Int. j. adv. multidisc. res. stud. 2025; 5(4):1009-1013

Received: 11-06-2025
Accepted: 21-07-2025

International Journal of Advanced Multidisciplinary Research and Studies

ISSN: 2583-049X

Crude Oil Price and Economic Growth in Nigeria

Briggs David Theophilus
Department of Economics, Faculty of Social Sciences, University of Port Harcourt, Nigeria

Corresponding Author: **Briggs David Theophilus**

Abstract
The study examined the effect of crude oil price on economic growth in Nigeria from 1981-2021. The objectives of the study are to examine the effect crude oil price and oil exports on gross domestic product in Nigeria. Annual data were collected from Central Bank of Nigeria (CBN) statistical bulletins and World Development Index (WDI). The main technique of analysis is the Autoregressive Distributed Lag (ARDL) model. The ARDL long run results showed that, there is a long-run effect of crude oil price and oil exports on economic growth. The empirical short run results showed that, there is an inverse relationship between crude oil price and gross domestic product. Also, crude oil export showed significant positive impact on gross domestic product. Thus, it can be concluded that in the short run, the response of GDP to crude oil price is asymmetry. Meaning that, crude oil price brings about negative impact on gross domestic product. Based on the findings it was recommended amongst others that, there is the need for proper coordination of fiscal and monetary policy for sustainability of economic growth in terms of real gross domestic product.

Keywords: Asymmetry, Auto-Regressive, Crude, Growth, Oil Price

1. Introduction

Crude oil was discovered in the 1800s and since its discovery, it has become a very important source of energy to the world, influencing the economy of nations and the world at large. In Nigeria, crude oil has become the major foreign exchange earner and the major revenue base for the government. Hence, crude export earnings account for about 70 percent of the revenues in the annual budget (Ibrahim, 2018) [10].

Theoretically, the rise in crude oil prices, triggers upward shift in revenues from importing to those of exporting nations; via adjustments in the terms of trade. The level of the direct impact of changes in crude oil prices is proportionate to the amount and level of the cost of oil on the nation's income, and the level of reliance on its oil imports and the willingness of consumers in cutting down their consumption thus reducing oil demands (Majidi 2006) [13]. Also, for major oil exporting nations, any price rise, will actually impact positively on real national income as it will trigger earnings from exports; though the anticipated gains will eventually be lost through reduced export demands which will be stirred up due to the resultant economic recession in the economies of her trading partners. It is pertinent to situate that, for net oil importing nations, increased oil prices; heightens inflation, raise import cost, lowers non-oil demands as well as reduces investments.

It is very pertinent to note that Nigeria's crude oil output per day presently, far exceeds the levels at inception, when crude was first discovered by Shell-Dutch in 1957. Existing records clearly reveals the above fact; as production figure rose from 1,433,000 barrels in 1981 with a reserve of 17 billion barrels. The quest for fresh fields in the post 1965 era, as well as increased output from the existing oil fields, accounted for an increased output to above 2.13 million barrels per day with an existing reserve of 3.7 billion barrels as at 2015 (Charles & Oguntade, 2018) [3].

The years preceding 2014, saw a dramatic fall in oil prices from $105 to $37 per barrel, which was one of the lowest rates ever. The slide in price was traceable to the Iranian oil output excesses that followed the 2015 lifting of earlier export sanctions on Iran. The International Monetary Funds (IMF) report of 2016 indicated that, the outburst from Iranian oil fields, triggered a global free fall due to excess production and exports from Iran into the global crude oil market. The global glut, negatively impacted on crude production in Nigeria, where the growth output fell by 1.1% in 2015 to 1.2% in the first three months in 2016, and continued into the first quarter of 2017 (NBS. 2017) [16]. World Bank (2019) [18] clarifies that, despite increasing US production, oil price rose during the first and third quarters of 2018 as market participant focus on falling production in

Venezuela and the prospect of lower Iranian export as a result of sanction on Iranian oil export by the United States. Towards the end of 2018, crude oil has fallen by around 40%. The reduction on oil prices did not stop until the beginning of 2019 after the drop in OPEC production. The price has remained averagely stable till date.

The above situation trigged upward price swings in goods and services experiencing today. Nigeria's major economic indexes were negatively impacted by the dwindled crude oil rates, influencing economic growth and triggering inflation rate due to the nation's unparalleled reliance and dependence on crude oil exports as its major source of foreign income. Hence the dwindling fortunes of crude oil, negatively affected all the other sectors of the nation's economy.

Empirical evidence elucidates that, crude oil earnings account for up to 90% of all of Nigeria's export income and also up to 70% of the national revenues in its yearly budgets. Consequent upon the above factors, the situation is expected to impact the level of output in the country. However, these adverse consequences of reduced crude oil price resulted in decline in the production sector; causing decline in output from 1.1 percent in December 2015 to 1.2 percent in the first three months of 2016, and maintained the decline till March, 2017 (National Bureau of Statistics, NBS, 2017) [16]. Thus, the specific objective of the study is to examine the impact of crude oil price and crude oil export on real gross domestic product in Nigeria. The remaining parts of the paper discussed literature review, methodology, results and discussion; and conclusion and recommendations.

2. Literature Review

The linear/symmetric relationship theory of growth is the theoretical based of the study. Hamilton (1983) [7], Hooker (1986) [8], and Laser are the three main proponents of the linear/symmetric relationship theory of growth. The theory states that, variations in oil prices will most likely trigger upward movement or rise in output growth rates in a volatile manner. Their position was hinged on the activities in the effects of the worldwide oil market between 1948 and 1972 on the economy of oil-exporting and importing countries.

Hooker (2002) [9] in his research concluded that, the empirical data for 1948 to 1972 has revealed that varying oil prices actually assert significant pressure on output yearly. Also, Laser (1987) [12] in his study the effects of global oil market between 1948 and 1972 on the economy of oil-exporting and importing countries, posited that, rise in the price of oil will trigger a fall in GDP, while the reverse (decrease), will have a significant effect on GDP.

Empirically, similar studies on other countries have had divergent results, varying from one nation to the other. For instance, Malika, Ayesha, Shoaib and Aisha (2021) [14] used OLS to discussed the impacts of crude oil price on the financial development of oil producing nations from 1972-2020. They concluded that, upward rise in oil costs adversely affects the financial development of Pakistan. Also, Mustapha (2020) [15] analyzed the impact of oil price shocks on exchange rate and monetary development in Nigeria for 32 years using the ARDL model in deciding both Short and Long Run connections between price shocks and financial development. The study discovered evidences of long run interactions between GDP, oil prices, exchange rates and other variables; indicating that variations in oil rates had very noticeable impact on exchange rate as well as economic growth.

Driouche and Hamrit (2020) [5] examined the asymmetric impact of crude price shocks and the development of some macroeconomic factors on the level of unemployment in Algeria, between 1990 and 2017 using Non-Linear ARDL model. The study also revealed that, crude price has an uneven and non-uniform impact on the short-term analysis. It also revealed the fact that the economic growth rate maintains a strong influence on unemployment levels as compared to investment, expenditure and the loan portfolios made available to the private sector. According to the study, non-hydrocarbon GDP progress rates are distorted, thus very unlikely to represent the input of the sector in addressing unemployment due to the fact that, upward movement in the rate of unemployment is usually attributive to earlier booms in the sector.

Joseph, Callistus and Pascal (2020) [11] determined the consequence of oil price fluctuations and financial development in Nigeria with the use of (GARCH model and found that, oil price is directly connected to financial development in Nigeria. In view of the foregoing, the study suggested that government at all levels needed to maximally utilize oil revenue in developing others critical sectors of the Nigerian economy.

Akalpler and Nuhu (2018) [1] examined crude price instability and economic growth in Nigeria from 1981-2015 by employing the Vector Errors Correlation model. The finding showed that, there is a positive correlation between crude price and real effective exchange rate and economic growth. Also the variance decomposition result showed that, instability in crude oil price is the most significant source of changes in economic growth and exchange rate.

Ebele (2015) [6] undertook a study of the outcome of crude price imbalance on Nigeria's economic growth for a period of 44 years, covering the years 1970-2014. Using the aggregate demand framework, the study carefully linked the investigative variables rather than merely looking at the productive performance of crude price and an aggregation of variables as was done by other scholars. The study also employed the Engel-Granger test for co-integration and Granger Representation Equation to analyze the link between crude price variations and economic growth. The outcome posits that, crude price instability, adversely influenced the nations, economic growth, despite the fact that, both revenue and reserves, and projected a posited influence on the economy.

3. Methodology

The study employed time series data for the dependent variable and the respective explanatory variables derived from the National Bureau of Statistics. The time series data that, were examined spanned a period of 1981 to 2021.The study adopted the ex-post facto design. This design is useful for establishing a cause-and-effect relationship between variables. Specifically, the research work utilized unit root test, test for co-integration and the Auto Regressive Distributed Lag (ARDL) model as the tools of analyses.

Model Specification

The functional and econometric models are specified as:

$$GDPR=f(COP,OXP) \quad (3.1)$$

$$GDP_t = \beta_0 + \sum_{i=0}^{n}\beta_{1i}\Delta GDP_{t-i} + \sum_{i=0}^{n}\beta_{2i}\Delta LnCOP_{t-i} + \sum_{i=0}^{n}\beta_{3i}\Delta LnOXP_{t-i} + \beta_4 GDP_{t-1} + \beta_5 COP_{t-} + \beta_6 LnOXP_{t-1} + \varepsilon_{1t} \quad (3.2)$$

Where: GDP = Gross Domestic Product, COP= Crude Oil Price, OXP = Oil Export, Δ is equal to first difference operator, β_{1i}, β_{2i} and β_{3i} which are short-run dynamics in the above equation and β_4, β_5 and β_6 in equation 3.2 suggests a long-term association. To test the null hypothesis, the F-statistic is performed to see if all the series are cointegrated, H_0: $\beta_4 = \beta_5 = \beta_6 = 0$ against the alternative hypothesis, H_1: $\beta_4 \neq \beta_5 \neq \beta_6 \neq 0$ in model 3.2.

4. Results and Discussion

Table 1: Descriptive Statistics

	COP	OXP (₦billion)	GDP (%)
Mean	43.04293	5104541.	3.055366
Median	29.60000	1649446.	4.200000
Maximum	111.6300	20475872	15.33000
Minimum	12.80000	7201.200	-13.13000
Std. Dev.	29.55633	6132074.	5.388020
Skewness	1.092331	0.972251	-0.825234
Kurtosis	3.041528	2.746444	4.620406
Jarque-Bera	8.156385	6.569189	9.139166
Probability	0.016938	0.037456	0.010362
Sum	1764.760	2.09E+08	125.2700
Sum Sq. Dev.	34943.07	1.50E+15	1161.230
Observations	41	41	41

Source: Computed Result from e-view 10

Table 1 presents the descriptive statistics of the time series data analyzed in this study. From the table, it is seen that the mean GDP value for the period under study (1981 – 2021) was 3.0554. The standard deviation for the GDP series was approximately 5.3880 with skewness of approximately -0.8252 indicative of the fact that, the series were skewed to the left, the extreme GDP series are smaller and that the median is greater than the mean. The kurtosis value of 4.6284 which is greater than the 3.0000 benchmark implies that, more of the GDP values were located in the tail of the distribution rather than around the mean or average. The Jarque-Bera probability value of 0.01 < 0.05 indicated that, the GDP series are normally distributed. Also, with respect to crude oil price, the mean value for the period under study was 43.0429 and the standard deviation of 29.5563. This indicated that, the variable is normally distributed. With the skewness value of approximately 1.0923 and the Jarque-Bera probability value of 0.0169 < 0.05, it was indicated that, OXP was not normally distributed.

Based on the crude oil exports variable, the mean OXP value for the period under study (1981 – 2021) was 5104541 and the standard deviation of 6132074. This indicated that, the variable is not normally distributed. With the skewness value of approximately 0.9722 and the Jarque-Bera probability value of 0.037456 < 0.05, it was indicated that, OXP was not normally distributed.

Table 2: ADF Test Results for the Estimated Model

Variables	ADF Statistics		Probability Values		Order of Integration
	Level	1st Difference	Level	1st Difference	
GDPGR	-2.697986	-11.6439*	0.0835	0.0000	I(1)
LOXP	-1.153967	-5.97528*	0.6847	0.0000	I(1)
COP	-3.506593*	……	0.0336	……	I(0)

Source: Computed Result from E-view 10

The Augmented Dickey Fuller (ADF) unit test of stationarity proposed by Dickey and Fuller (1981) [4] was used to ascertain the stationarity of the variables. The results presented on Table 2, showed that, only one variable (crude oil price) was stationary or stable at order zero I(0). This is because with the value of the ADF statistic of -3.506593 has the corresponding probability value of 0.0336 is less than the critical p-value at 0.05 level of significance. This implies that, crude oil price time series data is free of unit root problem. Meanwhile, the remaining two variables which including Gross Domestic Product (GDP) and Oil Export (OXP) which were not stationary at level or order zero were differenced and became stationary at first difference or order one. Since the variables have mixture of order of integration at order zero and order one, the requirement for using ARDL model is fulfill. Thus, the ARDL long-run test (bound test) and short run test (ECM test) was conducted for the estimated model

Table 3: ARDL Bound Testing Cointegration Analysis for the Estimated Model

F-Statistic=9.43891		
Unrestricted trend and intercept, k =2 (No of Independent Variables)		
	Critical Values	
Significance	**Lower Bound**	**Upper Bound**
10%	2.21	3.09
5%	2.56	3.49
1%	3.92	4.37

Source: Computed Result from E-view 10

The ARDL was adopted via the bound test to ascertain the existence of long run correlation between all series. The bound test result displays on Table 4 showed that, the F-statistic of 9.43891 is higher than the upper bound value of 3.49 at 5 percent significance level. Meaning that, there is a long-run interplay between the independent variables and the real gross domestic product.

Table 4: ARDL Long Run Estimate for the Estimated Model

Dependent Variable: GDP				
Variables	Coefficient	Std. Error	t-Statistics	Prob.
OXP	1.824998	0.412978	4.419111	0.0002
COP	1.427724	0.350248	4.076328	0.0005
C	-23.42377	5.659241	-4.139031	0.0004

Source: Computed Result from E-view 10

Having found a long-run correlation amongst variables, the long-run coefficient values was conducted as shown in Table 4. Based on the long-run, the values of both crude oil price (COP) and crude oil export (OXP) exhibits a significant positive effect on the real Gross Domestic Product (GDP). Meanwhile, the coefficient of crude oil price at 1.427724 shows that, a percentage increase in crude oil price increased GDP by 1.42% during the period of this study. Similarly, crude oil exports at 1.824998 indicated that, a percentage increase in crude oil export increased GDP by 1.82% during the period of this study. The finding above is in line with the scholarship of Oriakhi and Iyoha (2013) [17] who applied the VAR strategy to review the implications of variability in the oil price on Nigerian economic growth between 1970 and 2010 and discovered that oil price and exports significantly affects real GDP.

Table 5: ARDL Error Correction Regression for the Estimated Model

Dependent Variable: D(GDP)				
Variables	Coefficient	Std. Error	t-Statistics	Prob.
D(LOGGDP(-1))	-0.173683	0.091445	-1.899311	0.0707
D(LOG(OXP(-1))	3.964733	0.873841	2.57135	0.0037
D(LCOP(-1))	-0.656431	0.221907	-2.598142	0.0007
ECM(-1)*	-0.927479	0.114866	-6.642679	0.0000
R-Squared	0.81455	Adjusted R-Squared		0.74868
Durbin-Watson Stat	1.9562			

Source: Computed Result from E-view 10

The short run result of the estimated model was represented by the ARDL Error Correction Mechanism (ECM) as reported in Table 5. ARDL error correction regression result in Table 5 which represent the short run result, showed that, in the short run, change in lagged value of real gross domestic product D(GDP(-1)) had insignificant negative effect on current GDP. Also, change in crude oil export (OXP) exhibited significant positive impact on real gross domestic product. This outcome is consistent with the economic hypothesis which states that, exports of crude oil will increase real GDP. However, variation in the lagged value of crude oil price D(COP(-1) exhibited appreciable inverse effect on real gross domestic product (GDP). The D(COP(-1)) coefficient of -0.656431 implies that, a percentage increase in the previous year's crude oil price decreased current real gross domestic product by approximately 66 percent. The finding above is in line with the scholarship Oriakhi and Iyoha (2013) [17] who applied the VAR model to review the implications of variability in the oil price on the Nigerian economic growth between 1970 and 2010 and discovered that, oil price significantly affects real GDP.

Meanwhile, the coefficient of the ECM appears with negative sign and statistically significant at 5% level of significance. Thus, about 92% of long-run instability generated by lag period error shocks is represented by the coefficient of the error correction term, which is negative and experimentally considerable with extremely high speed. Both the coefficient of determination measured by R^2 and the adjusted R-square (R^2) are 0.814 and 0.748 respectively. These values implies that, the explanatory variables in the estimated model explained 81% and 75% respectively of changes in the dependent variable. The Durbin-Watson value of 1.9560 which is very close to 2.0 Durbin Watson bench mark, shows that, there is no serial correlation in the estimated model. Therefore, the estimated model is valid for policy formation and implementation.

Table 6: Diagnostic Test for the Estimated Model

Test Type	Test Statistics	P-Value	Critical Value
Serial Correlation Test	Chi Square (X^2)	0.1960	0.05
Heteroskedasticity Test	Chi Square (X^2)	0.2808	0.05

Source: Computed Result from E-view 10

The diagnostic test results conducted to validate the estimated ARDL model in the estimated model are presented in Table 6. The Lagrange multiplier (LM) tests and Breusch-Pagan-Godfrey heteroskedasticity tests were used as diagnostic measures for Breusch-Godfrey sequential correlation. The outcome of the LM test displays no serial relationship exists given the P-value of approximately 0.1960 which is greater than critical value of 0.05 necessitating the retention of the null hypothesis of no serial correlation. Similarly, there was no evidence of heteroskedasticity in the residuals. In other words, the variance of the residuals from the measured model was found to be constant over the study period considering the p-value of 0.2808, the null hypothesis that, there is no heteroskedasticity in the residuals must also be maintained.

Stability of the Parameter Coefficients in the Estimated Model

The stability of the parameter coefficients in the estimated model was measured using the Cusum test at the 5% significance level as shown in Fig 1. From the figure, it is seen that the Cusum statistic lies with the corridor of 0.05 probability or 5%. This implies that the parameter coefficients in the estimated model were stable and suitable for forecasting.

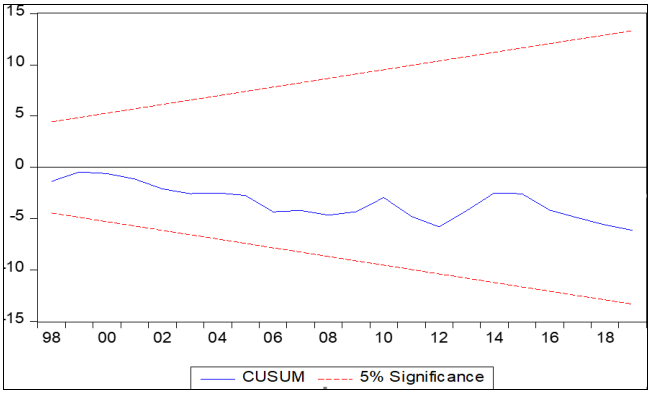

Fig 1: Cusum Test of Stability in the Parameter Coefficients of the Estimated Model

5. Conclusion and Recommendations

The study used auto regressive distributed lag model to examine the effect of crude oil price on economic growth in Nigeria from 1981-2021. Based on the empirical analysis, crude oil price exhibited significant inverse effect on real gross domestic product. This implies that a percent increase in crude oil price decreased real gross domestic product. The finding negates economic theory which postulates positive effect between the two variables. Thus, it can be concluded that in the short run, the response of real GDP to crude oil price is asymmetry. Meaning that, crude oil price brings about negative relationship with real gross domestic product.

Based on the findings, it was recommended that, government should use the proceeds from crude oil export to spur and support growth in the technology of crude oil exploration and exploitation in Nigeria. Over the years, the government has depended on foreign technology through foreign direct investment by multinational oil giants in the exploration and exploitation of crude oil in the petroleum industry without significant efforts to localize the technology. Also, there is need for more transparency in the institutional reporting of the proceeds of crude oil export and the consequent expenditure patterns by government at both national and sub-national levels. The Nigerian National Petroleum Corporation and the Central Bank of Nigeria should be more transparent in reporting crude oil proceeds to ensure efficient utilization of funds to achieve government macroeconomic objectives. In spite of the significant positive impact of crude oil export on real GDP in both the short and long run periods, it remains expedient for government both at the national and sub-national levels to ensure that the pattern of expenditure from the proceeds of crude oil is targeted at projects that further increase output growth in the real sector to ensure price and exchange stability, reduction in unemployment rate and sustained economic growth.

6. References

1. Akalpler E, Nuhu AB. The impact of oil price instability on economic growth: Evidence from Nigeria, Business Economic and Management Journal. 2018; 1(1):39-53.
2. CBN. Central Bank of Nigeria Statistical Bulletin, Abuja: CBN Publications, 2021.
3. Charles O, Oguntade PO. Impact of Oil Price on Nigerian Economy. International Journal of Economics, Commerce and Management. 2018; 6(4):252-263.
4. Dickey DA, Fuller WA. Distribution of the estimators for autoregressive time series with a unit root. Journal of the American Statistical Association. 1981; 74:427-431.
5. Driouche MD, Hamrit A. The assymetric impact of oil price shocks on the evolution of the unemployment rate in Algeria: New evidence using NARDL Aanaysis. Les Cahiers du Cread. 2020; 36(2):27-58.
6. Ebele E. Oil price volatility and economic growth in Nigeria: An empirical investigation. European Journal of Humanities and Social Sciences. 2015; 34(1):1901-1918.
7. Hamilton J. Oil and the macroeconomics since World War II. Journal of Political Economy. 1983; 91(2):228-248.
8. Hooker C. Effect of oil price and exchange rate variations on government revenue in China, Journal of Economics. 1986; 2(1):2-13.
9. Hooker M. Are oil shocks inflationary? Asymmetric and non-linear specifications versus changes in regime, Journal of Money, Credit and Banking. 2002; 34(2):540-561.
10. Ibrahim T. Oil price fluctuation and aggregate output performance in Nigeria. MPRA, 2018. Online at: https://mpra.ub.uni-muenchen.de/88636/. Retrieved on 27/07/2019.
11. Joseph O, Callistus C, Pascal K. Journal of Economics and Finance (IOSR-JEFe-ISSN:2321-5933), 2020, 11. www.905rjournal.org
12. Laser Y. Interest, inflation, growth and the direction of the Hong-Kong economy, Chinese Economic Reviews. 1987; 120(8):19-33.
13. Majidi M. Impact of oil on international economy. International Economics Course, Centre for Science and Innovation Studies, 2006.
14. Malika L, Ayelsa A, Shoaib N, Ahisha K. Impact of oil price inflation on economic growth of oil importing economies: Empirical evidence from Pakistan. Journal of Asia Finance, Economics and Business. 2021; 9(1):1167-1171.
15. Mustapha MSS. The impact of oil price shocks on exchange rate and economic growth in Nigeria: An ARDL Bond Test Cointegration Approach. Dept of Economics, Mewer University, Chifforgash, Rajasthan. India, 2020. Journal Web link: http://wwwdormal.org/indexphp/JEE
16. NBS. National Bureau of Statistics: Annual Abstract. 2017; (21):3-32.
17. Oriakhi DE, Iyoha OD. Oil price volatility and its consequences on the growth of the Nigerian economy: An examination (1970-2010), Asian Economic and Financial Review. 2013; 3(5):683-702.
18. World Bank. Oil price rises in 2019 to the modest as U.S. production constranits ease: Washington, World Bank Report, October, 2019.