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Research Article

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## Modeling the effect of crude oil production and other factors on Nigeria's economy: an autoregressive distributed lag approach

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### Abstract

The overdependence on crude oil has produced susceptibility to every part of the Nigerian Gross Domestic Growth (GDP) and there was the need to examine the effect of crude oil on the economy of Nigeria. This study, therefore, investigates the long-run effect between oil revenue, oil price volatility, and economic growth in Nigeria. The data on oil revenue, non-oil revenue, oil price volatility, and per-capita income from the year 2006 – to 2020 extracted from the Central Bank of Nigeria (CBN) Statistical Bulletin was applied in this research work. The research applied Descriptive Statistics, Augmented Dickey-Fuller Unit Root test, Johansen cointegration, and Autoregressive Distributed Lag (ARDL) co-integration statistical method to examine the long-run effects of crude oil production on Nigeria's economy. It was discovered from our result that; oil revenue plays a remarkable role in Nigeria's economy by its advancement of the country's GDP. Furthermore, Nigeria has regulated oil revenue to accomplish economic growth in numerous ways. The study recommended that the Nigerian Government should diversify its export supply through downstream production and encouragement of more private sector participation.

**Keywords** ADF, ARDL, GDP, Price Volatility, Economic growth

### Introduction

Oil is the pillar of the Nigerian economy, it is a significant derivation of energy in Nigeria, and it assumes a fundamental part in forming the economy and political destiny of the country. In spite of the fact that Nigeria's oil industry was established toward the start of the century, it was only after the finish of the Nigerian common conflict (1967-1970) that the oil business started to assume a conspicuous part in the financial existence of the nation (Odularu, 2008). The historical backdrop of the oil business in Nigeria uncovers that oil was found in Nigeria in 1958 at Oloibiri in the Niger Delta. The disclosure was made by Shell-BP. Nigeria joined the position of oil makers in 1958 when its first oil field came on stream creating 5,100 barrels each day. After 1960, investigation rights in inland and seaward regions abutting the Niger Delta were stretched out to other unfamiliar organizations (Onwe, 2012). From 1956 when the principal oil

was penetrated in Oloibiri to mid-2013 when the cost of the ware crashed past the creative mind of good judgment till this day, oil stayed the pillar of Nigeria's economy. In Nigeria, strategy detailing generally seems to answer the oil circumstance or endeavor to exploit it. This generally appears as extending use when oil profit increment, keeping up with the position when there is a plunge in income, and searching for a frantic way out when there is a crisis (Biodun 2004). The need to assess the effect of oil income on the Nigerian Economy has become basic. Rear entryway, et al. (2014), states that Nigeria acquired US\$390 billion in oil-related monetary income over the period 1971-2005. Nigeria has a populace of around 251.6 million every 2021 is by a wide margin the most crowded country in Africa. Nigeria likewise has the biggest economy in Africa with a Gross Domestic Product of \$522.6 billion starting in 2021. Besides, Nigeria is Africa's biggest maker of oil. Notwithstanding, Nigeria's Oil Wealth has demonstrated in numerous ways to be a gift and revile simultaneously. Abayomi, Adams, and Alumbugu

(2015) concentrated on the financial effect of oil exportation on the Nigerian economy for the period 1970 to 2012. The review utilized numerous relapse models and observed that there exists a long-run connection between the product of oil and financial development in Nigeria. The oil business in Nigeria has carried uncommon changes to the Nigerian economy, especially in the beyond fifty years when it supplanted horticulture as the foundation of the Nigerian economy (Aigbedion and Iyayi, 2007). The oil business has ascended to the directing statures of the Nigerian economy, contributing the overwhelming majority to total national output and representing the main part of central government income and unfamiliar trade profit since mid-1970. The oil and gas industry is key to the public turn of events and development in Nigeria. Oil and gas comprise around 90% of Nigeria's unfamiliar trade profit and 83% of its GDP (Ogbeifun, 2008). Despite Nigeria's colossal oil riches, Nigeria has stayed one of the most unfortunate on the planet. Furthermore, the insurrection in the North, Niger-Delta Avengers in the South, kidnappings for recovery, and the rampaging Fulani herders have all intensified Nigeria's concern in no little measure. The issues with the Nigerian economy have been followed by the disappointment of progressive states to utilize oil income and abundance of raw petroleum pay successfully in the improvement of different areas of the economy (Yakub, 2008). The economy has been beset by supported underdevelopment proved by unfortunate human formative and monetary files including unfortunate pay dispersion, aggressiveness and oil savagery in the Niger Delta, endemic defilement, joblessness, relative neediness (Nwezeaku, 2010). The oil business in Nigeria assumes a pivotal part in the food of the country and energizes not exclusively Nigeria's monetary and advancement exercises yet, in addition, socio-political life. The business has been generally depicted as the country's live wire and these records for the writing that flourishes on its job and importance in Nigeria. Notwithstanding, Nigerians have had a tiny portion of the Country's oil abundance and there was a critical need to invert this pattern. Nigeria's outrageous dependence on the raw petroleum market has set off primary challenges for the economy, as profit from unrefined petroleum vacillates alongside market patterns (Aigbedion and Iyayi, 2007). Raw petroleum turned into the prevailing asset during the 1970s. On-shore oil investigation represents around 65% of all out creation and it is tracked down chiefly in the damp region of the Niger Delta, while the leftover 35% addresses seaward creation and includes boring for oil in the profound waters of the mainland rack. The huge expansion in oil income as a result of the Middle - East conflict of 1973 made remarkable, surprising, and impromptu abundance for Nigeria, and afterward started the emotional shift of strategies from an all-encompassing way to deal with benchmarking them against the State of the oil area (Oladipo and Fabayo, 2012). The Petroleum Industry in Nigeria has carried extraordinary changes to the Nigerian economy, especially in the beyond fifty years when it supplanted Agriculture as the foundation of the Nigerian economy. The Oil Industry has ascended to the unassailable grandiosity of the Nigerian economy,

contributing the overwhelming majority to GDP and representing the greater part of central government income and unfamiliar trade profit since mid-1970. Raw petroleum disclosure significantly affects the Nigerian economy both decidedly and antagonistically. On the negative side, this can be considered in the encompassing networks inside which the Oil Wells are taken advantage of. A portion of these networks experiences ecological corruption, which prompts hardship of method for vocation and other financial and social elements. Albeit huge returns are gotten from the homegrown deals and commodities of oil-based goods, its impact on the development of the Nigerian economy concerning returns and efficiency is as yet sketchy. Likewise, given the way that the oil area is exceptionally pivotal in the Nigerian economy, there is a desperate requirement for a suitable and beneficial creation and commodity strategy for the area. In Nigeria, however unrefined petroleum has contributed generally to the economy, the income has not been as expected used. Since there are different areas in the economy, the overabundance of income produced using the oil area can be put resources into them to broaden and increment the all-out GDP of the economy (Gbadebo, 2008).

Therefore, this study seeks to examine the influence of crude oil production and other factors in Nigeria's economy like the oil revenue, oil price volatility, and economic growth in Nigeria.

A review of related literature is provided in the second section. Section three discussed the material and methods of the study. In section four, the result generated from data analysis and discussion of the result was presented while the conclusion and recommendations are presented in the last section.

### Review of Related Literature

The role of oil income in the turn of events and the well-being of many oil-producing nations most especially Nigeria has stayed one of the focal concerns of macroeconomists and researchers for a long time. Several kinds of literature abound on the said job of oil income in the financial existence of the oil-delivering nations at large. However, there are conflicting results on the idea of the connection between the two concepts, with some showing reverse causality and others bringing about insignificant boundaries, prompting the requirement for additional inside and out research regarding the matter. Nwezeaku (2010) brings up that, the economy has been beset by perpetual underdevelopment, destitution, expanding obligation trouble because of various issues, for example, unfortunate energy supply and blackouts, precise imploding of businesses and foundations, absence of legitimate circle back support in the oil and gas enterprises, high are of debasement, assailant revolts, crimes, and so on The is confronted with unfortunate human formative and financial records as proven by a high pace of lasting and industrious expansion, low per capita pay, unfortunate pay dispersion, GDP and supported impoverishment, natural, human and material resources, insatiability greed, and loss for

excessive wealth. Corruption practices at all levels and political banditry have been the bane of the Nigerian economy. [Akinlo \(2012\)](#) evaluated the significance of oil in the advancement of the Nigerian economy in a multivariate Vector Autoregressive (VAR) model over the period 1960-2009. The study modeled the oil sector against other four areas for example manufacturing, agribusiness, exchange and administration, and building and development. The observational proof shows that the five subsectors are co-ordinated and that oil can make other non-oil areas develop. It was additionally found oil area adversely affects the assembling area. Granger causality test tracks down bidirectional causality among oil and assembling, oil and building and development, assembling and building and development, assembling and exchange and administrations, and agribusiness and building and development. It additionally affirms unidirectional causality from assembling to farming and exchange and administrations to oil. No causality was found among horticulture and oil, similarly between exchange and administrations and building and development. [Auwal and Mamman \(2012\)](#) explored the effect of the oil-based goods supply and homegrown costs on the homegrown circulation utilizing the Vector Autoregression (VAR) model and Ordinary Least Square (OLS) assessment to notice the reliance as well as the effect of the factors on each other. The investigation discovered that on account of their non-zero coefficients. Given the slacked and dynamic long-run harmony, locally refined and costs of oil-based goods stayed harsh toward the amount appropriated, while the imported amount, however with a low coefficient and feeble relationship, stayed the vital method of supply that is as of now supporting the economy. [Ibeh \(2013\)](#) examined the effect of the oil business on the monetary development execution of Nigeria. Applying ordinary least square (OLS) regression technique to Gross Domestic Product (GDP), against oil Revenue (OREV) and time. A two-tailed test of 5% significant levels was conducted indicating that the two explanatory variables essentially affected the development execution of the Nigerian economy inside a similar period. It was suggested that the administration ought to form a fitting approach blend that would inspire the firm in the oil area to upgrade further developed execution and commitment of the area. [Baghebo and Atima \(2013\)](#) in their review of the effect of Petroleum on monetary development in Nigeria for the period 1980-2011, involved an econometric methodology in assessing the connection between oil trade, unfamiliar direct speculation, debasement record, outer obligation, and the Nigerian financial development. The fixed status of the time series information was analyzed utilizing the Augmented Dickey-Fuller test. The Johansen co-ordination test was directed to determine the long-run balance state of the factors in the model. The investigation discovered that FDI affected emphatically and fundamentally Real GDP with a coefficient of 50.15043, which suggests that a unit change in FDI brings about a 50.15043 expansion in GDP. The Parsimonious model was laid out to represent the short-run dynamic changes expected for stable long-run balance. [Awujola and Adams, Alumbu \(2014\)](#) examined the effect of oil exportation on

the financial development in Nigeria. The result obtained shows that there is a long-run connection between the response variable and the explanatory variables. [Eravwoke, Alobari, and Ukavwe \(2014\)](#) utilized the normal least squares regression technique, Augmented Dickey-Fuller unit root, co-integration test, and the short-run elements to analyze the impact of raw petroleum send out on the Nigerian economy. The investigation discovered that there was a reverse connection between unrefined petroleum sends out on financial development in the Nigerian economy, given the coefficient of - 2.115947, which is genuinely huge with an at-worth of 3.623380. This suggests that unrefined petroleum trades are a critical variable that can change the development of an economy. The investigation additionally discovered that there was a critical connection between unrefined petroleum products in the Nigerian economy. [Kawai \(2017\)](#) examined the influence of non-oil export in Nigeria on the production base of crude oil in the Nigerian economy as the major source of foreign exchange. Findings indicated that there exists a strong presence of a co-integration association between non-oil export and the rate of change in the level of Nigerian economic growth. Data on oil production from the year 1960-2010 was applied by [Nwoba and Abah \(2017\)](#) to investigate the effect of crude oil production on Nigeria's economy. The study discovered that a positive long-run relationship exists between oil production and Nigeria's economy. [Olayungbo and Olayemi \(2018\)](#) studied the long-run relationship between the Nigerian government spending, non-oil revenue, and economic growth from 1981 to 2015. It was discovered from the long-run analysis that a substantial relationship existed between non-oil revenue and economic growth and a contrary relationship was discovered between fiscal spending and economic growth, the causal test showed that fiscal spending causes a change in economic growth and non-oil revenue. [Ugwo, Umeh & Ochuba \(2019\)](#) studied the impact of crude oil export on economic growth in Nigeria and examine the relationship between crude oil export and economic growth in Nigeria. They concluded that there is a 32% (thirty-two percent) positive impact of crude oil export on economic performance in Nigeria. [Ogunbiyi and Abina \(2019\)](#) investigated the role oil and non-oil revenue play in the development process in Nigeria. The study made use of Descriptive Statistics, Augmented Dickey-Fuller Unit Root test, Johansen Cointegration, and Error Correction Estimates. The error correction estimates result showed that oil revenue has a negative but significant relationship with the human development index, the negative contribution arose as a result of the resource curse ideology while non-oil revenue has a positive but insignificant relationship with the human development index. [Maijama'a and Musa \(2020\)](#) examined the impact of crude oil fluctuation on the rate of unemployment in Nigeria using data from 1991 to 2018 and employed VECM. The outcome from the VECM estimation revealed that population and economic growths were positive and significantly associated with unemployment while crude oil price and electricity consumption have a significant negative sign with unemployment in the long-run but in the short-run

only population growth was significant and positively signed with unemployment.

Musa et al. (2020) investigates the impact of crude oil price on the exchange rate in Nigeria using an autoregressive distributed lag (ARDL) model covering the period from 1983- to 2017. The results showed that crude oil price has a negative and significant impact on the exchange rate in both the long run and the short run whereas oil revenue and Gross Domestic Products have a significant positive impact on the exchange rate also in both the long run and the short-run periods. Ighosewe, Akan and Agbogun, (2021) examined the effect of Crude Oil Fluctuation and the Nigerian economy. Using Auto-Regressive Distributed Lag Model (ARDL) and Pearson Correlation coefficient, they discovered that a strong positive association exists between the regressed and the regressors. Particularly, the individual results restated that in the short run only Fluctuation in Oil Price per Barrel (FOBP) improved the Nigerian economy significantly. However, in the long run, both Fluctuation in Oil Price per Barrel (FOBP) and Kerosene Pump Price Fluctuation (KPPF) improve the Nigerian economy significantly.

**Materials and Methods**

**Source of Data**

The data utilized in this study was extracted from the Nigerian Bureau of Statistics and the Central Bank of Nigeria Statistical Bulletin (CBN, 2020). It is the dataset on oil revenue, non-oil revenue, oil price volatility, and per capita income for the period of fourteen years (14) years from 2006 to 2020.

**Model Specification**

This study set out to investigate the influence of oil revenue on the Nigerian economic growth, to achieve this objective, the study utilized Gross Domestic Product (GDP), Gross National Product (GNP), and Per Capita Income (PCI) as the dependent variables while the response variables are Oil Revenue (ORV), Non-oil Revenue (NRV) and Oil Price Volatility (OPV). The linear relationship between the variables is described by the model;

$$ECG = (GDP + GNP + PCI) \tag{1}$$

$$GDP = \beta_0 + \beta_1ORV + \beta_2OPV + \beta_3NRV + ut \tag{2}$$

$$GNP = \beta_0 + \beta_1ORV + \beta_2OPV + \beta_3NRV + ut \tag{3}$$

$$PCI = \beta_0 + \beta_1ORV + \beta_2OPV + \beta_3NRV + ut \tag{4}$$

Where:

ECG = Economic Growth

GDP = Gross Domestic Product

GNP = Gross National Product

PCY = Per Capita Income

ORV = Oil Revenue

OPV = Oil Price Volatility

NRV = Non-Oil Revenue

B0 is the constant coefficients.

$\beta_1 - \beta_3$  are the predictor variables,  $ut$  = error term.

Equations (1) to (4) show the structure of the Vector Autoregression (VAR) technique utilized in the study to show the linear interdependencies among the variables. All the variables are treated symmetrically; each variable has an equation explaining its evolution based on its lags and the lags of all the other variables present in the models.

**Results**

**Descriptive Statistics**

Table 1 presents the descriptive statistics result of crude oil price (in million dollars), production, and crude oil export. The result indicated that; crude oil price ranges between the smallest value of 14.28 and the largest value of 138.74, with a median value of 73.18. The Table also shows the descriptive statistics for the data, with the mean crude oil price 77.151 and the standard deviation 26.82258, as well as the crude oil price, ranging between the minimum value of 14.28 and the maximum value of 138.74. While crude oil production has a mean of 2.124389 and a standard deviation of 0.240156, it is observed that crude oil production runs from a low of 1.42 to a high of 2.88, with a median of 2.14. and the mean of crude oil exportation is 1.674389 and the standard deviation 0.240156, it is observed that crude oil exportation ranges between the lowest value of 0.97 and the greatest value of 2.43 with a median value of 1.69.

**Table 1. Descriptive Statistics of Crude oil, Production, and Export**

Statistics	crude oil price	Production	Crude Oil Export
Sum	13887.18	382.39	301.39
Mean	77.151	2.124389	1.674389
Standard deviation	26.82258	0.240156	0.240156
Variance	719.4509	0.057675	0.057675
Minimum	14.28	1.42	0.97
Maximum	138.74	2.88	2.43
Median	73.18	2.14	1.69

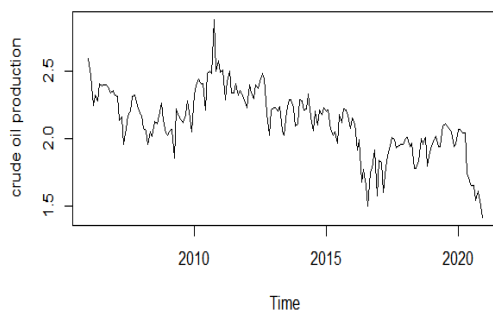
**Time Series Plots of Crude oil, Production, and Export in Nigeria**

price of crude oil in Nigeria



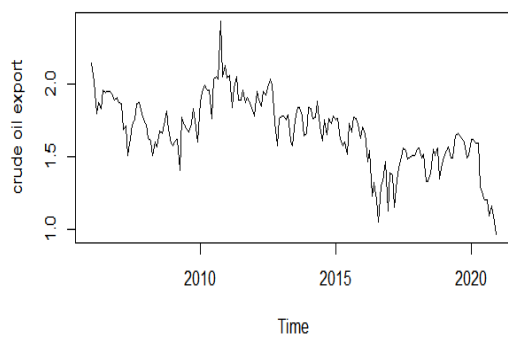
**Fig. 1 Plot of Crude oil price in Nigeria**

crude oil production in Nigeria



**Fig. 2 Plot of Crude oil production in Nigeria**

Nigeria crude oil exportation

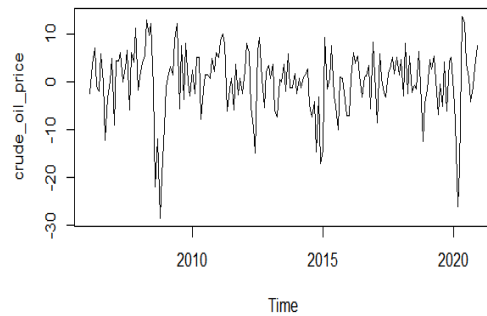


**Fig. 3 Plot of Crude oil Exportation in Nigeria**

Fig. 1, 2, and 3 presents the crude oil prices, production, and export quantities in Nigeria from 2010 to 2020, the data did not appear to be stationary, which implies that differencing is required.

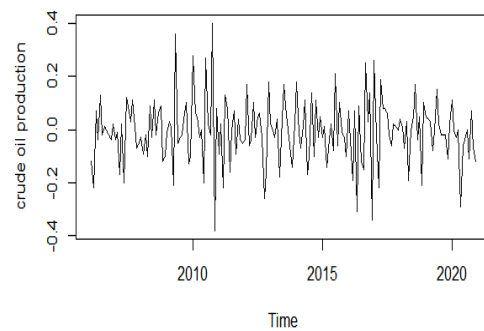
**Plot of First Differencing of Crude oil, Production, and Export in Nigeria**

price of crude oil in Nigeria



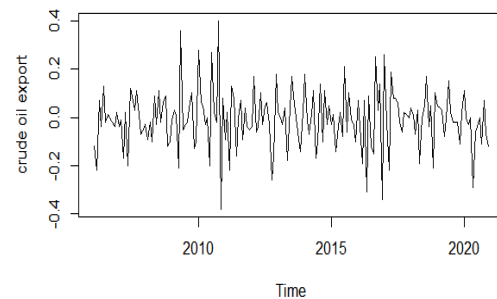
**Fig. 4 Plot of First Difference of Crude Oil Price**

crude oil production in Nigeria



**Fig. 5 Plot of First Difference of Crude Oil Production**

Nigeria crude oil exportation



**Fig. 6 Plot of First Difference of Crude Oil exportation**

The plots presented in Fig. 4, 5, and 6 indicate that with a constant mean, variance, and auto covariance the differenced

data on crude oil price, production, and export are now stationary.

**Unit Root Test**

Since ARDL is sensitive to a dataset that are I (2), this study considers it necessary to start by testing the variables for their order of integration. ARDL is applicable when the variables are purely I (1) or a mixture of I(0) and I(1). The study used Augmented Dickey-Fuller (ADF) technique to probe for stationarity of the variables and the findings are presented in Table 2 below. The result of the Augmented Dickey-Fuller (ADF) test shows that the p-value is less than 0.05, the p-value for crude oil price at the first difference is 0.01, the result of the crude oil production is 0.01 at the first difference and the p-value for crude oil export is 0.01 at first difference which is all lower than 0.05 level of significance, hence we conclude that all our variables are stationary at the order I (1).

**Table 2. ADF Test**

Variables	t-statistics	p-value
Crude oil price	-5.7802	0.01
Crude oil production	-7.3372	0.01
Crude oil Export	-7.3372	0.01

**ARDL Test**

The ARDL models are estimated by simple least squares, all the views and the procedures available to equation objects estimated by least squares are also available for ARDL models. The model selected is ARDL (2,2,2), there are 3 lags used for the dependent variable, 3 for the first independent variable, 3 lags of the second independent variable. The result above also presents the long-run association between crude oil price and its explanatory variables. The results show that all the lag of crude oil price is associated with a decrease in growth. If crude oil price (-1) increases by one percent crude oil price will increase by 0.35978 percent. If Crude oil price at lag 2 i.e. crude oil price(-2) increases by one percent crude oil price will decrease by 0.01350, A one percent increase in crude oil production will reduce crude oil price by 6.9194, all the past value of crude oil production will reduce the price of crude oil. The value of crude oil exportation is not defined because of singularities. From the p-value column, only the first lag of crude oil price is seen to be statistically significant.

**Table 3. ARDL Test**

	Coefficient	Std. Error	t-statistics	Pr(> t )
(Intercept)	-0.14199	0.49419	-0.287	0.774
L1 (Crude Oil Price)	0.35978	0.07646	4.705	5.21e-06 ***

L2 (Crude Oil Price)	-0.01350	0.07607	-0.177	0.859
L1(Crude Oil Production)	-7.50781	4.59853	-1.633	0.104
L2(Crude Oil Production)	-4.19810	4.37575	-0.959	0.339
L1(Crude Oil Export)	-6.91949	4.40596	-1.570	0.118
L1(Crude Oil Export)	-5.40230	4.11653	-0.9435	0.327

Signif. codes: 0 ‘\*\*\*’ 0.001 ‘\*\*’ 0.01 ‘\*’ 0.05 ‘.’ 0.1 ‘ ’ 1

Residual standard error: 6.541 on 171 degrees of freedom

Multiple R-squared: 0.1499,

Adjusted R-squared: 0.1251

F-statistic: 6.032 on 5 and 171 DF,

p-value: 3.615e-05

H<sub>0</sub>: Possible cointegration

H<sub>1</sub>: no possible cointegration

The ARDL bound test provided in Table 4 shows that the absolute value of T-statistics value of 7.5824 is bigger than the 1 bound value at a significance of 5%, and the p-value is statistically significant i.e. p-value = 0.000001, p < 0.05, we conclude that there is cointegration among the variables, which implies that there exist a long-run relationship between the variables as the value of the computed T-statistics is above the upper bound at -7.5824.

**Table 4. ARDL Bound Test**

T- statistics	Lower-bound I(0)	Upper-bound I(1)	p-value
-7.5824	-3.43	-4.10	1e-06

**Conclusion and Discussion**

The focus of this research is the investigation of the influence of crude oil on the economic growth of Nigerian. The result from the ADF test indicates that the entire dataset were stationary. The descriptive statistics analyzed showed the mean of crude oil price 77.151 and the standard deviation 26.82258, and the crude oil price, ranges between the smallest value of 14.28 and the biggest value of 138.74. While crude oil production has a mean of 2.124389 and a standard deviation of 0.240156, it is also discovered that crude oil production runs from a low of 1.42 to a high of 2.88, with a median of 2.14. and the mean of crude oil exportation is 1.674389 and the standard deviation 0.240156, it is observed that crude oil exportation ranges between the smallest value of 0.97 and the largest value of 2.43 with a

median value of 1.69. The model selected is ARDL (2,2,2) meaning that three lags were used as the response variable, three for the first independent variable and three lags of the second independent variable. The findings show that all the lag of crude oil price is associated with a decrease in economic growth. If crude oil price increase by one percent crude oil price will increase by 0.35978 percent. If Crude oil price at lag 2 i.e. crude oil price (-2) increases by one percent crude oil price will decrease by 0.01350. In finding is in line with (Babalola et al, 2018) whose study discovered that government revenue declined as a result of the impact of the world oil price shock. It was also observed that, for every one percent increase in crude oil production, there will be a reduction in crude oil price by 6.9194 and a reduction in economic growth. These findings contravene the findings from (Kornonen and Juurikkala, 2007) and Ighosewe, Akan, and Agbogun (2021) whose findings show that when the crude oil price is high it increases the real national income through higher export and fluctuation in oil price per barrel improved the Nigeria economy.

The findings from the analysis show that oil revenue plays an important role in Nigeria's economy through its contribution to GDP. Furthermore, Nigeria has managed oil revenue to achieve economic growth on all fronts. The data collected and analyzed showed that Nigeria has saved in a fund to diversify investment in product portfolios. Nigeria has also saved to smoothing expenditure process without much borrowing and has saved for infrastructural development. It can be concluded that in reality, Nigeria lacked the basic key capabilities presence of weak political and democratic institutions which have encouraged the institutionalization of bad governance, corruption, and outright disregard for the rule of law to manage oil revenues to attain the desired economic growth. Based on the above findings and conclusions, the study recommended the following:

The Nigerian Government ought to enhance its commodity export through downstream creation, this will upgrade the refined petrol for trades.

The government ought to empower more privately owned business interest. So that better-prepared refineries can be created and the expense of refining unrefined petroleum will decrease.

Security ought to be helped on the high ocean where unrefined petroleum items are being smuggled. This will assist with diminishing the unlawful export of unrefined petroleum product.

Government should concentrate entirely on the indigenes of the area where raw petroleum is being removed from. This will lessen the unrest from that area.

Government create an organization that will guarantee that the global oil companies are socially responsible to their host communities.

Government should discourage corruption by creating ministries that will captured and arraign corrupt public officeholders. There is an earnest requirement for Nigeria to diversify its commodity market, particularly the oil market.

## Conflict of Interest

The author hereby declares no conflict of interest.

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