

IMPACT OF OIL PRICE ON NIGERIAN ECONOMY

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Abstract

This paper examines the impact oil prices has on economic growth in Nigeria from 1980 to 2016. An exploratory data analysis is employed using secondary data, employing the unit root test for stationarity, the co-integration to test for longrun relationship between the variables and finally the OLS estimating for the relationship between the key and control variables in concordance with our objectives. The research found that there is a significant and positive relationship between oil price changes and economic growth in Nigeria. In the short-run, Nigeria was able to have increasing growth because of the high global oil prices, but in the long-run, the inconsistency of oil prices and lack of diversification of the productive base has not really helped the Nigeria economy. Thus, the research suggests that oil prices are the cause of Nigeria's volatile growth rate. A combination of strict fiscal policy focused on the actual implementation of developmental strategy, diversification and industrialization might be effective to protect the country's economy and lead to increasing and consistent economic progress.

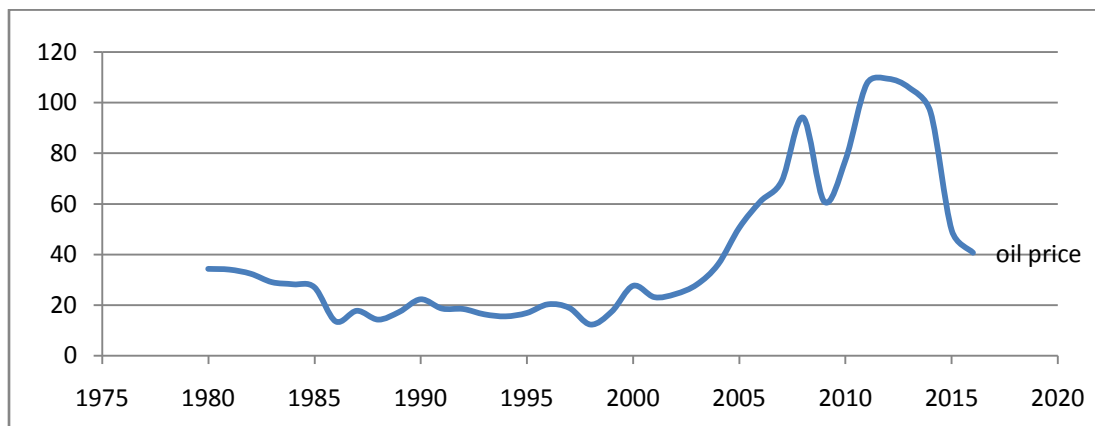
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INTRODUCTION

Nigeria economy has been absolutely subjected to Crude oil and the basis upon which government budgeting, revenue distribution and capital allocations are determined. Crude oil is major source of revenue for Nigeria economy due to its vital role in shaping the economy and political landscape of the country. It is also a major source of foreign exchange earnings and the

dominant source of revenue for the Nigerian government. Crude oil price shocks or volatilities have had varying effects on the nation's economic activities. The production of crude oil per day in Nigeria since its discovery by Shell-BP has risen and in 1981, 1,433 thousand barrels was recorded while reserves stood at 17 billion barrels. The dramatic rate of increase in production has been the result of a higher success rate in the oil companies' search for new oil fields particularly after 1965, and the increased output rate from the existing oil wells. In 2013 production of crude oil stood at an average of 2.13 million barrels per day and reserves increased to 37 billion in year 2015. Since then, there has been progressive increased production of crude because of prospecting.

Figure 1. Crude oil price from 1980-2016



Source: Researchers' computation 2017

The fall in the crude oil price is expected to negatively affect Nigeria economy due to its solely dependent on it and this might likely have adverse impact on other sectors. This study therefore examines the effects a persistent fall in the price of crude oil has on the Nigerian economy. There is therefore the need to understand the effect of oil price fluctuation on fundamental economic variables such as total government revenue, inflation, exchange rate, external reserve and foreign exchange reserves etc. Based on this, the researcher intends to determine relationship between crude oil price and economic growth, government revenue, foreign exchange rate, inflation, external reserves and government revenue.

LITERATURE REVIEW

Theoretical Framework

Mainstream economists believe that in order for a country to experience economic growth, they must continue to produce and trade goods in which they have a comparative advantage. The

final view discussed in this section is presented by structural economists who believe that diversification and industrialization, not resource dependency will lead to rapid growth.

Mainstream economists view on resource-based growth

Mainstream economics argues that countries should produce and export according to their comparative advantage. The theory of comparative advantage suggests a country gains the greatest economic benefit relative to other countries by producing at lower overall cost commodities which a country has in abundance or can easily produce. Other trading countries will therefore benefit if they accept the cost advantage of the trading country and focus on producing a commodity in which they have an advantage. It is this theory which guides mainstream economists to belief in free trade, specialization and the international division of labor. This is the reason why some countries produce agricultural and mineral commodities while others produce industrial goods (O'Toole 2007:620). Mainstream economists believe that this process allows for efficient use of resources which lead to more gains from trade (WTO 2010). Hence countries with an abundance of capital would export capital intensive goods and import labor intensive goods, while countries with an abundance of labor would export labor intensive goods and import capital intensive goods (Clarke et al. 2009: 114).

Structural Economists view

The Structural Theory argues that structural shocks such as sudden large changes in the prices of food and oil and could be attributed to macroeconomic fluctuations (Sommer, 2002). However, there is a sharp disagreement among the structuralist theorists on the amplitude effect of structural shocks. One school argues that supply shocks are in the short-run and have only transitory effect on the macro-economy (Ball and Mankiw, 1995). They further argue that since the role of policy makers is to ensure favorable economic environment in the long term, policy makers should not respond to adverse pressures from food and oil prices that are highly volatile in the short-run, in order not to drive the economy into recession (Armando, 2009). They suggested that policy makers should rather, focus on preventing “the second-round effect”, which is likely to be more prolonged and could result in economic recession (Inflation Report, 2006). Fischer (1985) argues that if there is no real wage resistance by workers, supply shock by themselves do not require policy response.

Another school documented extensive evidence from Latin America and developing countries to show that structural shocks could be persistent, and are rooted in bottlenecks of inelastic supply in the agricultural and oil sectors (Watcher, 1979). In their view, agriculture, oil, foreign trade, and government sectors suffer from institutional rigidities that cause prices to rise

with economic developments. They advocated for the elimination of such institutional rigidities by using fiscal discipline as a measure for curbing the adverse effects of structural shocks. The above views have been counteracted by some scholars using the rational expectation theory. They argue that the amplitude of supply-side is contingent on behavior of expectation (Sommer, 2002).

Empirical Framework

Although, a number of empirical studies on the relationship between crude oil price and economic growth exist, most of such studies have largely focused on developed economies. The relationship between crude oil price and economic growth varies depending on a country's sectorial composition, institutional structures, and macroeconomic policies among others (Chukuet *al.* 2010).

Forrest (1995) observes that the large windfall from oil has had many unforeseen and unintended consequences for the country. These include the power of government to bypass taxpayers in expending funds on unproductive "white elephant" projects. Moreover, there is a lack of public accountability in governance, a neglect of non-oil tax revenue, an unnecessary expansion of state resources and a loss of control and discipline by those in positions of authority. Aiyegoro (1997) enumerates on the outcomes associated with the oil discovery in Nigeria to include an over-bloated public sector, ambitious public projects, a depreciating currency, badly implemented price and wage controls and the distortion of financial markets through poor public policy. Omotoye (1997) supports this viewpoint by also noting that the demise of the agricultural sector is associated with the oil discovery in Nigeria. Ogbonna and Ebimobwei (2012) examined the impact of oil revenue and the Nigerian economy during the period of 1970-2009. They used Pearson correlation to analyze primary and secondary data and descriptive statistics to explain evidence and events. The results of the analysis show that oil revenue positively affected the gross domestic product and per capita income of Nigeria. However, the relationship between petroleum revenue and inflation rate was negative. They suggested proper utilization and management of oil revenue to achieve long-run growth and development of the country. Olomola (2006) investigated the impact of oil price shocks on aggregate economic activity (output, inflation, the real exchange rate and money supply) in Nigeria using quarterly data from 1970 to 2003. The findings revealed that contrary to previous empirical findings, oil price shocks do not affect output and inflation in Nigeria significantly. However, oil price shocks were found to significantly influence the real exchange rate. The author argues that oil price shocks may give rise to wealth effect that appreciates the real exchange rate and may squeeze the tradable sector, giving rise to the "Dutch-Disease. Akpan

(2009) study the asymmetric effects of oil price shocks on the Nigerian economy. The findings from her study show a strong positive relationship between positive oil price changes and real government expenditure. Also, the impact of oil price shocks on industrial output growth was found to be marginal with observed significant appreciation of the real exchange rate. A finding which reinforces that of Olomola and Adejumo (2006) and Ayadi (2005) that oil price shocks tend to create the tendency for the Dutch disease syndrome in Nigeria

Hamilton (2008) and Fattouh (2007) agree that crude oil price elasticity is very low especially in the short run. This is due to technology lock-up; that is, it takes some time before energy-consuming appliances/capital stocks are replaced with more energy-efficient substitutes, whereas, studies by Oriakhi and Osaze (2013) have also found a positive relationship between oil price increases and growth of output in Nigeria (possibly because Nigeria is a net exporter of crude oil.

Oil and the Nigerian Economy

Nigeria's economy can be described as growing economy with an average growth rate of 6.3% between 2005 and 2015 (Nigeria Economic and Growth Plan 2017-2020). Primary production is oriented around agriculture, mining and quarrying (which include oil and gas) and accounts for more than 65 per cent of real gross outputs and more than 80 per cent of foreign exchange revenues in the year 2011 (National Planning Commission 2011). With more than 65 per cent of Nigeria's Federal-collected revenue coming from oil in the last decade, Nigeria's fiscal policy remains heavily influenced by the oil industry and its volatile movement. According to the IMF, beginning in the last 35 years, Nigeria's revenue and expenditures followed a similar pattern to oil prices. In periods of high oil prices such as 1979-82, 1991-92, 2000-02, 2005-09 and 2010-14, revenue and expenditures also experienced sharp increases. Consequently, when oil prices declined after the booms, Nigeria's revenue decreased as well. In 2016, the economy entered into recession with GDP contracting by 0.36% in the first quarter, 2.1% in the second quarter and 2.2% in the third quarter and made inflation soar to 18.5% in November 2016 from 9.5% in December 2015. Nigeria's economy is highly dependent on the oil and gas sector. Although the sector accounts for just 10% of GDP, it represented 94% of export earnings and 62% of Government revenues (Federal and State) in 2011-2015. Foreign exchange reserves declined from USD32 billion in January 2015 to USD25 billion in November 2016 (from a high of USD53 billion in 2008). As a result, the naira depreciated sharply, losing almost half of its value against the dollar. Similarly, foreign direct investment (FDI) declined sharply from a peak of USD8.9 billion in 2011 to USD3.1 billion in 2015 and did not recover in 2016. Falling oil revenues widened the Federal Government deficit from N1.2 trillion in 2013 to N1.4 trillion in 2015, and an

estimated N2.2 trillion in 2016. States in particular have been badly hit by the oil price shock; in 2015, 40% of States were running a deficit of more than 30% of their revenues. Fiscal sustainability is therefore a critical challenge for Nigeria. But Nigeria's challenges are not only economic. On the social side, poverty and social exclusion rates are high. About 61% of the population lives on USD1 or less a day. Human development indicators paint a bleak picture of Nigeria's health and education systems. The country has the fourth-highest infant mortality rate in the world, and nearly 55% of this is attributable to malnutrition. Nigeria's primary school net enrolment rate is 54% and 10 million children of school age do not attend school. Unemployment is high, especially among youth. Nigeria has 17.6 million unemployed/underemployed youth who account for about 22% of the labour force (Q2 2016). Unless additional jobs are created as a matter of extreme urgency, these numbers will increase dramatically over the next five years as the 45% of the population under 15 years enters the work force.

The country also faces governance challenges. Nigeria ranked 169 out of 190 countries in the World Bank's 2017 Doing Business index, 44 places lower than in 2010. Paying taxes, enforcing contracts and trading across borders are among the areas where Nigeria performs poorly and this has a negative impact on tax revenue, investor confidence and mobility of goods. Businesses in Nigeria cite poor infrastructure – the lack of reliable power supply and transportation – as a critical challenge. The total value of Nigeria's infrastructure stock represents only 35% of GDP, compared to 45-90% in BRICS countries (Brazil, Russia, India, China, and South Africa). Insufficient investment in maintenance means that only one-third of the country's installed power capacity is operational while the quality and coverage of roads is inadequate. Governance - policy design, execution and oversight - requires review. Corruption and security issues – terrorism, insurgency, piracy, oil theft – are of serious concern and constitute major barriers to economic growth and social development.

RESEARCH METHODOLOGY

This research is designed to critically analyze the impact of crude oil in Nigeria economy. The Error Correction Model (ECM) method is used to analyze the data obtained from the publication of Central Bank of Nigeria, (CBN) (annual Report), International Financial, Statistca.com and The World Bank for various years covering 1980 to2016.The rationale for the choice of the period is motivated by need to cover a period long enough within which reliable data is available for the analysis to give meaningful result

Model Specification

The econometric model to consider in this study takes crude oil price, foreign exchange, external reserve, government revenue and inflation as the explanatory variable and gross domestic product as dependant variable respectively. These variables are used at constant prices.

For the successful examination of the relative impact of crude oil on the Nigerian economy, with regards to the work of Milbourne, Otto and Voss (2003) and Gbadebo Olusegun Odularu (2008), which is based on studies by Mankiw, Romer, Weil (1992), we specify our model to determine the impact of crude oil price ultimately on economic growth in Nigeria.

Model 1

$$RGDP = F(C, K, E, R, I), \dots\dots\dots(1)$$

Where, RGDP - represents the real gross domestic product, C – represents crude oil price, K – represents foreign exchange rate, E –represents external reserve, R –represents government revenue and I – represents inflation rate

Note that Real GDP is GDP at factor prices deflated by the consumer price index (at constant factor cost). Also, we specify other variables aside crude oil price as control variables to suppress the chances of experiencing a spurious result. These variables largely determine the crude oil price and the impact on economic growth; hence, we employ them under the course of this research.

This can be specifically expressed in explicit econometric (linear equation) form as:

$$RGDP_t = b_0 + b_1C_t + b_2K_t + b_3E_t + b_4R_t + b_5I_t + b_6ECM1_t + U_t \dots\dots\dots(2)$$

Where, U – stochastic or random error term (with usual properties of zero mean and non-serial correlation).

A priori Specification: the expected signs of the coefficients of the explanatory variables are: $b_1 > 0$, $b_2 > 0$, $b_3 > 0$, $b_4 > 0$, $b_5 < 0$.

EMPIRICAL FINDINGS

This part focused on the analysis and interpretation of the regression result for the model used in this study, for the regression model, the method of analysis employed is econometric techniques with special focus on multiple regression analysis. To capture both the long run and the short run impact of crude oil price on the Nigeria economy, we estimate the existence of both long run and short run relationship using the Error Correction Model (ECM) Methodology. To avoid spurious regression results, stationarity of variables by performing ADF unit root test and Cointegration test were conducted prior to the estimation of Error Correction Model.

Unit root test

Table 1 Unit root result

VARIABLES	ADF TEST STATISTICS	Critical value	S/NS
RGDP	-4.226277	-2.957110	S
COP	-1.328860	-2.945842	NS
EXCH	1.458287	-2.945842	NS
EXR	-0.675308	-2.951125	NS
INF	-2.910736	-2.945842	NS
GREV	-3.078066	-2.971853	S

Note: NS – Not Significant S – Significant

In table 1 above, real gross domestic product (RGDP) and government revenue (GREV) are stationary at level while other variables such as crude oil price, exchange rate (EXCH) and external reserves (EXR) as well as inflation rate (INF) are not stationary at level that is 1(0). This is because the test statistics of these variables are greater than the critical value. We can therefore conclude at level the of data series COP, EXCH, EXR and INF are characterized by unit root problem.

Table 2 Unit root result

VARIABLES	ADF TEST STATISTICS	Critical value	S/NS
COP	-5.203996	-2.948404	S
EXCH	-3.498443	-2.948404	S
EXR	-5.005332	-2.951125	S
INF	-5.576418	-2.948404	S

Note: NS – Not Significant S – Significant

From the table 2 shown above, all the variables are stationary at first difference i.e. the order of integration of these variables will now be 1(1), this is because at this order of integration the test statistics is smaller than their corresponding critical value at 5% level of significant. From the table above, we can now see that the RGDP and GREV are stationary at level while COP, EXCH, EXR and INF are only stationary after taking their first difference. This result shows the important of undergoing a co-integration test to establish the long run equilibrium as the variables are not of the same other in terms of their stationarity.

Co-Integration Result

To establish the long run equilibrium that exists among the selected variables for this study, Johansen co-integration test, which produces the likelihood ratio and Max-Eigen value to assert the validity of the long run relationship at 5% level of significant is adopted.

Table 3 Co-Integration Result

Hypothesized No. of CE(s)	Eigenvalue	Trace statistics	0.05 Critical value	Prob **	Eigenvalue	Max-Eigen statistics	0.05 Critical value	Prob **
None *	0.777880	140.7780	95.75366	0.0000	0.777880	43.63158	40.07757	0.0191
At most 1 *	0.715263	97.14643	69.81889	0.0001	0.715263	36.42952	33.87687	0.0242
At most 2 *	0.651381	60.71691	47.85613	0.0020	0.651381	30.55946	27.58434	0.0201
At most 3 *	0.519990	30.15745	29.79707	0.0454	0.519990	21.28451	21.13162	0.0476
At most 4	0.226096	8.872931	15.49471	0.3773	0.226096	7.432924	14.26460	0.4393
At most 5	0.048443	1.440007	3.841466	0.2301	0.048443	1.440007	3.841466	0.2301

From the table 3 above, there is long run relationship among the selected variables as the values of both trace statistics and the Max-Eigen value are greater than four critical values as shown above. The implication is that, it confirms the efficiency of the results that will be estimated at the next stage.

Estimation of the Model

Having verified the existence of long run relationships amongst the variables in our models, we therefore subject them to the error correction mechanism. The results are as follows:

Table 4. Model Estimation

Dependent Variable: D(RGDP)				
Method: Least Squares				
Date: 11/17/17 Time: 16:54				
Sample (adjusted): 1983 2010				
Included observations: 28 after adjustments				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.559323	0.052606	8.056358	0.0000
D(COP)	0.340690	0.204015	2.669928	0.0098
D(EXCH)	0.548010	0.005004	5.731809	0.0024
D(EXR)	0.463635	0.000064	4.003047	0.0076

D(GREV)	0.653359	0.002083	3.613157	0.0016
D(INF)	-0.294683	0.000827	-1.666150	0.0005
ECM (-1)	-0.377915	0.171350	-2.205514	0.0000
R-squared	0.886626	Mean dependent var	4.538000	
Adjusted R-squared	0.782805	S.D. dependent var	1.794403	
S.E. of regression	4.591615	Akaike info criterion	6.098659	
Sum squared resid	442.7416	Schwarz criterion	6.431710	
Log likelihood	-78.38122	Hannan-Quinn criter.	6.200476	
F-statistic	332.4261	Durbin-Watson stat	2.167124	
Prob(F-statistic)	0.00000			

$$RGDP = 0.559 + 0.340C + 0.548K + 0.463E + 0.653R - 0.294I - 0.377ECM1 + U \dots (2)$$

(8.056) (2.669) (5.731) (4.003) (3.613) (-1.666) (-2.205)

Notes: values in parentheses are absolute *t*-values of the corresponding coefficients.

A Priori Expectation and Coefficients

From the foregoing result, all the variables meet their respective a priori expectations, Crude Oil, Foreign exchange rate, External reserve, Government Revenue and Inflation are all inelastic (i.e, elasticity less than 1) to Real GDP in Nigeria. This follows the fact that the estimated coefficients of all these variables are less than unity. Consequently, changes in any of these variables will command less than proportionate response from Real GDP in Nigeria, i.e., a unit change in these variables will prompt a less than one unit change in the Real GDP in Nigeria. The F-statistic offers reliable proof of the overall significance of the model. With a value of 332.43, the calculated F is greater than the critical F which has a value of 2.69 at 5% level of significance. This simply implies that at least one of the variables in the model is statistically significant. The probability of the calculated F being 0.0000 and of course less than the level of significance, as well further affirms the overall significance of the model. The Durbin-Watson statistic with a value of 2.167, offers evidence of the absence of first-order autocorrelation in estimated model. The result of the ECM1, shows that the coefficient of determination R² is 0.886. Also, the adjusted R² is 0.782. These findings imply that our estimated model achieved a strong goodness of fit. Accordingly, we surmise that the mix of regressors in this model on the average account for about 83.4% of the impact of crude oil prices on economic growth in Nigeria, while the remaining 16.6% variation is accounted for by the error term.

Speed of Adjustment Coefficient

In the estimated model 1, the speed of adjustment coefficients is the parameters of the variables ECM1. This coefficient informs the rate at which the disequilibrium in the Real GDP and Crude Oil price in error correction model 1 is being corrected. This correction however holds only in cases where the conditions (negativity and significance of the error correction coefficient) for adjustment to equilibrium are met.

As is evident in the estimation result, the speed of adjustment coefficient (error correction coefficient- ECM) is 37.7 percent. The speed of adjustment coefficient is rightly signed, with a value of -0.3779, showing that the average adjustment is 37.7 percent within a year. However, the observed significance of the error correction coefficient (value of -0.3779) shows that the 37.7 percent adjustment is significant enough to return the model to equilibrium when there is temporal disequilibrium in the model.

CONCLUSION

This study examined the impact of crude oil price on economic growth and how the oil price fluctuation could affect the economic wide factors such as foreign exchange rate, Inflation, external reserves and government revenue. The study used econometrics models for the model specified according to the objectives stated and the data covered the period 1980 to 2016. Error correction method was adopted. Apart from inflation that has negative significance on the economic growth, other variables such as crude oil prices, exchange rate, external reserve and government revenue showed some positive significant influence on the economic growth. The ECM result equally showed that only inflation has negative influence on economic growth over the period of study but crude oil price, exchange rate, external reserve and government revenue have positive influence on economic growth. It is worthy of note that all the variable in the model impact economic growth but all the control variables in the model such as exchange rate, external reserve, government revenue and inflation that influence economic growth are themselves influenced by price of crude oil and not the other way round, but each of these variables impact economic growth more than the change in oil price as can be seen from their respective coefficients. This argues in favour of increase diversification of sources of government revenue i.e. Improved tax system and improvement in the general economic environment in-order to attract foreign exchange earnings through improved terms of trade, expansion of export base, attraction of international portfolio investment, foreign direct investment and unilateral financial inflows

RECOMMENDATIONS

1. In view of the current global unpredictability in oil prices, it is now necessary for Nigeria to diversify its sources of foreign exchange earnings, so as not to remain almost dependent on crude oil for economic survival. One of the areas where this diversification can take place is the petroleum industry itself, through the development of condensates, liquefied natural gas, optimization of local refining capacity for local sustainability and to get the other by product of crude such as paraffin wax, fertilizer input, etc and exports of condensate and refined petroleum and petro chemicals. This is because the global fall in oil prices offered a unique opportunity for the country to reposition the economy from it's over dependence on crude oil.
2. Federal government should wisely use excess crude oil account (ECA) in this time of crisis. The funds should be used to fund development of critical infrastructure for long term growth and development.
3. Government should focus its energy on improving the investment climate by further improving ease of doing business in Nigeria, reduce insecurity to life and property. Improve human and property rights and improve the tourism potential of Nigeria
4. Government should overhaul the entire tax system by promoting tax payers education, increase the current tax base and enhance the efficiency of the tax collection machinery.

FURTHER RESEARCH

This paper shows that further research would reinforce the recommendations of this paper and this research could be in the following areas.

1. The impact of exchange market instability on the stock market performance
2. Exploring feasible alternative sources of foreign exchange earnings to fast track economic growth in Nigeria.
3. Human Capital development, mobilization and deployment as an alternative development strategy.

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