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Article

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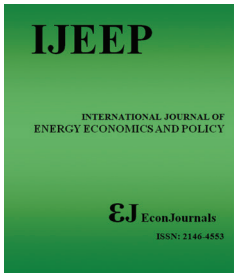

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Oil Revenue and Sustainable Economic Growth in Nigeria: Empirical Analysis

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ABSTRACT

In this study, the nexus between the generated oil revenue in Nigeria from 1981 to 2021 and its possible influences on the relative growth of the economy on a sustainable basis has been investigated. Utilizing the Johansen Co-Integration test, Granger Causality Technique as well as the Error Corrections Mechanism (ECM) to analyze the sourced data from both the World Development Indicators and the Nigeria Central Bank. The findings depict the occurrence of a long-run connection amongst the variables of the study as both the eigenvalue test and trace test depict two and three cointegrating equations respectively at a 5% level of significance. 34.8% of short-run errors are rectified annually, according to the error correction mechanism. As a result, the coefficient reflects the rate of adjustment at which the RGDP's short and long runs are tied together. Further findings reveal that economic growth (RGDP) granger caused oil revenue (OREV) and that the generated oil revenue in Nigeria (OREV) granger caused economic growth (RGDP) during the study period. This suggests that the generated oil revenue in Nigeria (OREV) and economic growth (RGDP) relationship is causally bidirectional. This study, therefore, recommends the creation and efficient implementation of policies that facilitate prudent identification, collection and utilization of the generated oil income and adequate deployment to critical underdeveloped and developing sectors of the economy.

Keywords: Economic Growth, Revenue, Oil Revenue, Nigeria
JEL Classifications: H27, H26, O40, O43

1. INTRODUCTION

The foundation of Nigerian economy's was built on the agricultural sector. The agricultural sector serve as a vital engine that propel the entire economy before oil was discovered, generating over 60% of employment opportunities, 95% of foreign exchange revenues, and around 56% of GDP (Akinleye et al., 2021). Most of Nigeria's exports were made up of these products, which included cocoa, palm oil, cotton, groundnuts, lumber, and rubber. Nigeria's economy was based primarily on agriculture at the time with less prospect for the oil exportation. Nweze and Edame, (2016) and Oladipo and Fabayo, (2012) claims that Nigeria's economy was primarily rural and reliant on agriculture for income with merely 0.07% of the gross domestic product's contribution from petroleum between 1958 and 1969.

However, the petroleum industry in Nigeria overtook all other sectors when significant quantities of oil were discovered. From 1970, generated oil revenue constituted 90% of the gross nation's income and foreign exchange which significantly increased the gross domestic product. Onshore exploration, which is primarily concentrated in the Niger Delta's swampy regions, produces around 65% of total oil production. The remaining 35% is derived from offshore production, which includes oil drilling in the deep continental shelf waters. As a result of the Middle East War in 1973, Nigeria had an extraordinary, unforeseeable, and unanticipated rise in wealth, which prompted a radical change in policy to make sure a comprehensive approach of determining the oil sector's standing benchmark (Efanga et al., 2020; Ogunmakin et al., 2014). Nigeria's oil production capacity, according to projections by The Nigerian National Petroleum Corporation (NNPC), was 2 million

barrels per day as of 2020, however, it dropped to its low point of 1.14 million barrels per day in January 2021. The possibility for oil market volatility has therefore been illustrated, and this could influence oil revenue. As of September 2022, the NNPC estimated that Nigeria consumed 66.8 million liters of petroleum per day. These numbers demonstrate that despite a decline in oil production in 2021, Nigeria's oil consumption rate is rising.

Akinleye et al. (2021) asserted that the oil price volatility globally has put the Nigerian state in very difficult position given that its consumption rate continues to increase as it ranks 37th in the world in terms of oil consumption while its production capacity continues to decline year on year. This current trajectory might have resulted from the global shocks brought on by the COVID-19 pandemic and the recent Russian-Ukrainian war, which decreased the oil supply. Many observers are worried about Nigeria's economy's future due to the oil market's instability and the nation's total reliance on it. For Nigerian to meet it various financial obligation, there is urgent need to source for alternative foreign exchange to keep the economy buoyant particularly with the drive toward green economy by oil importing nation (Igberaese, 2013). Given the significant oil revenue in Nigeria, it is expected that net wealth would have been created resulting in more avenue for expanding domestic investment. However, Nigeria is currently plagued with a double-digit rate of inflation and unemployment, low agricultural and manufacturing output as well as absent of critical infrastructure which has resulted in lower per capital income compare to other oil producing nations.

Despite the recent crude oil theft, which has lowered production capacity, it is not certain whether the relative economic growth in Nigeria over the years is directly attributable to the generated oil revenue or by other relevant drivers of the economy. On the other hand, it is still not established whether the relative growth in the Nigerian economy has resulted in increased or decrease oil revenue generated over the years. Given the above dilemma, this study is justified by investigating the linkage between the generated oil revenue in Nigeria and relative growth in the economy on a sustainable basis.

2. CONCEPTUAL, THEORECTICAL AND EMPIRICAL REVIEW

Oil revenue denotes receipts accruing from various crude oil transaction. In Nigeria, oil accounts for around 90% of all exports, or about 80% of all government revenues, making it the main source of income for the government (National Bureau of Statistics, 2020). Oil has dominated Nigeria's economy ever since it was discovered in the early 1970s. To (Budina and van Wijnbergen, 2008; Farzanegan et al., 2021; Manasseh et al., 2022; Omodero and Ehikioya, 2020). The economic performance of most oil producing nations is often attributed to the volatility of earnings from the oil industry as compare to other sector.

In Nigeria, the Petroleum Profit Tax (PPT) constitute another sizable portion of its oil revenue. The Petroleum Profit Tax Act (1959), as amended, oversees the administering of the PPT. The PPT is levied in Nigeria on the profits of oil-producing corporations to fund the government. The purpose of the petroleum profit tax, to put it simply, is to raise money to improve the welfare of a nation's citizens, with a particular emphasis on providing basic amenities and improving public services thereby fostering economic growth and development (Adefolake and Omodero, 2022; Akhanolu et al., 2014; Inimino et al., 2020; Matthew and Adegboye, 2014). Ebimobowei and Ebiringa, (2012); and Pibowei, (2021) made the case that the goals of the petroleum profit tax are to increase government revenue, generate employment, and regulate the economy and economic activity. Since the oil industry in Nigeria is considered to be the backbone of the economy, In terms of revenue share, PPT is one of Nigeria's largest taxes revenue which constitutes over 70% of the aggregate foreign exchange earnings of the government (Abdul-Rahamoh and Adejare, 2013; Igbasan, 2017; Ojukwu and Odoemelam, 2020).

The gross domestic product (GDP) periodically reflects the monetary estimation of the worth of services rendered and products manufactured within a country geographical jurisdiction. As an absolute and broad measure, GDP depicts the Financial and Economic performance of a nation at any relevant period of assessment. It is mostly computed net of capital consumption and presented either in nominal term or real term (inflation adjusted). The real GDP is adopted to represent sustainable economic growth for this study.

Theoretically, Solow, (1956) and Mincer (1958) who developed the standard classical and neoclassical growth models asserting that increased capital and labor inputs automatically propels economic growth. These models do not consider non-economic elements like human capital or health. According to this concept, capital, including technology, increases worker productivity and efficiency and boosts overall production of products and services. This basically indicates that technological advancement is "exogenous" to the system. The Solow, (1956) model of the neo-classical growth theory placed emphasis on the idea that economic growth results from the physical capital accumulation and an increase in the productivity of labor. Furthermore, the resource endowment theory of growth advocates that countries should continuously specialize to manufacture and internationally trade goods and rendered services in accordance with their comparative advantages over one another. David Ricardo (1817) and Adam Smith (1776) elucidated both comparative and absolute cost advantage respectively as cited by Ruffin (2002) and Schumacher (2012). According to the principle of comparative advantage, a nation can outperform rival nations economically by manufacturing goods that are in high demand or are simple to create at a lower overall cost while other respective trading countries are expected to adopt the strategy of concentrating on producing a good at which they excel with minimal effort and cost. Given the abundant of oil reserve in Nigeria compare to other non-oil producing nations, both the Solow growth theory and the resource endowment growth theory adequately depict the Nigeria situation given the existence of global free trade, relative specialization and disaggregation of labor.

2.1. Empirical Review

The relative contribution of oil revenue towards the growth and development of most oil base economy has been widely

researched. Nevertheless, various empirics have birthed differing findings about the nature, degree of impact and direction of the association between receipts from oil transaction and development in respective countries economy over the years. With some indicating reverse causality and others supporting direct causality and a long-term relationship, others no causality and no long-term relationship, and others leading to insignificant outcome, necessitating further research on the subject. Some of the recent empirical reviews are as follow.

Nweze and Edame, (2016) analyzed the growth of Nigeria's economy and oil income empirically between 1981 and 2014. They utilized both the Johansen Cointegration Techniques and the Error Correction Mechanism (ECM). In their investigation, a long-term association amongst the variables of the study was discovered using the three cointegrating equations (s). All variables, except for the lag in government expenditure which significantly influence economic growth during the study period. They did advocate increased investment of oil revenue in other domestic industries including manufacturing and agriculture to diversify the economy's sources of income and broaden its base of tax revenue. Olayungbo and Adediran, (2017) utilized the Autoregressive Distributive Lag technique (ARDL) to investigated how oil revenues and institutional strength affected economic growth. Their findings reflect a long-run connection between the generated oil revenue within the study period, corruption, and relative economic growth.

Asagunla and Agbede, (2018) examined how oil revenues affected Nigeria's economic growth. Engaging the Ordinary Least Square (OLS) method analytical tool. They discovered that oil receipts have no immediate effect on Nigeria's economy. The policy's long-term impact, however, gave it an authentic level because it was found that Nigeria's economy will eventually develop as oil revenues continue to rise. According to the report, to lower the rate of insufficiency and support production growth, the government should use the oil revenue wisely and effectively in strategic projects. Omitogun et al. (2018) examined the connection between Nigerian economic growth and volatility in the price of oil receipts. Autoregressive Distributive Lag (ARDL) was used in the study as an analytical method. According to the study, economic growth is positively correlated with the consumer price index, oil, and exchange rates over the long term, but it is inversely correlated with oil revenue. The inflation and foreign exchange rate had a short-term negative association with growth in the economy. Furthermore, short-term growth in the economy showed a strong positive link with oil prices and revenue during the study period. Olayungbo, (2019) studied the impact of oil income on Nigeria's economic growth from 1970 to 2015 using the Bayesian time-varying parameters as analytical tools, the findings reveals that the Nigeria's economy grew greatly and favorably throughout the period under consideration due to the utilization oil revenue. Obaretin et al. (2019) utilized the Ordinary Least Square (OLS) estimation techniques to investigate the relative influences on Nigeria's economic growth due to the utilization of the petroleum profit tax collected between 1994 and 2015. The study findings discovered that, Nigeria's economy was positively and substantially influenced by petroleum profit tax and foreign direct investment.

Fossong et al. (2021) investigated how oil and non-oil earnings affects Cameroon's economic growth. The study employed the Autoregressive Distributive Lag (ARDL). Gross domestic product (GDP), revenue from oil and other sources, gross capital creation, and general government spending all have a long-term relationship. The findings also showed that the long-term effects on economic growth were positive and significant. However, the findings demonstrated that when the two revenue streams interacted, non-oil and oil revenue were both competitive in terms of long-term economic growth. To prevent income leakages brought on by financial theft, the study recommended that public policy interventions strengthen their revenue collecting process through stringent implementation and appropriate monitoring of the oil agency. Additionally, it also advocated for improvement in the manufacturing and agricultural sectors.

Onifade et al. (2020) examined the linkages between revenue from oil transaction, rate of inflation, and growth of the Nigerian economy. Utilizing both the Granger Causality test, and Autoregressive Distributive Lag (ARDL) as analytical methods for the investigation. The findings reported a positive and substantial interaction amongst the study variables. The Granger causality test also offered supplementary proof of the linkage between oil revenue generated during the study period and changes in monetary policy and growth. They recommended aggressive diversification plans to lessen the nation's heavy reliance on oil revenues while the monetary authorities closely monitor and control the monetary environment to effectively limit the effects of inflation and promote sustainable growth over the long term.

Mohammed et al. (2020) reported that government spending from oil revenue favorably influences economic growth through the expansion of the banking sector in Nigeria. The study also discovered absent of significant impact on stock market growth. The study also showed that while stock market development was unaffected by private investment in oil revenue, it had a detrimental impact on the development of the banking industry for about 83 oil-producing countries between the study period of 1990 to 2015. Akinleye et al. (2021) engaged the Autoregressive Distributive Lag (ARDL) approach to assess how oil revenue affected Nigeria's economic growth. Their findings depict that economic growth and oil revenue are directly correlated, whereas taxes on petroleum profits, the rate of inflation, and the exchange negatively influence growth in economy between the study period of 1981-2018. They recommended that all loopholes in the collection of oil revenue should be eliminated to guarantee that revenues are directed in the proper manner for the advancement of the economy as well as deliberate drives towards a non-oil dependable economy through relevant sectorial diversification.

Ebimobowei, (2022) examined the connection between oil revenue and Nigeria's economic expansion. Pearson Moment Correlation technique and Multiple Regression techniques were engaged as analytical tool. The study discovered a substantial and negative association between revenue from oil and gas transaction and Nigeria's GDP on the other hand, substantial and positive connection between taxation from petroleum profit and Nigeria's GDP. And a negligible and unfavorable relationship between oil licensing fees and Nigeria's real GDP. According to the study, the

government should use the oil budget for strategic development projects in an effective and efficient manner.

From the above, (Asagunla and Agbede, 2018; Obaretin et al., 2019; Nweze and Edame, 2016; Olayungbo, 2019; Olayungbo and Adediran, 2017) all reported a positive and long-run association between oil revenue and economic growth in Nigeria while others such as (Akinleye et al., 2021; Ebimobowei, 2022; Omitogun et al., 2018) reported a contrary association between revenue generated from crude oil transaction and growth in the economy. The overall findings from these studies are that the outcomes have been inconsistent including contradictory data set, sample periods, methodology, estimating approaches, variables employed, and nations taken into consideration (developed or developing) prompting additional studies in this field. This study therefore incorporates variables form the real sector (manufacturing output), fiscal sector (government expenditure), monetary sector (interest rate), and the external sector (exchange rate), and the main variable, which is oil revenue so as to improve the robustness of the model.

3. METHODOLOGY AND DATA

The theoretical foundation for this study is the Cobb-Douglas aggregate production function as derived from the Solow neoclassical growth model, which is depicted below,

$$Y = K^{\alpha} (AL)^{(1-\alpha)} \quad (3.1)$$

Y denotes gross domestic product, capital (human and physical) stock is represented by K, L denotes labor, and A represent technology which is needed to harness labor productivity:

3.1. Model Specification

To achieve the study objective of investigating the nature and direction of association between the generated revenue from oil crude oil transaction in Nigeria and growth in the economy during the period of 1981-2021. The model of Akinleye et al. (2021) has been adopted and modified by incorporating the real sector (manufacturing industry), the external sector (exchange rate), the monetary sector (interest rate), and the fiscal sector (government expenditure) as well as variables for oil revenue and petroleum profit tax so as to ascertain the level of impact of each sector on economic growth while taking Nigeria's oil revenue into account. In (3.2), the econometric function is thus written as follows:

$$RGDP = F (OREV, PPT, MANU, EXR, INTR, GOVEX) \quad (3.2)$$

Equation (3.2) is transformed and expressed in log-linear form function to include the stochastic error term as:

$$LOGRGDP_t=\beta_0+\beta_1 LOGOREV_t+\beta_2 LOGPPT_t+\beta_3 LOGMANU_t+\beta_4 LOGEXR_t+\beta_5 LOGINTR_t+\beta_6 LOGGOVEX_t+\mu_t \quad (3.3)$$

Where;
RGDP = Real Gross Domestic Product
F = Functional notation
PPT = Petroleum Profit Tax
MANU = Manufacturing Output

Table 1: Unit root test

Variable	ADF test	1% critical level (**)	5% critical level (*)	Order of integration
RGDP	−10.35835	−3.610453	−2.938987	I (1)
OREV	−6.541852	−3.610453	−2.9389 87	I (1)
MANU	−7.146920	−3.610453	−2.938987	I (1)
EXR	−3.862278	−3.610453	−2.938987	I (1)
INTR	−6.635954	−3.615588	−2.941145	I (1)
GOVEX	−3.299117	−3.661661	−2.960411	I (1)

Source: Authors' computation using (2022)

Table 2: Trace

Hypothesized No. of CE (s)	Eigenvalue	Trace statistic	0.05 critical value	Prob**
None*	0.779372	121.3102	95.75366	0.0003
At most 1*	0.531039	62.37030	69.81889	0.0019
At most 2*	0.374541	32.83811	47.85613	0.0008
At most 3	0.224941	14.53660	29.79707	0.8092
At most 4	0.101330	4.598776	15.49471	0.8499
At most 5	0.011016	0.432023	3.841466	0.5110

Source: Author's computation (2022) Trace test specifies 3 cointegrating eqn (s) at the 0.05 level

Table 3: Maximum eigenvalue

Hypothesized No. of CE (s)	Eigenvalue	Max-eigen statistic	0.05 critical value	Prob**
None*	0.779372	58.93988	40.07757	0.0001
At most 1*	0.531039	29.53220	33.87687	0.0014
At most 2	0.374541	18.30151	27.58434	0.4702
At most 3	0.224941	9.937823	21.13162	0.7505
At most 4	0.101330	4.166753	14.26460	0.8414
At most 5	0.011016	0.432023	3.841466	0.5110

Source: Author's computation (2022). Max-eigenvalue test indicates 2 cointegrating eqn (s) at the 0.05 level

Table 4: Error correction mechanism test

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	13.52465	6.035980	2.240672	0.0319
OREV	0.000211	0.000579	0.363998	0.0182
MANU	−0.607674	0.287485	−2.113758	0.0422
EXR	0.021915	0.018615	1.177259	0.2475
INTR	−0.104787	0.281640	−0.372061	0.7122
GOVEX	−0.001530	0.000754	−2.029783	0.0505
ECM (−1)	0.348063	0.144712	2.405206	0.0219
R^2	0.639382	Durbin-Watson stat		2.312775
Adj. R^2	0.537451			
F-stat.	4.310595			
Prob (F-stat.)	0.002575			

Source: Author's computation (2022)

EXR = Exchange Rate
INTR = Interest Rate
GOVEX = Government Expenditure
μ_t = Stochastic error term
t = Subscript t

While β_0, β_1, β_2, β_3, β_4, β_5 and β_6 are the parameters.

3.2. Priori Expectations

The following are the a priori expectations:

$\beta_1 > 0, \beta_2 >, \beta_3 > 0, \beta_4 > 0, \beta_5 > 0$, and $\beta_6 > 0$

Table 5: Pairwise granger causality tests

Direction of causality	OBS	No. of lag	F-stat.	Prob.	Decision	Type of causality
(OREV)→ (RGDP)	39	2	0.70838	0.0248	Reject H0	Bi-directional causality
(RGDP)→ (OREV)	39	2	0.56589	0.0031	Reject H0	Bi-directional causality

Source: Author's computation (2022)

3.3. Data Sources and Estimation Technique

This study utilized time data obtained from both the World Development Indicators and the Central Bank of Nigeria Statistical Bulletin covering the study period of 1981-2021. The Augmented Dickey-Fuller (ADF) technique is been utilized to conduct the unit root test for all variables of the study so as to determine the stationarity at various differencing order and the appropriate analytical estimation techniques to achieve the objective of this study. The Johansen Co-Integration technique is utilized to ascertain the nature of connection between the study variables while the Error Corrections Mechanism is utilized to link variables short-run behavior to their long-run values and to address the short-run disequilibrium among variables. The Granger Causality Techniques is engaged to establish the direction of causal connection amongst variables of the study.

4. RESULTS AND DISCUSSION

4.1. Unit Root Test

The study initially put the data through a stationarity test via the Augmented Dickey-Fuller (ADF) techniques to prevent spurious regressions result commonly associated with time series data. Table 1 shows the data series' stationarity state:

As shown in Table 1, According to the result of the ADF unit root test, all the study variables for this investigation were stationary at the first difference order of integration. This report passes our criteria for performing the co-integration Johansen test (Table 2).

4.2. Johansen Cointegration Test

The maximum eigenvalue test found two co-integrating equations at a 5% level of significance, while the trace test found three co-integrating equations (Table 3). The investigation consequently came to the consensus that the model contains a long-run link based on the co-integration result. As a result, the study rejects the null hypothesis and concludes that Nigeria's economic growth and oil revenue are related over the long term. Consequently, it is necessary to do an error correction test (ECM).

4.3. Error Correction Mechanism (ECM) Result

Short-term variations are made possible by the occurrence of a long run co-integrating equilibrium. As previously mentioned, the ECM aims to link the co-integrating equations' short-run dynamics to their long-run stationary dispositions. The outcome of the error correcting procedure is shown in Table 4.

The outcome demonstrates that the ECM coefficient is 0.34806. This shows that 34.8% of short-term errors are fixed annually. As a result, the coefficient reflects the rate of adjustment at which the RGDP's short and long runs are tied together. The result is noteworthy since the error correction variable (ECM) is positive multiple of (13.52465) which is greater than zero, indicating that there has been feedback from the disequilibrium of the previous year. Simply looking at the individual parameters reveals that while some of the study variables, such as RGDP, oil revenue (OREV), and manufacturing output (MANU), were significant because their P-values were <5% level of significance, other variables, such as exchange rate (EXR), interest rate (INTR), and government expenditure (GOVEX), were not because their P-values were greater than significance level of 5%. The outcome is consistent with the a priori anticipation that oil revenue (OREV) will not be negative.

4.4. Pairwise Granger Causality Tests

The result of Table 5 showed that the oil revenue (OREV) granger caused economic growth (RGDP) and economic growth (RGDP) granger caused oil revenue (OREV). This suggests the existence of a bidirectional causation of oil revenue (OREV) and economic growth (RGDP) in Nigeria during the study period. The implication of this result is that historical variation in oil revenue (OREV) can be utilized to forecast future variations of growth in the economy (RGDP). Concurrently, historical variation of growth in the Nigerian economy (RGDP) can also be used to predict the future variation in oil revenue (OREV). It follows therefore that the performance of oil revenue influences to a large extent relative growth in Nigeria economy and the performance of growth in the economy influences to a large extent oil revenue in Nigeria during the study period.

5. CONCLUSION AND RECOMMENDATIONS

Due to the unique position that petroleum profit tax holds in the Nigerian revenue basket, this study was an attempt to examine the effect of revenue generated from crude oil transaction on sustainable economic growth in Nigeria from 1981 to 2021. Both the ADF, Johansen co-integration technique, error correction mechanism, and Granger causality technique were engaged to achieve the study objectives.

From the study findings, it can be concluded that the oil revenue generated in Nigeria have a long-term link with the growth in the economy during the study period according to the Johansen co-integration test and a bidirectional association according to the Granger causality result (RGDP). Therefore, to boost Nigeria's economic growth, the government must create proper regulations that would permit better and more prudent use of oil income. Additionally, inefficiencies in the collection of oil income need to be overcome to guarantee that funds are efficiently directed toward the expansion of the economy. The government should also take a substantial move toward harnessing other critical non-oil sector. The study has contributed to knowledge by capturing variables from the real sector (manufacturing output), the external sector

(exchange rate), the monetary sector (interest rate), and the fiscal sector (government expenditure) so as to ascertain the role of each sector towards sustainable economic growth.

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