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EFFECT OF OIL REVENUE AND NON-OIL REVENUE ON AGRICULTURAL OUTPUT IN NIGERIA

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Abstract

This study investigates the effect of oil revenue and non-oil revenue on agricultural output in Nigeria. The study employs regression analysis using Ordinary Least Squares (OLS) to examine agricultural output and oil revenue (LGOILR) as well as non-oil revenue (LGNOILR). The regression analysis reveals that oil revenue has a statistically significant positive impact on agricultural output, indicating that increases in oil revenue are associated with corresponding increases in agricultural productivity. However, non-oil revenue does not exhibit a significant direct effect on agricultural output. The study also confirms the presence of stationarity in the variables after first differencing and the absence of heteroskedasticity in the residuals. Based on the findings, policymakers are to prioritize strategies that promote stability and growth in the oil sector while effectively channeling benefits from oil revenue to support agricultural development. Investments in agricultural infrastructure, research, extension services, and market access are recommended to enhance productivity and resilience in the agricultural sector.

Keywords: Agricultural Output, Oil Revenue, Non-Oil Revenue, Agricultural Infrastructure

1. Introduction

Agriculture remains a pivotal sector in Nigeria's economy, contributing significantly to GDP, employment, and food security. Over the years, the Nigerian government has implemented various fiscal policy measures aiming at stimulating growth and development within the agricultural sector. Fiscal policy, a crucial tool wielded by governments, plays a significant role in shaping economic outcomes. In the context of Nigeria, a country with a predominantly agrarian economy, the effect of oil revenue and non-oil revenue on agricultural output is of paramount importance (Aliyu & Elijah, 2019).

In Nigeria, various policies have been formulated to realize these aforementioned roles. The policies also aim at strengthening the agricultural sector. Some of these policies include Operation Feed the Nation (OFN) in 1976, Green Revolution of 1980, Structural Adjustment Programme (SAP) in 1986, the Directorate of Foods, Roads and Rural Infrastructure (DFRRI) in 1987, Better Life for Rural Women also in 1987, Rural Agro-Industrial Development Scheme (RAIDS) in 2001, National Economic Empowerment Development Strategy (NEEDS, SEEDS and LEEDS) of 2003, Land Use Decree of 1976 among others. Also, to effectively achieve and harness the potential of agriculture in Nigeria various governments and different levels have engaged in fiscal policy measures like expansionary fiscal policy, contractionary fiscal policy and balanced or neutral fiscal policy. Specifically, there are fiscal policy measures that are directly targeted at improving the agricultural sector in Nigeria like the establishment of the Nigeria Agricultural Co-operative and Rural Development Bank (NACRDB), National Economic and Reconstruction Fund (NERFUND), Small and Medium Enterprise Development Agency (SMEDA) and The Agriculture Transformation Agenda policy of

the past Government of Nigeria (2011-2015) expressed determination to end the era of food imports, particularly rice, and develop cassava and rice value chains to produce and add value to these selected products and create domestic and export markets for farmers. Also, the Nigerian New Agriculture Promotion Policy 2016 -2020 was established to determine what it offers and how it addresses the challenges that have stifled the growth of agriculture in Nigeria (Abdulhussain et al. 2022).

Despite these reforms and policies, Nigeria's agricultural sector still faced several problems which hindered the growth of the sector and also inhibited its potential to be fully realized. These problems include; inadequacies in the supply and delivery of farm inputs, shortage of working capital, low level of technology, diseases and pest infestation, poor post-harvest processing, poor storage facilities, inconsistent and poorly conceived government policies, problems of pests and diseases, negative attitude of people towards farming due to low reward, inadequate agricultural education and extensions, poor transportation, lack of credit facilities, irrigation problems, lack of investment, lack of basic infrastructure, inaccessibility to loan facilities due to high bank interest rates, inadequate fertilizers and farm implements, environment hazards, labour and land use constraints. Also, some scholars Zirra & Ezie (2017), Aina & Omojola (2017), and Oluwaseun et al. (2020) have argued that the contribution of the agricultural sector to the economy compared to other sectors has not been impressive for example, National Bureau Statistics estimates that the agricultural sector contributes about 25 percent to the GDP of the Nigerian economy while, 70 percent of Nigeria's labour force is employed in the agricultural sector (National Bureau Statistics, 2021). Therefore, the study seeks to examine the effect of oil revenue and non-oil revenue on agricultural output in Nigeria.

Nonetheless, recognizing the necessity for economic diversification and resilience, Nigeria has gradually sought to bolster non-oil revenue sources, with agriculture emerging as a key focus area. Non-oil revenue encompasses various sectors such as agriculture, manufacturing, services, and taxation. Among these, agriculture stands out as both a significant contributor to non-oil revenue and a sector with immense growth potential (Salisu & Haladu, 2021).

Tax policies also play a crucial role in shaping agricultural outcomes. Tax incentives, exemptions, and credits tailored to the agricultural sector can incentivize investment, innovation, and expansion, consequently fostering increased production and output Conversely, excessive taxation or inappropriate tax structures may burden farmers, diminish profitability, and hamper growth within the agricultural industry (Omonona & Babatunde, 2016).

Furthermore, subsidies and support programs can significantly influence agricultural output. Subsidies on inputs such as fertilizers, seeds, and machinery can lower production costs for farmers, incentivizing higher levels of production. Additionally, price support mechanisms implemented by the government can stabilize market prices, mitigate risks for farmers, and encourage investment in agricultural activities (World Bank 2020).

The dynamic between oil revenue and non-oil revenue is intricately linked to the efficacy of fiscal policy measures on agricultural output in Nigeria. Historically, windfalls from the oil sector have often led to neglect or underinvestment in other sectors, including agriculture. However, fluctuations in oil prices and revenue instability have underscored the necessity of diversification and resilience (Odusola, 2016).

Nevertheless, the interplay between oil revenue and non-oil revenue remains a critical factor shaping the effectiveness of fiscal policy measures on agricultural output. The volatility of oil prices and revenue poses challenges to sustainable long-term planning and investment in the agricultural sector. Moreover, the allocation of resources and attention towards agriculture may fluctuate in response to shifts in oil

revenue dynamics, highlighting the need for consistent and coherent fiscal policies that prioritize agricultural development. Therefore, the research questions this study tends to proffer an answer to are: How has oil revenue affected agricultural output in Nigeria? and What is the effect of non-oil revenue on agricultural output in Nigeria? Primarily, the objective of this research is to systematically examine the effect of fiscal policy measures on agricultural output in Nigeria. Specifically, the study aims to analyze the effect of oil revenue on agricultural output in Nigeria and the effect of non-oil revenue on agricultural output in Nigeria. To statistically answer the economic questions as stated above, the following null hypotheses are formulated: H_{01}: oil revenue has no significant effect on agricultural output in Nigeria and H_{02}: non-oil revenue has no significant effect on agricultural output in Nigeria. This study examined the effect of oil revenue, non-oil revenue on agricultural output in Nigeria, considering the country's heavy reliance on oil revenue and efforts to diversify the economy. By analyzing oil revenue and non-oil revenue such as government spending, taxation, and subsidies, the study provides an insight into how these revenue sources affect agricultural output.

2. Literature Review

2.1 Conceptual Issues

Concept of Agricultural Output

The concept of agricultural output refers to the quantity and quality of agricultural products or goods produced by farming activities within a given period and this is a measure of the total agricultural production and is often expressed in terms of the number of crops harvested or livestock raised. The conceptual framework for understanding agricultural output involves a multifaceted interplay of factors, ranging from climatic conditions and technological advancements to policy interventions and macroeconomic variables. Achieving sustainable growth in agricultural output is paramount for ensuring food security, alleviating rural poverty, and contributing to overall economic stability. Consequently, a nuanced exploration of the determinants and dynamics of agricultural output serves as the foundational underpinning for this study (Udeaja et al, 2021).

Concept of Oil Revenue

Oil revenue refers to the income generated by a country through the production, sale, and export of oil and petroleum-related products. Oil revenue is a significant source of income for many oil-producing countries and plays a crucial role in their economies. It can have both positive and negative impacts, depending on how it is managed and utilized (Adelegan et al., 2020). While Abbas et al., (2022) said that Oil revenue is derived from the extraction and production of crude oil or petroleum products. Countries with significant oil reserves and production capabilities can generate substantial revenue by selling oil on the global market. The amount of revenue generated is influenced by factors such as the quantity of oil produced, global oil prices, and production costs.

Oil revenue contributes to a country's government revenue through taxes, royalties, and other levies imposed on oil companies. Governments often establish fiscal regimes that determine the share of oil revenue that goes to the States. This revenue can be used to fund public services, infrastructure development, social welfare programs, and other government expenditures (Asagunla et al., 2018). However, Oil revenue can have a significant impact on the overall economy of an oil-producing country. It can contribute to economic growth, create job opportunities, and attract investment in related industries. However, heavy reliance on oil revenue can also lead to an economic phenomenon known as the "resource curse" or "Dutch disease," where excessive dependence on oil can hinder the development of other sectors, create economic imbalances, and increase vulnerability to oil price fluctuations (Ezu & Osakwe, 2019).

Concept of Non-Oil Revenue

Non-oil revenue refers to the income generated by a country through sources other than the production, sale, and export of oil and petroleum-related products.

It encompasses various sources of revenue, such as taxes, customs duties, fees, licenses, non-oil exports, and income from non-oil industries and sectors. Non-oil revenue is particularly important for countries that have limited or no significant oil production and for oil-producing countries aiming to diversify their economies (Akpokerere & Ekane, 2022).

Non-oil revenue is crucial for economic diversification, reducing reliance on volatile oil markets, and promoting sustainable and inclusive growth. Governments often aim to enhance non-oil revenue sources to fund public services, infrastructure development, social welfare programs, and other priority areas. Effective fiscal policies, tax reforms, investment in non-oil sectors, and sound governance are essential for maximizing non-oil revenue and achieving long-term economic stability and development (Omesi et al., (2020). Before the discovery of crude oil, the driver of the Nigerian economy was revenue from agriculture. Nigeria was one of the leading producers of certain agricultural products (Adeusi, et al., 2020).

2.2 Empirical Review

Popoola et al., (2022) examined the effect of oil price shock and agricultural productivity in Nigeria from 1981 – 2018. The data used for the study were obtained from World Development Indicator, World Bank and Central Bank of Nigeria Statistical Bulletin 2020. The variables are (AGP) Agricultural Productivity for dependent variable and (OIP) Oil price, (CPI) Consumer price index, (REX) Real exchange rate, (OPN) Oil production, (OEX) Oil export as the independent variables. The model used in this work is based on the Lewis Arthur development theory. Based on the unit root test, Johansen Cointegration was used to examine the long run. Evidence from the result shows that there is a long-run relationship in the model. The result of the normalized cointegration revealed that oil price has a negative impact on agricultural productivity in the long run. In contrast, consumer price index, oil production and oil export have positive impact on agricultural productivity in Nigeria. This study recommends that refining crude oil before exporting to other countries will reduce its price fluctuations in the economy, and this will reduce its adverse effect on agricultural productivity in Nigeria. The study under review examined the period from 1981 – 2018 while this study covered the period from 1990 – 2022.

Omodero and Ajetumobi (2022) examined the effect of direct taxes and agricultural finance from 2012 to 2021. Petroleum Profit Tax (PPT), Personal Income Tax (PIT), and Company Income Tax (CIT) are the direct taxes utilized as predictor variables in this study. The government's investment in agriculture (AGR) is the response variable. The data on PPT, PIT, and CIT were acquired from the online database of the Organization for Economic Cooperation and Development (OECD), while the statistics on AGR were gathered from the Central Bank of Nigeria's Statistical Bulletin. The study used multiple regression approach and Statistical Package for Social Sciences (SPSS). The findings have sparked a slew of policy debates on how to prioritize the use of tax resources. As a result of the findings, the study recommends that a large percentage of the direct taxes be earmarked for agricultural finance and this will allow for enough employment creation, an increase in adequate food supply, and the alleviation of poverty in the country. The study under review used Multiple regression approach, and Statistical Package for Social Sciences (SPSS) for data analysis, while this study used Ordinary Least Square (OLS) model for data analysis.

Omodero (2022) assess the impact of direct taxes on public investment in agriculture in Nigeria from 2010 to 2020. Petroleum profit tax (PPT), personal income tax (PIT), and corporate income tax (CIT) are the independent variables used in this study. The dependent variable is the government's investment in agriculture (AGR). The data on PPT, PIT, and CIT were collected from the OECD's online database, while the figures on AGR were obtained from the Central Bank of Nigeria's Statistical Bulletin. The study employed multiple regression method, and the significance level was set at 5%. The outcome

illustrates why direct tax income can aid agricultural growth. The conclusions of the study indicate that tax money has not been utilized to enhance agriculture. The study recommends that Nigeria's tax policy be enhanced and a significant portion of direct taxes be dedicated for agricultural funding. The study focused on investigating the Impact of Direct Taxes on Public Investment in Agriculture in Nigeria from 2010 to 2020, while this study investigated the effect of fiscal policy measures on Agricultural Output from 1990 to 2022.

Damankeshideh (2021) examined asymmetric effects of oil revenues and government facilities on Iran's agricultural economics. The variables used for the study are Value-Added of the Agricultural sector (VAgre) which is an index of agriculture growth while the explanatory variables affecting VA of agriculture sector in Iran included Oil Revenues (OILR), Exchange rate (EX), Government facilities given to agricultural sector (GF), Inflation Rate (INF), Fixed Capital of agriculture sector (K) and Employment Rate in the agriculture sector (L). The variables mentioned above were collected from primary data for the period 1981-2018. The study used Nonlinear Autoregressive Distributed Lag Model (NARDL) model to estimate long-term coefficients and error correction coefficient, as well as short-term coefficients. The obtained results indicated consistency between long-term coefficients of variables and theoretical foundations. However, study recommends that oil revenues must be managed well not investing in short term cases that cause inflation and unemployment in the agriculture sector The study under review used Value-Added of the Agricultural sector (VAgre) as dependent variable and Oil Revenues (OILR), Exchange rate (EX), Government facilities given to agricultural sector (GF), Inflation Rate (INF), Fixed Capital of agriculture sector (K) and Employment Rate in the agriculture sector (L) as independent variables, while this study used Agricultural Output in Nigeria (AGON) as the dependent variable, Oil Revenue in Nigeria (OILR) and Non-Oil Revenue in Nigeria (NOLR) as the independent variables.

Ammani and Abubakar (2021) investigated the relationship between oil revenue and the agricultural Sector in Nigeria. Time series data from 1981 - 2019 on aggregate oil revenue, agricultural sector GDP, crop production GDP, Livestock GDP, Forestry GDP and Fishing GDP were collected and used. The study used the Cointegrating Regression Durbin-Watson (CRDW) Test method as expounded by Gujarati (2003). Highlights of the findings of the study revealed a highly significant relationship between oil revenue and the performance of agricultural sector and the forestry sub-sector; highly significant inverse relationship between oil revenue and the performance of livestock sub-sector and no significant relationship between the oil revenue and the performance of the crop production and fishing sub-sectors in Nigeria over the study period. Based on the findings of this study it was recommended that the federal government should continue to vigorously pursue policies and programmes directed at the diversification of the Nigerian economy away from oil with a view towards expanding output from non-oil sectors like agriculture. The study under review covered the period from 1981 – 2019 while this study covered more recent period from 1990 – 2022.

Udeaja et al., (2021) investigated impact of non-tax incentives on agricultural sector output in Nigeria spanning the periods of 1981-2019. For the dependent variable, Agricultural Sector Output was adopted by the study. While the independent variables included Non-Tax Incentives and Government Expenditure on Agriculture. The study employed data from various governmental reports, agricultural databases, and relevant scholarly publications. The study utilized the Autoregressive Distributed Lag (ARDL) Model/Bounds test technique to examine the relationship between non-tax incentives, government expenditure on agriculture, and the output of the agricultural sector in Nigeria. Both the short-run and long-run impacts of the variables were evaluated to provide a comprehensive understanding of their effects. The empirical analysis yielded the following key findings, non-tax incentives were found to have a significant positive impact on the growth of the

agricultural sector in the long run. However, in the short run, the effect was observed to be negative and statistically insignificant. Government expenditure on agriculture exhibited a negative and significant impact on the growth of the agricultural sector in the short run, and its long-run impact was negative but not statistically significant. Based on the findings, the study recommends there should be a targeted expansion of non-tax incentives across the entire agricultural value chain in Nigeria to stimulate long-term growth in the sector and government should consider re-evaluating its current expenditure strategies on agriculture, with a focus on developing more effective and sustainable approaches to enhance the sector's output in both the short and long run. However, the study's scope was focused solely on the Nigerian context, limiting the generalizability of the findings to other countries or regions. Udeaja et al., (2021) investigated the period from 1981 – 2019, while this study reviewed more recent period from 1990 – 2022.

Ekwe and Nuhu (2020) examined petroleum profit tax revenue and agricultural development in Nigeria from 1985 to 2017. The study adopted the ex-post facto research design as data collected were sourced from relevant publications of the Central Bank of Nigeria statistical bulletins and the releases of the National Bureau of Statistics. The exogenous variable for the study is Revenue from Petroleum Profit Tax while the endogenous variable is government expenditure on agriculture serving as proxy for Agricultural Development. Simple Linear Regression was used to test the hypotheses. The result showed that petroleum profit tax has positive and significant effect on agriculture expenditure at the lag of 6 years. The study recommends that the attitude of Nigerians to taxation should be encouraged to grow into voluntary compliance to tax and government should endeavor to solve the current national problem of mono-economy by investing more funds into Agricultural programmes to further develop the sector. The study used Simple Linear Regression for data analysis while this study used Ordinary Least Square (OLS) for data analysis.

Michael and Denham (2020) examined the influence of petroleum profit tax revenue on agricultural development in Nigeria from 1985 to 2017. The exogenous variable for the study is Revenue from Petroleum Profit Tax while the endogenous variable is government expenditure on agriculture serving as proxy for Agricultural Development. The study adopted the ex-post facto research design as data collected were sourced from relevant publications of the Central Bank of Nigeria statistical bulletins and the releases of the National Bureau of Statistics. Simple Linear Regression was used to test the hypotheses. The result showed that petroleum profit tax has positive and significant effect on agriculture expenditure at the lag of 6 years. The regression result was strengthened by the residual outcomes which reflected r-squared of 73% and f-statistics that has probability of 1%. Based on the findings, the study recommends that the attitude of Nigerians to taxation should be encouraged and with the increase in VAT from 5% to 7.5%, more funds should be channeled into agricultural research and development for the ultimate benefit of the economy. The study examined one dependent variable and one independent variable, while this study examined one dependent variable and two independent variables

Oladipo et al., (2019) explored the impact of total tax revenue on agricultural performance in Nigeria. For the dependent Variable, Agricultural Output was assumed while the Independent Variables included Revenue obtained in the Agricultural Sector, Capital in Agricultural Sector (Proxy by Loan), Employment and Total Tax Revenue. The study utilized the Engel and Granger approach to cointegration to examine the long-run and short-run behavior between total tax revenue and agricultural performance in Nigeria. The empirical analysis revealed the following key findings, a positive and significant relationship was observed between revenue obtained in the agricultural sector, capital in the agricultural sector and agricultural output, both in the short and long run. Employment and total tax revenue were not found to be significant in the short run, while in the long run, employment, capital, and total revenue demonstrated statistically

significant relationships with agricultural output. The study recommends the incorporation of tax benefits to enhance agricultural performance and equally proposes a systemic approach that allocates a significant percentage of the total tax revenue generated to enhance the development of the agricultural sector, fostering its growth and resilience in the face of economic challenges. Oladipo et al., (2019) explored the Impact of Total Tax Revenue on Agricultural Performance in Nigeria using Agricultural Output as dependent variable and Revenue in Agricultural Sector, Capital in Agricultural Sector (Proxy by Loan), Employment and Total Tax Revenue as the independent variables, while this study used Agricultural Output in Nigeria (AGON) as the dependent variable, Oil Revenue in Nigeria (OILR) and Non-Oil Revenue in Nigeria (NOLR) as the independent variables.

Nivievskyi (2018) analyzed tax incentives and agricultural productivity growth in Ukraine. The study looked at how various tax incentives affected agricultural productivity growth in Ukraine over the period 1995-2014. The study used panel data from the Ukrainian State Statistics Service. The main variable is total factor productivity (TFP) growth rates, which are regressed on lagged tax benefits from the value added tax on agriculture (AgVAT) and fixed agricultural tax (FAT) systems, as well as a set of control variables including farm-specific characteristics (crop share, livestock production, and technical efficiency) and year dummies to account for differences in year-specific conditions. The study employs a two-stage estimation methodology. In the first stage, the authors calculate productivity growth using a Total Factor Productivity (TFP) index for each farm in the dataset. The study finds that tax incentives have a positive effect on agricultural productivity growth in Ukraine. Specifically, the study finds that the AgVAT system has a positive and significant effect on TFP growth rates, while the FAT system has a negative and significant effect on TFP growth rates. Tax exemptions positively affect agricultural TFP growth, but they turned out to be very cost-inefficient instrument of stimulating TFP growth in agriculture. Also tax exemptions strongly undermined efficiency and productivity convergence in agriculture. The result obtained from the review of the Ukraine study will be different from the result that will be obtained in this study since the variables used are different in nature.

2.3 Theoretical Framework

The Revenue Productivity Theory

The Revenue Productivity Theory, an enduring concept in public finance, explores the intricate relationship between tax rates and government revenue. Originating from the insights of economists spanning decades, it posits that there exists an optimal tax rate where tax revenue reaches its peak. Initially, as tax rates rise, revenue tends to increase as the government collects more from taxpayers. However, beyond a certain threshold, further tax rate hikes may lead to diminishing returns, as they could discourage economic activity, resulting in decreased taxable income and, consequently, lower overall tax revenue. Critics argue that the theory oversimplifies the complexities of tax policy, as the effects of taxation on economic behavior are multifaceted, and optimal tax rates may vary depending on numerous factors. Nevertheless, the theory remains pertinent in tax policy discussions, guiding policymakers in striking a balance between revenue generation and economic incentives while acknowledging the need for empirical evidence and nuanced analysis in policy formulation.

The Green Revolution Theory

The Green Revolution theory was championed primarily by American agronomist Norman Borlaug, who was awarded the Nobel Peace Prize in 1970 for his contributions. The theory emerged predominantly in the mid-20th century, gaining traction in the 1960s and 1970s. At its core, the Green Revolution theory proposed that agricultural productivity could be significantly increased through the adoption of high-yielding crop varieties, along with modern agricultural techniques such as the use of fertilizers, pesticides, and irrigation. The goal was to achieve greater food production to meet the growing demands of a rapidly increasing global population. Proponents argued that by introducing these technologies and practices,

farmers could produce more food on the same amount of land, thereby alleviating hunger, reducing poverty, and stimulating economic development in rural areas. However, the theory also faced significant criticism. Detractors pointed out that the Green Revolution often prioritized the needs of large-scale commercial agriculture over small-scale subsistence farming, leading to increased social and economic disparities. Additionally, the heavy reliance on chemical inputs raised environmental concerns, such as soil degradation, water pollution, and loss of biodiversity. Critics also highlighted the potential negative impacts on traditional farming practices and indigenous knowledge systems. Despite the criticisms, the Green Revolution had a profound impact on agricultural output, particularly in countries like India, Mexico, and the Philippines, where it led to substantial increases in crop yields. This increase in productivity helped to avert famines and improve food security in many parts of the world. However, the long-term sustainability of the Green Revolution model remains a subject of debate, as concerns persist about its environmental and social consequences, as well as its ability to address the challenges of a rapidly changing climate and growing population.

This study adopts the Green Revolution theory as it says increase in agricultural output leads to increase in revenue generation.

3. Methodology

This study employed an ex-post facto research design to investigate the relationship between oil revenue, non-oil revenue and agricultural output in Nigeria. Secondary data, sourced from Central Bank of Nigeria (CBN) and National Bureau of Statistics (NBS) was utilized for the study. The selected timeframe spanned from 1990 to 2022, which are annual time series data.

The study adopted and modified the model of the work of Oluwaseun et al., (2020) who examined the impact of fiscal policy on agricultural output in Nigeria and the functional model of the study was stated as:

$AGR_t = f(GEA_t, DBA_t, GCE_t)$ …. (1)

where: AGR is Agricultural output in Nigeria, GEA is the Government Capital Expenditure on Agriculture, DBA is the Deposit Money banks loan, GCE is the Government Capital Expenditure on Agriculture in Nigeria, and the subscript t denotes the period.

The model was modified to have the functional representation of the model for this study aimed to examine the effect of fiscal policy measures on agricultural output in Nigeria. The model specifies that Agricultural Output in Nigeria (AGON) being the dependent variable is significantly influenced by oil revenue (OILR) and Non-oil revenue (NOILR) constituting the independent variables.

Mathematically,

$AGON = f(OILR, NOILR)$…(2)

The econometric model becomes:

$LGAGON_t = \beta_0 + \beta_1 LGOILR_t + \beta_2 LGNOILR_t + \mu_t$ (3)

Where,

$LGAGON_t$ = Log of Agriculture Output in Nigeria

$LGOILR_t$ = Log of oil revenue in Nigeria

$LGNOILR_t$ = Log of non-oil revenue in Nigeria

β_0 = Intercept

$\beta_1 - \beta_2$ = Coefficient of the independent variables

μ = Error Term

Aligned with the study's research objectives, the Ordinary Least Squares (OLS) methodology was deployed to discern the intricate relationship between oil revenue, non-oil revenue and agricultural output in Nigeria.

4. Results and Discussion

Table 2: Descriptive Statistics

	AGON	OILR	NOILR
Mean	10375.43	1741.064	4396.703
Median	10222.47	785.3	3354.8
Maximum	19624.2	6397.1	41097

Minimum	3464.72	18.3	71.9
Std. Dev.	5612.149	1883.407	7085.943
Skewness	0.136507	1.040079	4.354346
Kurtosis	1.525871	3.117227	23.2389
Jarque-Bera	3.090442	5.968597	667.4999
Probability	0.213265	0.050575	0.0000
Sum	342389.3	57455.1	145091.2
Sum Sq. Dev.	1.01E+09	1.14E+08	1.61E+09
Observations	33	33	33

Source: Researcher's EViews computation, 2024

The descriptive statistics for agricultural output (AGON), oil revenue (OILR), and non-oil revenue (NOILR) in Nigeria offer valuable insights into their distribution and variability. On average, agricultural output stands at approximately 10,375.43, with a relatively symmetric distribution indicated by a median close to the mean. In contrast, oil revenue and non-oil revenue exhibit right-skewed distributions, with medians lower than their respective means, suggesting a concentration of lower values and potential outliers with higher values. Moreover, both oil revenue and non-oil revenue display considerable variability, as indicated by their high standard deviations. The positive skewness and kurtosis values for oil revenue and non-oil revenue signify their right-skewed distributions, with non-oil revenue displaying particularly pronounced skewness and kurtosis, indicating a heavily right-skewed and leptokurtic distribution with a heavy tail. These statistical insights provide a foundational understanding of the characteristics of agricultural output and revenue streams in Nigeria, laying the groundwork for further analysis to explore the relationships between these variables and assess the impact of fiscal policy measures on agricultural productivity.

Table 2: Correlation Analysis

	LGAGON	LGNOILR	LGOILR
LGAGON	1 -----		
LGNOILR	0.894582 0.0000	1 -----	
LGOILR	0.963182 0.0000	0.92273 0.0000	1 -----

Source: Researcher's EViews computation, 2024

The correlation analysis presented in Table 2 reveals the relationships between the logarithmically transformed variables: LGAGON (logarithm of Agricultural output), LGNOILR (logarithm of non-oil revenue), and LGOILR (logarithm of Oil revenue). LGAGON and LGNOILR exhibit a strong positive correlation of approximately 0.895, indicating that as agricultural output increases, non-oil revenue tends to increase as well. This relationship is statistically significant ($p < 0.05$). LGAGON and LGOILR display an even stronger positive correlation of approximately 0.963, suggesting a robust relationship between agricultural output and oil revenue. This correlation is also statistically significant ($p < 0.05$).

LGNOILR and LGOILR show a strong positive correlation of approximately 0.923, indicating that non-oil revenue and oil revenue tend to move together. This relationship is statistically significant ($p < 0.05$).

Table 3: ***Unit Root Test***

Variable	at levels			at 1st difference		
	t-statistic	5% level	p-value	t-statistic	5% level	p-value
LGAGON	-1.180693	-3.557759	0.8977	-5.085891	-3.562882	0.0014
LGOILR	-1.691773	-3.557759	0.7316	-8.503294	-3.562882	0.0000
LGNOILR	-2.558228	-3.557759	0.3004	-4.461051	-3.587527	0.0076

Source: Researcher's EViews computation, 2024

Table 3 presents the results of the unit root tests conducted on the variables LGAGON (logarithm of Agricultural output), LGOILR (logarithm of oil revenue), and LGNOILR (logarithm of non-oil revenue) to assess stationarity at levels and first differences. LGAGON, the t-statistic for the unit root test at levels (-1.180693) is greater than the critical value (-3.557759) at the 5% significance level, indicating that LGAGON is non-stationary at levels. However, after differencing once, the t-statistic (-5.085891) becomes less than the critical value (-3.562882), suggesting that LGAGON becomes stationary at the first difference with a high degree of statistical significance (p-value = 0.0014). LGOILR, at levels, the t-statistic (-1.691773) is greater than the critical value (-3.557759) at the 5% significance level, indicating non-stationarity. However, after differencing once, the t-statistic (-8.503294) is substantially lower than the critical value (-3.562882), indicating that LGOILR becomes stationary at the first difference with very high statistical significance (p-value = 0.0000). LGNOILR, similar to LGOILR, LGNOILR is non-stationary at levels, with a t-statistic (-2.558228) greater than the critical value (-3.557759) at the 5% significance level. After differencing once, the t-statistic (-4.461051) is lower than the critical value (-3.587527), indicating that LGNOILR becomes stationary at the first difference with statistical significance (p-value = 0.0076).

Table 4: F-Bounds Test

Test Statistic	Value	Signif.	I(0)	I(1)
F-statistic	5.409149	5%	2.72	3.83

Source: Researcher's EViews computation, 2024

Table 4 presented the nature of the relationship between the dependent variable and independent variables. Given the value of 5.40 which is greater than the lower bound I(0) 2.72 and the upper bound I(1) 3.83, this indicated a long-term relationship exist between the dependent variable and the independent variables.

Table 5:Variance Inflation Factors

Variable	Coefficient Variance	Uncentered VIF	Centered VIF
LGOILR	0.001975	97.87933	6.730833
LGNOILR	0.002556	165.4649	6.730833

Source: Researcher's EViews computation, 2024

Table 5 provides information on the Variance Inflation Factors (VIF) for each independent variable, which assesses multicollinearity in the regression model. Given the centered VIF for all variables are less than 10, as Lgoilr (6.73) and Lgnoilr (6.73), this indicates no presence of no multicollinearity.

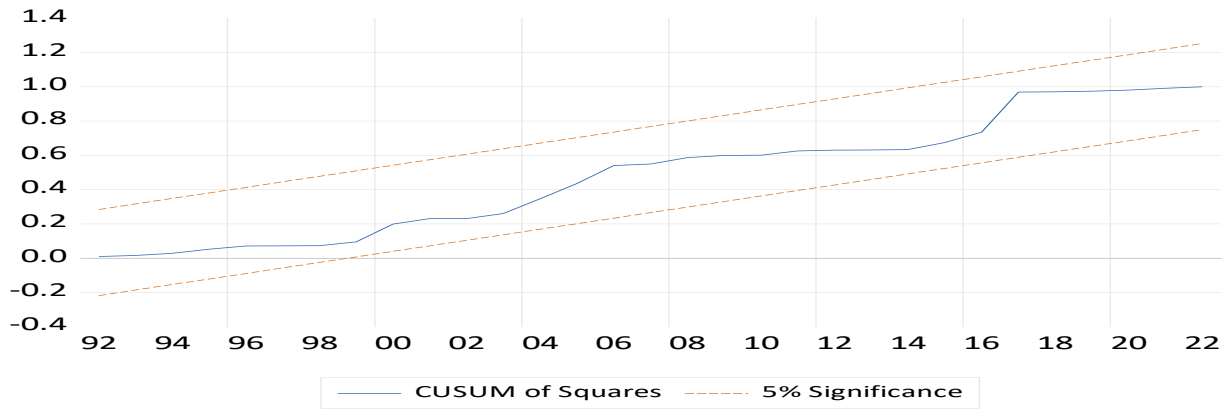

Fig 1 Cusum of Squares Test:
This shows the model is stable overtime with no evidence of structural break.
Source: Researcher's EViews Computation, 2024

Table 6: Regression Results

Dependent Variable: LGAGON				
Method: Least Squares				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	6.861998	0.161917	42.37967	0.0000
LGNOILR	0.015590	0.050554	0.308382	0.7599
LGOILR	0.324056	0.044446	7.290916	0.0000
R-squared	0.927947			
Adjusted R-squared	0.923144			
Durbin-Watson stat	2.564191			

Source: Researcher's EViews Computation, 2024

The regression results indicate the relationship between the dependent variable LGAGON (logarithm of Agricultural output) and the independent variables LGNOILR (logarithm of non-oil revenue) and LGOILR (logarithm of Oil revenue). LGNOILR has a coefficient of approximately 0.016 with a standard error of 0.051 and a t-statistic of 0.308, suggesting that the coefficient is not statistically significant at conventional levels (p-value > 0.05). This indicates that changes in non-oil revenue are not significantly associated with changes in agricultural output in this model. LGOILR has a coefficient of approximately 0.324 with a standard error of 0.044 and a t-statistic of 7.291, indicating that the coefficient is highly statistically significant (p-value < 0.0001). This suggests that changes in oil revenue are significantly associated with changes in agricultural output, with a positive relationship between the two variables. The R-squared value of 0.928 indicates that approximately 92.8% of the variability in LGAGON can be explained by the independent variables LGNOILR and LGOILR in the model. The adjusted R-squared value, which adjusts for the number of predictors in the model, is slightly lower at 0.923. The Durbin-Watson statistic of 2.564 suggests that there is no significant autocorrelation present in the residuals of the regression model. Overall, the regression results suggest that oil revenue (LGOILR) has a significant positive effect on agricultural output (LGAGON) in Nigeria, while non-oil revenue (LGNOILR) does not have a significant association with agricultural output in this model.

Table 7: Heteroskedasticity Test: Breusch-Pagan-Godfrey

Null hypothesis: Homoskedasticity			
F-statistic	2.617929	Prob. F(2,30)	0.0895
Obs*R-squared	4.903622	Prob. Chi-Square(2)	0.0861
Scaled explained SS	6.227234	Prob. Chi-Square(2)	0.0444

Source: Researcher's EViews Computation, 2024

The ObsR-squared statistic is 4.904 with a probability value (Prob. Chi-Square) of 0.0861. This statistic is based on the residuals' squared values and their relationship with the independent variables. Similar to the F-statistic, the ObsR-squared statistic is not statistically significant at the 5% significance level, suggesting no strong evidence against the null hypothesis of homoskedasticity based on this statistic.

4.1 Discussion of Findings

Hypothesis Statement

H_{01}: Oil revenue has no significant effect on agricultural output in Nigeria.

From the OLS output, the coefficient for LGOILR is 0.324 with a standard error of 0.044 and a t-statistic of 7.291 with associated p-value of < 0.0001. Since the p-value is less than the significance level (commonly set at 0.05), we reject the null hypothesis. Therefore, we have sufficient evidence to conclude that oil revenue has a significant effect on agricultural output in Nigeria.

H_{02}: Non-oil revenue has no significant impact on agricultural output in Nigeria.

From the OLS output, the coefficient for LGNOILR is 0.0156 with a standard error of 0.0506 and a t-statistic of 0.308 with associated p-value of 0.7599. Since the p-value is greater than the significance level (0.05), we fail to reject the null hypothesis. Therefore, we do not have sufficient evidence to conclude that non-oil revenue has a significant effect on agricultural output in Nigeria.

5. Conclusion and Recommendations

The analysis of the independent variables, oil revenue (LGOILR) and non-oil revenue (LGNOILR), reveals distinct patterns regarding their effect on agricultural output (LGAGON) in Nigeria. Oil revenue is found to have a statistically significant positive effect on agricultural output, as indicated by the regression coefficient (0.324, $p < 0.0001$). Conversely, non-oil revenue does not exhibit a significant association with agricultural output, as the regression coefficient is not statistically significant (0.016, $p = 0.7599$).

Oil revenue plays a crucial role in influencing agricultural output in Nigeria, with increases in oil revenue associated with corresponding increases in agricultural productivity. This underscores the significant effect of oil revenue dynamics on the agricultural sector's performance. On the other hand, non-oil revenue does not appear to have a significant direct effect on agricultural output, suggesting that other factors or mechanisms may be driving agricultural productivity beyond revenue from non-oil sources.

Given the effect of oil revenue on agricultural output, policymakers should prioritize strategies that promote stability and growth in the oil sector while also ensuring that benefits from oil revenue are effectively channeled into supporting agricultural development. This may involve targeted investments in agricultural infrastructure, research and development, extension services, and market access to enhance productivity and resilience in the agricultural sector.

Efforts to diversify revenue sources beyond oil should continue, with a focus on policies that foster sustainable growth and innovation in non-oil sectors to complement the contributions of the agricultural sector to Nigeria's economy.

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APPENDIX I

YEAR	Agriculture Output in Nigeria (**AGON**)	Oil Revenue in Nigeria **(OILR)**	Non-Oil Revenue in Nigeria **(NOILR)**
1990	3464.72	26.2	71.9
1991	3590.84	18.3	82.7
1992	3674.79	26.4	164.1
1993	3743.67	30.7	162.1
1994	3839.68	41.7	160.2
1995	3977.34	135.4	324.5
1996	4133.55	114.8	408.8
1997	4305.68	166.0	416.8
1998	4475.24	139.3	324.3
1999	4703.64	224.8	724.4
2000	4840.97	314.5	1591.7
2001	5023.54	524.1	1707.6
2002	7817.08	501.0	1230.9
2003	8364.83	500.8	2074.3
2004	8888.59	565.7	3354.8
2005	9516.99	785.3	4762.4
2006	10222.5	677.5	5287.6
2007	10958.5	1264.6	4462.9
2008	11645.4	1336.0	6530.6
2009	12330.3	1652.7	3191.9
2010	13048.9	1907.6	5396.1
2011	13429.4	2237.9	8879.0
2012	14329.7	2628.8	8026.0
2013	14750.5	2950.6	6809.2
2014	15380.4	3275.0	6793.8
2015	15952.2	3082.4	3830.1
2016	16607.3	2922.5	2693.9
2017	17179.5	3335.1	4109.7
2018	17544.2	4005.9	5545.8
2019	17938.6	4725.7	5536.7
2020	18348.2	4543.6	4732.5
2021	18738.4	6397.1	4358.3
2022	19624.2	6397.1	4358.3

Sources: *Industrial and foreign trade data in CBN Statistical Bulletin, 2022*