variance of foreign direct investment (FDI) which to a large extent is considered a low proportion. This proportion appears to be very insignificant suggesting that the revenue from oil price increase could have probably be diverted to some avenues that other than public expenditure on investment whose effects might not be directly felt in the economy. It could equally be explained by the pace of high level of corruption in the economy that has drastically reduced the resources meant for public investment purpose.

All other variables like trade openness, exchange rate, and inflation contributed to the variance of foreign direct investment (FDI) more than that of oil price at least in the long run. However, the contribution of trade openness, exchange rate, and inflation variables appear significant with a value of between 0.07 per cent

 

and 52.5 per cent. GDP makes an insignificant contribution to the variance of Foreign Direct Investment (FDI) with a range of between -0.5 and 1.8 per cent. This implies that Nigerian economy is largely dependent on occurrences outside the country. Such an undue dependence on external events that are exogenous to the system could largely disrupt the economy and make the economy vulnerable to shocks that emanate outside the economy.

Table 4. SVAR Forecast Error Variance Decomposition of GDP

| Forecast Horizon | OILP | FDI | EXCH | TRAOP | INFL | GDP |
|---|---|---|---|---|---|---|
| 1 | 0.000000 | 0.000000 | 0.000000 | 0.000000 | 0.000000 | 1.178977 |
| 2 | 2.034225 | 4.83E+08 | -1.320634 | 0.926604 | 1.820129 | 0.370117 |
| 3 | 0.845469 | 5.86E+08 | -1.460281 | 4.843713 | -2.025841 | -0.096000 |
| 4 | 0.304184 | 5.30E+08 | -0.709723 | 2.921869 | 3.829481 | -0.077237 |
| 5 | 0.470385 | 7.09E+08 | 1.804673 | 4.186477 | 6.814370 | -0.168490 |
| 6 | -0.006636 | 8.04E+08 | 3.631031 | 4.974490 | 6.988587 | 0.036694 |
| 7 | 0.760578 | 9.60E+08 | 5.121185 | 5.667666 | 9.075839 | 0.234763 |
| 8 | 1.415293 | 1.23E+09 | 7.090946 | 7.587094 | 8.140302 | 0.305146 |
| 9 | 1.931149 | 1.48E+09 | 9.187109 | 9.103260 | 9.307757 | 0.370883 |
| 10 | 2.799577 | 1.80E+09 | 12.08552 | 10.84309 | 11.47377 | 0.416786 |

Table 4 presents the results of the contributions of oil price on economic growth (GDP) which has a low variance ranging between -0.07 and 1.17 per cents. Oil price contributed between 0.00 and 2.79 per cent to variance of economic growth (GDP) which to a large extent is considered a low proportion. This proportion appears to be very insignificant suggesting that the revenue from oil price increase could have probably be diverted to some avenues that other than public expenditure on investment whose effects might not be directly felt in the economy. It could equally be explained by the pace of high level of corruption in the economy that has drastically reduced the resources meant for public investment purpose. This has an adverse effect on the economic growth (GDP) in Nigerian economy.

All other variables like trade openness, exchange rate, and inflation contributed to the variance of foreign direct investment (FDI) more than that of oil price at least in the long run. However, the contribution of trade openness, exchange rate, and inflation variables appear significant with a value of between 0.00 per cent and 12.08 per cent. Foreign Direct Investment (FDI) initially makes a significant contribution and end to make an insignificant contribution to the economic growth (GDP) with the variance ranging between 0.00 and 9.60 percent.

## 6. Conclusion and policy implication

Oil price shocks have a lot of influence on the Nigerian economy. The oil price shocks have a great influence on the level of investment; domestic and foreign direct investment which greatly influenced the level of growth in the Nigerian economy. A shocking revelation from the analysis shows that despite the fact that oil price contributed to GDP, such an increase did not proportionally translate to increase in foreign direct investment. It could therefore be inferred from this that there some resources are probably being misappropriated instead of being engaged in productive activities and investment for economic growth. The study finds out that oil price shocks insignificantly retards economic growth while oil price itself significantly improves it and FDI. The significant positive effect of oil price on FDI and economic 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 shocks.

The government should therefore take steps to ensure that any unforeseen influences resulting from the vagaries from oil price shocks are guarded against. Besides, the government should not totally rely on the windfalls from oil price shocks in making economic forecast as this could be dangerous to the economy, rather other sources of revenues should be explored to complement the revenues from oil price shocks. In addition, government should initiate appropriate measures to ensure that additional revenues realized from the oil price shocks are properly utilized to pursue developmental objectives. The study strongly recommends diversification of the economy to other minerals resources as a source of revenue.

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