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Diversification of the Nigerian Economy; The Interplay Between Agricultural Output and Non-Oil Export

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Abstract

This study examined diversification of the Nigerian economy: the interplay between agricultural output and non-oil export in Nigeria for the period of 1981-2021. Annual time series data were sourced from world development indicators (WDI) and Central Bank of Nigeria (CBN). Autoregressive and distributed lag (ARDL) model was employed in the study. This paper examines the trends in Nigeria's agricultural output from 1981 to 2021, highlighting phases of moderate to rapid growth driven by policy reforms and increased government focus. However, it also identifies persistent structural challenges that continue to limit the sector's productivity and potential. The study underscores the critical role agriculture can play in Nigeria's economic diversification, particularly in reducing dependence on crude oil, which currently accounts for over 90% of foreign exchange earnings. The paper argues that without significant public and private investment in modernizing agriculture and integrating it into global value chains, the sector will remain unable to meet rising domestic and international demand or support long-term sustainable development. Strategic policy interventions, increased budgetary allocations, and technological adoption are essential for transforming Nigeria's agricultural landscape and achieving inclusive economic growth.
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Keywords: Diversification, Agricultural output, and Non oil Export
JEL Classification:

1.0 Introduction

In Sub-Saharan Africa (SSA), agriculture has been the major key factor to output growth, poverty reduction and food security. According to Schaffnit-Chatterjee (2014), the sector is important to the region's economies as it generates an average of 25% of the gross domestic product (GDP) and much more in many countries. The Food and Agriculture Organization (FAO) noted that the growth in agriculture between 1999 and 2009 was responsible for half of the employment in SSA. The author further suggests that developing the sector in some SSA countries like Nigeria and Angola (over-reliance on oil) is key to diversification of economic activities in these nations. The SSA has been the only region who failed to improve agricultural productivity owing to several factors such as lack of investment, infrastructural decay, unfavourable price policies, insecure land tenure and weak institutions Schaffnit-Chatterjee, (2014). Despite all these challenges, agriculture remains the mainstay of Sub Saharan African countries including Nigeria.

Nigeria is endowed with huge expanse of fertile land, rivers, streams, lakes, forests and grasslands, as well as a large active population that can sustain highly productive and profitable agricultural sector which can ensure self-sufficiency in food and raw materials for the industrial sector and as well provide gainful employment for the teeming population. The reverse is the case despite the resource endowment of the country. Several factors account for the poor performance of the agricultural sector in Nigeria. These include virtual neglect of the sector, poor access to modern inputs and technology, and lack of optimum credit supply. Aside the problem of poor access to modern technology, the major bane of agricultural development in Nigeria is low investment finance.

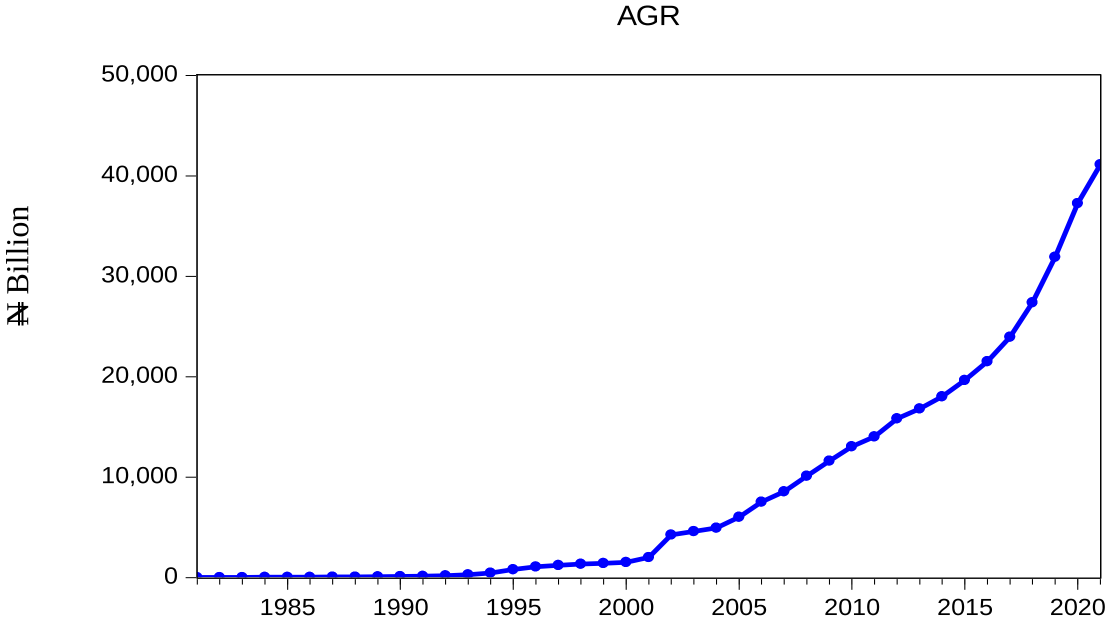

Figure 1.1: Trend of Agricultural output in Nigeria.

Source: Author's computation (E-views, 10) 2024

The agricultural output data for Nigeria, spanning from 1981 to 2021, reveals several significant trends and patterns. From 1981 to 1997, the country experienced consistent but moderate growth in agricultural production. Starting at 17.05 in 1981, the output gradually increased to 1,211.46 in 1997. This period of growth reflects sustained efforts in agricultural development, potentially supported by government interventions, technological advancements, and improving market conditions. However, despite the overall upward trajectory, there were fluctuations, possibly influenced by factors such as weather variations and economic shifts.

In the subsequent years from 1998 to 2009, Nigeria witnessed further expansion in agricultural output, albeit with occasional fluctuations. Despite facing challenges like political instability and economic downturns, the agricultural sector maintained a growth trajectory. Notably, there were periods of rapid growth, especially in the early 2000s, where output nearly doubled within a few years. This period likely saw continued investments in agriculture, policy reforms, and increasing focus on food security, all contributing to the sector's resilience and expansion.

From 2010 to 2021, Nigeria experienced a significant acceleration in agricultural production, marking a robust growth phase. During this period, output more than tripled, reaching 41,126.06 in 2021. This remarkable growth underscores the country's efforts to prioritize agriculture as a key driver of economic development. The government's initiatives, such as agricultural transformation programs, improved access to finance and technology, and increased mechanization, likely played pivotal roles in fostering such substantial growth. Additionally, rising domestic and international demand for agricultural products may have incentivized farmers to enhance productivity, contributing to the overall surge in output.

1.2 Statement of The Research Problem

Nigeria's economy has historically been heavily reliant on crude oil exports, with oil accounting for over 90% of foreign exchange earnings and more than 60% of total government revenue

(CBN, 2023). This over-dependence on a single commodity has made the economy highly vulnerable to external shocks, such as fluctuations in global oil prices. For instance, the collapse of oil prices in 2014-2015 pushed the economy into a recession, highlighting the risks associated with Nigeria's oil dependency (IMF, 2016). Despite efforts to diversify the economy, such as the establishment of various diversification initiatives and the Economic Recovery and Growth Plan (ERGP) in 2017, oil still dominates the economic landscape. This heavy reliance on oil revenue has limited the growth and resilience of other sectors, including agriculture, manufacturing, and services, which are critical for achieving sustainable long-term economic growth and reducing vulnerability to external price shocks.

Agriculture, once the dominant sector in Nigeria's economy, has the potential to significantly contribute to economic diversification. However, agricultural output has remained stagnant, with the sector contributing about 24% to Nigeria's GDP in 2022, down from over 40% in the 1960s (National Bureau of Statistics, 2022). Despite Nigeria's vast arable land and the employment of over 60% of the population in agriculture (World Bank, 2021), the sector faces challenges including outdated farming practices, poor infrastructure, limited access to credit, and vulnerability to climate change. In addition, government investments in the sector remain insufficient, with the Nigerian government allocating only 3.2% of its budget to agriculture, well below the 10% recommended by the African Union (Nigeria's Ministry of Finance, 2020). As a result, agricultural productivity has not kept pace with the population's needs or global demand, which hinders its potential to drive economic growth and serve as a backbone for economic diversification. To fully harness agriculture's potential, the country needs to implement policies that increase productivity, modernize the sector, and integrate it into global markets.

1.3 Research Question

The following main research question will guide the research process:

i. What is the impact agricultural output on non-oil export in Nigeria?
ii. Is there long-run relationship between agricultural output and non-oil export in Nigeria?

1.4 Objectives of the Study

The main objective of this study is to examine the interplay between agricultural output and non-oil export in Nigeria.

The specific objectives are:

i. To investigate the impact of agricultural output on Non-oil Export in Nigeria.
ii. To find out the long-run relationship between agricultural output and non-oil export in Nigeria.

2.0 Literature Review

2.1 Conceptual Review

2.1.1 Concept of Agricultural Output

Agriculture is the art and science of crop and livestock production. In its broadest sense, agriculture comprises the entire range of technologies associated with the production of useful products from plants and animals, including soil cultivation, crop and livestock management, and the activities of processing and marketing. The term agribusiness has been coined to include all the technologies that mesh in the total inputs and outputs of the farming sector. In this light, agriculture encompasses the whole range of economic activities involved in manufacturing and distributing the industrial inputs used in farming: the farm production of crops, animals and animal products, the processing of these materials into finished products and the provision of products at a time and place demanded by consumers, (Ishola et al. 2013).

According Aminu and Anono (2012), Agriculture involves the cultivation of land, raising and animals, for the purpose of production of food for man, feed for animals and raw materials for industries. It involves forestry, fishing, processing and marketing of these agricultural products. Essential, it is composed of crop production, livestock, forestry, and fishing. The role of agriculture in reforming both the social and economic framework of an economy cannot be over emphasized. It is a source of food and raw materials for the industrial sector. It is also essential for the expansion of employment opportunity, for reduction of poverty and improvement of income contribution, for speeding up industrialization and easing the pressure on balance of payment. In effect, it has the main source of gainful employment, which the nation can feed its teeming population, a regenerative source of foreign exchange earnings, a means of providing the nation's industries with local raw materials and a reliable source of government revenue.

Development economists have focused on how agriculture can best contribute to overall growth and modernization. The physiocrats laid more emphasis on agriculture in the development of an economy. In their views, the development of an economy depends on the growth of the agricultural sector. The source of national wealth is essentially agriculture. The physiocrats believe that the fate of the economy is regulated by productivity in agriculture and its surplus is diffused throughout the system in a network of transactions. The agricultural sector to the physiocrats is the only genuinely productive sector of the economy and the generator of surplus upon which all depends.

2.1.2 Concept of Non-Oil Export

Prior to the 1970s, agricultural exports were Nigeria's main sources of foreign exchange. During this period, Nigeria was a major exporter of cocoa, palm oil, palm kernel, groundnuts and rubber, and in the 1950s and 1960s, 3%-4% annual output growth rates for agricultural and food crops were achieved. Government revenues also depended heavily on taxes on those exports. Thus, during the period, the current account and fiscal balances depended on the agricultural sector. As early as the 1970s, the government saw the need to diversify its export base and therefore established various agencies (The Nigerian Export Promotion Council, Export Incentives and Miscellaneous Provisions Decree No. 18 of 1986 and Nigerian Export-Import (NEXIM) Bank) and put various policies in place to improve the economic situation in the country by increasing the share of non-oil products in total exports (Adesoji and Sotubo, 2013). Onayemi and Akintoye (2009) opined that export trade is an instrument for economic growth. this is because, it increases foreign exchange earnings, improves balance of payment position, creates employment and development of export oriented industries in the agricultural sector, manufacturing sector and solid mineral sector thereby improves government revenue through taxes, levies and tariffs. These benefits will in turn enhance the process of growth and development in an economy.

2.2 Theoretical Review

2.2.1 Structural Change Theory

The Structural Change Theory was developed by Arthur Lewis in the year 1954. It is a very systematic theory of economic development with unlimited supply of labour. This model considers the dualism between the agricultural/traditional sector and the industrial/modern sector in developing countries; not only do these sectors use different technologies (combinations of capital and labor) but also they differ in institutions. Like the classical economists, Lewis believes that in many underdeveloped countries supply of labour is available at a subsistence wage.

The specific question Lewis pondered was rather simple, at least by hindsight. This is how could a capital-poor country with an underutilized labor force kickstart a growth process that would eventually lead to a structural transformation, i.e., a robust industrialization drive? Given the large reservoir of unemployed and underemployed labor, the answer seems to be simple and direct. The solution lies in mobilizing and reallocating surplus labor toward the more productive and primarily urban based activities. The challenge, of course, is to explain the process by which such factor reallocation-driven growth takes place in an 'infant' market economy. Lewis shared the dominant view of his day that the accumulation of physical capital is the primary constraint on productivity-driven growth. A key feature of the Lewis model is the presence of some barriers that prevent, or slow down, the allocation of low-productivity workers away from the subsistence or traditional service sectors to the more dynamic commercial or industrial sectors.

Empirical foundations for the two-sector labor-surplus model shows that empirically across all countries as income grows, the share of workers in agriculture decreases and the share of workers in industry increases. There is a large gap between the value of output of workers in industry and in agriculture. In some countries (like Benin republic) income in the informal sector is larger than income in peasant agriculture; the income gap is even greater in the formal sector (mining, government, etc.). Average income for the economy rises as portions of the labor force get more capital to use. The extended version of the theory added that the full benefits of agricultural growth cannot be realized unless government support systems are created that provide the necessary incentives, economic opportunities and most importantly access to needed inputs to enable small farmers to expand their output and raise their productivity.

2.2.2 Reliable Livestock Theory

Chamber and Conway (1991) further developed the reliable livestock theory for capabilities, which encompasses capital and other social inputs as well as other farming activities needed for a means of living. It further stated that the theory forecasted that increased output can only be obtained by ensuring secured ownership of, or access to capital inputs and income earning activities such as; reserves and assets to offset risk ease stocks and meet contingencies as well as improvement and maintenance of productive resources on a long term basis. Therefore, raising agricultural productivity (good output) is not just food affordability but the effort to produce food and obtain more income on a long term basis by farmers. In order have a successful attainment in agricultural productivity, the economic development theory emphasised that a technical, institutional and financial supports in terms of incentives needed to boost productivity level of peasant small holder farmers (Orok and Ayim (2017). They further added that an effort to raise the economic development of agricultural activities, financial scheme act dual function of increasing the purchasing power and making inputs available for industrial development in any given country.

2.3 Empirical Review

Oyinbo and Rekwot (2014) provide an empirical information on the relationship between agricultural production and the growth of Nigerian economy with focus on poverty reduction.

Time series data were employed in this research and the analyses of the data were done using unit root tests and the bounds (ARDL) testing approach to cointegration. The result of the data analysis indicated that agricultural production was significant in influencing the favourable trend of economic growth in Nigeria. Despite the growth of the Nigerian economy, poverty is still on the increase and this calls for a shift from monolithic oil-based economy to a more plural one with agriculture being the lead sector. It was recommended that pro poor policies should be designed for alleviating rural poverty through increased investments in agricultural development by the public and private sector.

Adams O. Kemi (2016) Determine the relationship between diversification into agricultural production and economic development in Nigeria; the study have shown that there exists a positive relationship between economic growth in Nigeria and diversification into the agricultural sector. Descriptive statistical method and correlation analysis were employed in this paper. This paper however, attempted to seek out how diversification of the economy will enhance stable and viable economic growth in Nigeria. The study therefore recommends that Government should promote foreign private investment, Upgrade all basic infrastructures, Introduce mechanized system of agriculture to increase productivity and revive all the agricultural research institutes.

Adams Oluwadamilola Kemi (2016) studied the diversification of the Nigeria economy through Agricultural production with the aim to attain a solid economic growth. These studies have shown that there exists a positive relationship between economic growth in Nigeria and diversification into the agricultural sector. Descriptive statistical method and correlation analysis was employed in this paper. This paper however, attempted to seek out how diversification of the economy will enhance stable and viable economic growth in Nigeria.

Matthew and Mordecai (2016) investigate the extent to which agricultural output impacted on economic development in Nigeria using an annual time series data between 1986 and 2014. The author employed variables such as economic development captured with per capita income, public agricultural expenditure and agricultural output. The Vector Autoregressive (VAR) method of estimation was employed in the study. They found that a lot of the lags of the regressors are not statistically significant in explaining the economic development. The study concluded that agriculture plays an important role in achieving economic development in Nigeria. The variance decomposition result indicated that large contributors to shocks in economic development came from shocks in agriculture.

Musa (2016) in his paper titled “towards a diversified Nigerian economy” examine the contribution of agriculture to the GDP of Nigeria, the data used were analysed using regression analysis, and the result revealed that there is a positive relationship between agricultural GDP and total GDP between the periods of 1990 to 2013. Based on the findings, it was recommended that government should ban importation of some agricultural products to encourage local production and also to increase government budgetary allocation to the sector to reduce financial distress in the implementation of indispensable agricultural programs.

Emmanuel, Azara, Dishok, Yilkes, and Mutgap (2021) examined the relationship between agricultural output and economic growth in Nigeria, using gross domestic product (GDP) as a proxy for economic growth and agricultural components such as crop, livestock, forestry, and fishery as independent variables. The study analyzed annual time series data from 1986 to 2020 sourced from the Central Bank of Nigeria and the National Bureau of Statistics. Employing pre-diagnostic tests, including unit root and cointegration tests, the study established the stationarity of the variables and confirmed a long-run relationship among them. Using the Error

Correction Model (ECM), the findings revealed that livestock and fishery production positively and significantly contributed to economic growth, with coefficients of 5.0526 and 67.26, and p-values of 0.0432 and 0.0292, respectively. However, crop production and forestry showed negative and insignificant impacts, with coefficients of -4.593964 and -2.625762 and p-values of 0.6432. The study recommended that the Nigerian government review policies on forestry and crop production to improve their contribution to economic growth. It also advocated for increased livestock and fishery production and emphasized funding research institutes to develop improved seedlings for enhanced crop productivity.

Ohwofasa and Matthew (2022) analyzed the relationship between agricultural productivity and economic growth in Nigeria, utilizing data from 1986 to 2021 sourced from the Central Bank of Nigeria Statistical Bulletin. The study employed key variables to measure agricultural productivity, including labor productivity, capital productivity, and interest rates, as explanatory variables. Using cointegration and error correction modeling (ECM), the study found a significant long-run relationship between agricultural productivity and economic growth. However, the results revealed that in the long run, agricultural productivity had a negative impact on economic growth, while capital productivity exhibited a significantly positive impact. Conversely, in the short run, agriculture value-added and labor productivity had a positive effect on economic growth, whereas capital productivity had a negative impact. Based on these findings, the study recommended broad-based reforms in the agricultural sector, emphasizing the provision of farm inputs such as tractors and fertilizers, as well as interest-free loans to farmers, to enhance productivity. Additionally, the study highlighted the importance of increasing capital investment to address critical infrastructural deficits, including poor road networks and inadequate power supply, to support sustainable agricultural productivity and economic growth.

Chukwu (2023) conducted a study to examine the impact of the agricultural sector on economic growth in Nigeria from 1981 to 2020. The study employed multiple regression analysis with real gross domestic product (RGDP) as the dependent variable, while crop production, livestock production, forestry production, and fish production served as independent variables. Using the Ordinary Least Squares (OLS) estimation technique, the findings revealed that crop production and livestock production significantly impact economic growth in Nigeria, while forestry production and fish production do not have significant impacts. Despite this, all independent variables demonstrated a positive relationship with economic growth, indicating that increases in crop, livestock, forestry, and fish production result in an increase in RGDP. The study further revealed no causality relationships between crop production or livestock production and economic growth. However, a unidirectional causality relationship was observed, flowing from forestry production to RGDP. Based on these findings, Chukwu recommended that the Nigerian government and citizens focus on enhancing crop productivity to promote food security and economic growth. Efforts should also be directed toward increasing the productive capacities of the agricultural sector as a whole to achieve sustainable economic development.

Olawale (2024) examined the relationship between Nigeria’s manufacturing sector and its pursuit of export diversification using regression analysis and time-series data from 1985 to 2022. The findings revealed a long-run equilibrium relationship between the manufacturing sector and export diversification, though the association was weak and negative, indicating the sector's limited contribution to diversification during the study period. The study emphasized the need for a comprehensive transformation of the manufacturing sector, advocating for the establishment of an innovative and productive ecosystem. It proposed focusing on producing high-quality goods such as value-added agricultural products and advanced machinery to enhance Nigeria's export portfolio. Olawale concluded that government efforts should shift from piecemeal interventions to a holistic approach aimed at unlocking the manufacturing sector's potential as a significant driver of export diversification.

3.0 Methodology

This section provides description of the methodology applied in this research, the data and sources, variables measurements, model specification and method utilized (ARDL)

3.1 Model Specification

From the literature, the adopted model for this study is based on the Structural Change Theory, which was developed by W. Arthur Lewis in 1954 and expanded upon by other scholars such as Hollis Chenery. This theory focuses on the process of economic transformation, where resources shift from traditional sectors, such as agriculture, to modern sectors like industry and services, leading to overall economic growth and diversification. The modification aligns the Structural Change Theory with this study's focus on non-oil export diversification in Nigeria: Agricultural Output (AGR): Reflects agriculture's foundational role in enabling non-oil export growth and broader economic diversification, as emphasized by W. Arthur Lewis. School Enrollment (SE): Captures the role of human capital in fostering economic transformation and structural change. Exchange Rate (EXR): Highlights the impact of currency valuation on export competitiveness and agricultural trade performance.

From the related literature, the adopted model explores the relationship between agricultural output and its determinants in driving structural economic change. The adopted model is specified as:

$$AGR = f\left(IND, SER, CAP\right) \quad (1)$$

Where: AGR = Agricultural Output, IND = Industrial Output, SER = Services Sector Contribution and CAP = Capital Formation. For the purpose of this study, the model is modified to align with the research objective two of examining the role of non-oil exports (NOE) in relation to agricultural output, school enrollment, and exchange rate. The modified model is given as:

$$NOE = f\left(AGR,\ SE,\ EXR\right) \quad (2)$$

Transforming equations into an econometric model, we have the following:

$$NOE_t = \beta_0 + \beta_1 AGR_t + \beta_2 SE_t + \beta_3 EXR_t + \mu_t \quad (3)$$

Where
ln = natural log form.
NOE = Non-oil exports
β1¬, β2&β3 = Coefficients of the explanatory variables (Coefficients of the Regression Line)
AGR = Agricultural Output
SE = School enrolment (Human capital)
EXR = Exchange rate
µt = Error term

Transforming the equations into log form we have:

$$\ln NOE_t = \beta_0 + \beta_1 \ln AGR_t + \beta_2 \ln SE_t + \beta_3 EXR_t + \mu \tag{4}$$

Logarithmic transformation is a convenient means of transforming a highly skewed variable into a more normalized dataset. In theory, we want to produce the smallest error possible when making a prediction, while also taking into account that we should not be overfitting the model. Using the logarithm of one or more variables improves the fit of the model by transforming the distribution of the features to a more normally-shaped bell curve (Andy, 2019).

3.2 Estimation Technique and Procedure

This section involves a range of methods used to examine and analyze our models in order to achieve the objective of the research. These techniques encompass analytical approaches such as the pretests, the ADRL approach and diagnostic tests.

3.2.1 ARDL Long-Run Model

After discovering the evidence of cointegration, the long-run ARDL model would be estimated and is specified as:

$$\Delta \ln NOE_t = \beta_0 + \sum_{i=1}^{k} \phi_i \Delta \ln NOE_{t-1} + \sum_{i=0}^{k} \varphi_i \Delta \ln AGR_{t-1} + \sum_{i=0}^{k} \lambda_i \Delta \ln SE_{t-1} + \sum_{i=0}^{k} \delta_i \Delta \ln EXR_{t-1} + \sum_{i=0}^{k} + \theta_1 \ln NOE_{t-1} + \theta_2 \ln AGR_{t-1} + \theta_3 \ln SE_{t-1} + \theta_4 EXR_{t-1} + \varepsilon_t \tag{5}$$

3.2.2 ARDL Error Correction Term Model

Given the presence of a long-run relationship, the error correction model is formulated to estimate the short-run dynamics, where the Error Correction Term (ECT) in Equation 3.19 is defined as:

$$ECT_t = \beta_0 + \sum_{i=1}^{k} \phi_i \Delta \ln NOE_{t-1} + \sum_{i=0}^{k} \varphi_i \Delta \ln AGR_{t-1} + \sum_{i=0}^{k} \lambda_i \Delta \ln SE_{t-1} + \sum_{i=0}^{k} \delta_i \Delta \ln EXR_{t-1} + \sum_{i=0}^{k} + \theta_1 \ln NOE_{t-1} + \theta_2 \ln AGR_{t-1} + \theta_3 \ln SE_{t-1} + \theta_4 \ln EXR_{t-1} + \varepsilon_t \tag{6}$$

The ECT which represents the residual of the long run shows how much of the disequilibrium is being corrected, that is, the extent to which any disequilibrium in the previous period is being adjusted in yt. A positive coefficient indicates a divergence, while a negative coefficient indicates convergence. If the estimate of ECT = 1, then 100% of the adjustment takes place within the period, or the adjustment is instantaneous and full. And if the estimate of ECT = 0.5, then 50% of the adjustment takes place each period/year. ECT = 0, shows that there is no adjustment, and to claim that there is a long-run relationship does not make sense any more. A negative and significant ECTt-1 coefficient implies that any short-term disequilibrium between the explained and explanatory variables will converge to the long-run equilibrium.

4.0 Results and Discussion

It presents the results, and discussion of findings.

4.1 Descriptive Statistics of Objective Two

In this selection the degree of confidence and reliability of the data sets employed was tested and presented in Table 4.1.

Table 4.1: Descriptive Statistics

	LNOE	LAGR	LSE	EXR
Mean	6.3788	7.3038	4.5168	3.4959
Median	7.1274	8.3550	4.5045	4.7116
Maximum	9.2114	10.624	4.7286	5.9943
Minimum	1.7227	2.8362	4.3368	-0.4817
Std. Dev.	2.6333	2.6013	0.0980	2.0736
Skewness	-0.5090	-0.3980	0.4893	-0.6656
Kurtosis	1.7428	1.6528	2.5932	2.0964
Jarque-Bera	4.2521	3.9790	1.8256	4.2069
Probability	0.1193	0.1367	0.4013	0.1220
Sum	248.77	284.85	176.15	136.34
Sum Sq. Dev.	263.51	257.14	0.3650	163.39
Observations	41	41	41	41

Source: Author's computation using EViews10 (2024)

Table 4.1 presents descriptive statistics for the variables LNOE (Natural Logarithm of Non-oil Exports), LAGR (Natural Logarithm of Agricultural Output), LSE (Natural Logarithm of School Enrolment), and EXR (Exchange Rate). These statistics offer insights into the central tendency, dispersion, and shape of the distributions of these variables.

Looking at the mean values, we observe that LNOE has a mean of 6.378, indicating the average level of non-oil exports in the sample period. Similarly, LAGR has a mean of 7.303, reflecting the average agricultural output, while LSE has a mean of 4.516, representing the average level of school enrolment. EXR, with a mean of 3.495, shows the average level of the exchange rate.

The skewness measures provide information about the asymmetry of the distributions. Negative skewness values for LNOE, LAGR, and EXR (-0.509, -0.398, and -0.665, respectively) suggest that the distributions are slightly skewed to the left. However, LSE has a positive skewness value of 0.489, indicating a slight skewness to the right. Kurtosis measures the peakedness of the distributions. The values for LNOE, LAGR, and EXR (1.742, 1.652, and 2.096, respectively) suggest that these variables have distributions slightly more peaked than a normal distribution. Conversely, LSE has a kurtosis value of 2.593, indicating a distribution with heavier tails than a normal distribution.

The Jarque-Bera test assesses whether the data follow a normal distribution. The p-values associated with LNOE, LAGR, LSE, and EXR (0.119, 0.136, 0.401, and 0.122, respectively) are above the conventional significance level of 0.05, suggesting that we fail to reject the null hypothesis of normality for these variables. Overall, these descriptive statistics provide valuable insights into the distributional characteristics of the variables under consideration.Correlation test between dependent variable and independent variables is of importance in pre-estimation analysis this is because it shows relationship between the variables proposed by theories. Therefore, the statistical correlation of the variables is examined and reported in Table 4.11 for the model.

Table 4.2 Correlation Matrix

	LNOE	LAGR	LSE	EXR
LNOE	1			
LAGR	0.8896	1		
LSE	-0.5279	-0.4981	1	
EXR	0.9271	0.9317	-0.58027	1

Source: Author's computation using EViews10 (2024)

The table 4.2 presents the correlation matrix and provides a snapshot of the linear relationships between the variables, offering valuable initial insights into potential connections within the diversification context of the Nigerian economy (i.e., there is the absence of multicollinearity). This is because correlation value among all the variables is less than 0.9 Consequently, the variables can be used in their respective models and can produce reliable estimates.

4.2 Unit Root Test of Objective Two

To begin the estimation, the time series properties of the data were first tested using Augmented Dickey Fuller (ADF; 1981) test statistics and the results of the test is presented on table 4.3 below:

Table 4.3: Unit Root Test Using Augmented Dickey Fuller (ADF).

Variables	Order of Integration	Augmented Dickey-Fuller Test Critical Values			ADF Statistics	Prob.
		1%	5%	10%		
LNOE	I(1)	-3.6104	-2.9389	-2.6079	-7.4671	0.0000***
LAGR	I(1)	-3.6104	-2.9389	-2.6079	-4.0091	0.0035***
LSE	I(0)	-3.6463	-2.9540	-2.6158	-3.3111	0.0224**
EXR	I(1)	-4.2118	-3.5297	-3.1964	-9.2511	0.0000***

*, ** and *** represent 10%, 5% and 1% level of significance respectively
Source: Author's computation using EViews10 (2024)

Table 4.3 shows the outcomes of the Augmented Dickey-Fuller (ADF) unit root tests, which are crucial in determining the stationarity of the variables. Stationarity is a key consideration in time series analysis, as non-stationary series can exhibit trends or irregular patterns that complicate modeling. It can be seen that all variables are stationary at 1st difference and at level of significance; 1% and 5% (i.e LNOE LAGR and EXR) are I(1) and (LSE) is stationary at level. The decision is arrived by comparing the absolute values against the respective ADF statistics and by observing the probability values.

Before testing for cointegration relationship among the variables, it is paramount to identify the optimum lag length to be used in order to avoid spurious regression. As such, optimal lag selection test was conducted and the result is presented on table 4.4 below:

4.3 Optimal Lag Selection

The optimum lag of the model selected for the analysis is presented here.

Table 4.4: Lag Length Selection

Lag	LogL	LR	FPE	AIC	SC	HQ
0	-84.73343	NA	0.002545	5.377784	5.559178	5.438817
1	45.38173	220.8015*	2.55e-06*	-1.538286*	-0.631312*	-1.233117*
2	54.24729	12.89536	4.12e-06	-1.105896	0.526657	-0.556592

3	62.63315	10.16467	7.39e-06	-0.644433	1.713700	0.149007

Note. * indicate lag order selected by the criterion. LR = sequential modified LR test statistic; FPE = Final prediction error, AIC = Akaike information criteria, SC = Schwarz information criteria, HQ = Hannan-Quinn information criteria, LogL = log likelihood, LR = likelihood ratio.

Source: Author's computation using EViews10 (2024)

The lags selected for model is depicted in Table 4.4. It can be seen that LR FPE, AIC, SC and HQ all suggested the use of lag 1. Thus, lag 1 was selected for further estimations of the model base on AIC. A big advantage of AIC for model selection is that it produces weights that can be used directly for model-averaging predictions or parameters that have a consistent interpretation across models.

4.4 Cointegration Bound Test Results

Having identified the optimal lag length, the next step is to estimate the long-run relationship among the variables using the ARDL bound test.

Table 4.5: Bounds Test Result for Objective Two

				Bounds critical values [Unrestricted intercept & no trend]	
	F-stats	Lag	Level of significance	I(0)	I(1)
$(LNOE_t \mid LAGR_t LSE_{TEXRt})$	6.4223	**4**			
			10%	2.97	3.74
			5%	5%	3.38
			1%	1%	4.3

The Critical values are obtained from Narayan (2005) table case III. The boldness indicates the level of significance at which the F-statistic exceeds the upper bound.

Source: Author's computation using EViews10 (2024)

The results presented in Table 4.5 shows that the computed F-statistic for objective two. F-statistics 6.422 is greater than the upper bound value 3.38 at 5% significance level. This shows the presence of long-run relationship among the variables and therefore we could safely reject our null hypothesis of no cointegration exist and accept the alternative hypothesis that cointegration exist i.e there is a long-run equilibrating relationship among the variable of interest.

4.5 Estimations of the Long Run Relationship

Here long run estimation results of objective two is presented in table 4.6 and discussed.

Table 4.6 Estimations of the Long Run Relationship

Dependent Variable, lnNOE				
Variable	**Coefficient**	**Std. Error**	**t-Statistic**	**Prob.**
LAGR	2.1783	0.2578	8.4497	0.0000***
LSE	0.2831	0.1861	1.5212	0.1477
EXR	-9.0873	2.1741	-4.1796	0.0007***
C	-0.3379	0.0787	-4.2899	0.0006***

Source: Author's computation using EViews10 (2024).

Note***, ** and * Denotes 1%, 5% and 10% significance level respectively.

Table 4.6 presents estimations of the long-run relationships for the dependent variable lnNOE (Natural Logarithm of Non-oil Exports) and its independent variables. These coefficients, along with their standard errors, t-statistics, and associated probabilities, provide insights into the relationships between the variables and their statistical significance.

Starting with the coefficients, we observe that LAGR (Natural Logarithm of Agricultural Output) has a coefficient of 2.178. This indicates that a one-unit increase in agricultural output is associated with a 2.178 unit increase in non-oil exports, this coefficient is statistically significant at the 1% level (0.0000), suggesting a strong positive relationship between agricultural output and non-oil exports, the findings is coreespodent with findings of other researchers such as Onyeka (2017), Adesoji and Sotubo (2013) and Olabanji & Henry (2013).

.The coefficient for LSE (Natural Logarithm of School Enrolment) is 0.283. This coefficient suggests that a one-unit increase in school enrolment is associated with a 0.283119 unit increase in non-oil exports, all else being equal. However, this coefficient is not statistically significant at conventional levels (0.147), indicating that the relationship between school enrolment and non-oil exports may not be robust in this model. The coefficient for EXR (Exchange Rate) is -9.087. This negative coefficient implies that a one-unit increase in the exchange rate is associated with a 9.087320 unit decrease in non-oil exports, holding other variables constant. This coefficient is statistically significant at the 1% level (0.0007), suggesting a strong negative relationship between the exchange rate and non-oil exports. After establishing the long-run coefficient result, the short-run model was estimated to obtain the short-run coefficient. This result is shown in Table 4.16.

4.6 Estimations of the Short Run Relationships of Objective Two

Here short run estimation result of objective two model is presented. The results are shown in Table 4.7

Table 4.7: The Error- Correction Model (ECM) (Objective two)

Dependent Variable, lnNOE				
Variable	**Coefficient**	**Std. Error**	**t-Statistic**	**Prob.**
D(LAGR)	1.1909	0.3203	3.7170	0.0019***
D(LAGR(-1))	-1.2643	0.3712	-3.4056	0.0036***
D(LAGR(-2))	-0.4915	0.3012	-1.6318	0.1222
D(LAGR(-3))	-0.7057	0.3386	-2.0839	0.0536*
D(LSE)	-4.4880	0.9082	-4.9415	0.0001***
D(LSE(-1))	3.9100	1.1001	3.5541	0.0026***
D(LSE(-2))	3.5093	1.0962	3.2011	0.0056***
ECT_{t-1}	-0.9832	0.1551	-6.3355	0.0000***

***, **and* Denotes 1%, 5% and 10% significance level respectively.
Source: Author’s computation using EViews10 (2024).

Table 4.7 presents the results of the Error-Correction Model (ECM) for objective two with the dependent variable lnNOE (Natural Logarithm of Non-oil Exports). The coefficients, standard errors, t-statistics, and associated probabilities provide insights into the short-run dynamics and long-run equilibrium relationships between the variables.

The coefficients for D(LAGR) (First Difference of Natural Logarithm of Agricultural Output) capture the short-run effects of changes in agricultural output on non-oil exports. Specifically, the coefficient for D(LAGR) is 1.190, indicating that a one-unit increase in the first difference of agricultural output is associated with a 1.190 unit increase in non-oil exports in the short run. This coefficient is statistically significant at the 1% level (0.0019), shows a significant positive relationship between changes in agricultural output and non-oil exports in the short run.

The coefficient for ECTt-1 (Error Correction Term Lagged by One Period) is -0.983232. This coefficient represents the speed of adjustment towards the long-run equilibrium relationship between non-oil exports and its determinants. A negative coefficient indicates that deviations from the long-run equilibrium are corrected in subsequent periods. This coefficient is statistically significant at the 1% level (0.0000), suggesting a strong adjustment mechanism towards the long-run equilibrium between non-oil exports and its determinants.

4.7 Goodness of Fit and Joint Significance Test

Table 4.8: Goodness of fit and Joint Significance test for Objective Two

R-square	0.836
DW-statistics	2.14
F-statistic(Prob)	9.270 (0.000)***

***, **and* Denotes 1%,5% and 10% significance level respectively.
Source: Author's computation using EViews10 (2024).

The R-square of the model from Table 4.8 revealed that 83% of the proportion of the dependent variable has been explained by the explanatory variables. This shows that the model is good fit. The Durbin Watson statistics shows that the model is free from serial correlation because it falls within the range of 1.5 and 2.5. Also, the probability of F-statistics is less than 5% i.e. (0.000<0.05), this means that the explanatory variables are jointly significant in influencing the dependent variable (RNOE).

To further ensure the reliability of the estimates, diagnostic tests of serial correlation, functional form, normality, and heteroscedasticity were conducted and reported in Table 4.19.

4.8 Diagnostic Checks

Diagnostic checks were applied and appropriate lags levels determined to ensure a better model. Diagnostics tests applied included serial correlation test and heteroskedasticity test. The results point out that the estimated result generally free from serial correlation. Additionally, no evidence of heteroskedasticity was found on the errors of the estimated system. Therefore, it can be concluded that the results are efficient and consisted.

Table 4.9: Diagnostic Test

	Test Statistics	F Version
A.	Serial Correlation	F(2,28) = 5.163 (0.0123)
B.	Functional form	F(1,29) = 3.18 (0.0255)
C.	Normality	0.757 (0.684)
D.	Heteroskedasticity	F(6,30) = 2.811 (0.0272)

Source: Author's computation using EViews10 (2024).

The result of the diagnostic tests in Table 4.9 above reveals that the Breusch-Godfrey LM test shows that there is no presence of serial correlation in the model. The JarqueBera test shows that the data in the model has been normally distributed. The Heteroskedasticity; Breusch-Pagan Godfrey shows no sign of heteroskedasticity in the model. The Ramsey RESET test shows that the model has been correctly specified. This means that the model is free from serial correlation, heteroscedasticity, functional form and normality problems. As such, this model could produce reliable results.

5.0 Summary, Conclusion and Recommendations

5.1 Summary of Major Findings

The purpose of this research is to determine the impact agricultural output on non-oil export in Nigeria from 1981 to 2021. The study adopts structural change theory as its theoretical framework. From the result of the study, the Bound Test Result reveals the bound test F-statistic for the bound test is 6.422309, exceeding the upper bound value of 3.38 at a 5% significance level. This suggests the presence of a long-run relationship among the variables, supporting the rejection of the null hypothesis of no cointegration. Consequently, it can be inferred that a long-run equilibrating relationship exists among the variables under consideration in objective two. ARDL Long-Run Estimations for objective two, the estimations reveal positive long-run relationships between LAGR with the coefficient of 2.178344 and statistically significant with non-oil exports at 1%. The coefficient for (EXR) is -9.087320 has negative impact on non-oil exports and statically significant at 1%. Table 4.7 presents the results of the Error-Correction Model (ECM) for objective two with the dependent variable lnNOE (Natural Logarithm of Non-oil Exports). The coefficients, standard errors, t-statistics, and associated probabilities provide insights into the short-run dynamics and long-run equilibrium relationships between the variables. The coefficients for D(LAGR) (First Difference of Natural Logarithm of Agricultural Output) capture the short-run effects of changes in agricultural output on non-oil exports. Specifically, the coefficient for D(LAGR) is 1.190905, indicating that a one-unit increase in the first difference of agricultural output is associated with a 1.190905 unit increase in non-oil exports in the short run. This coefficient is statistically significant at the 1% level (0.0019), shows a significant positive relationship between changes in agricultural output and non-oil exports in the short run. The coefficient for ECTt-1 is -0.983232. This coefficient represents the speed of adjustment towards the long-run equilibrium relationship between non-oil exports and its determinants. A negative coefficient indicates that deviations from the long-run equilibrium are corrected in subsequent periods. This coefficient is statistically significant at the 1% level (0.0000).

5.2 Conclusion

In conclusion, this research examined the relationship between agricultural output and non-oil export in Nigeria from 1981 to 2021. Utilizing the Structural Change Theory as theoretical frameworks, the study employed econometric techniques such as the Bound Test and the Autoregressive Distributed Lag (ARDL) approach to analyze these relationships. The findings revealed the presence of long-run relationships among the variables, signifying the existence of equilibrium relationships over time. Specifically, positive long-run relationships were revealed between agricultural output (LAGR) and non-oil exports, despite the negative impact of Exchange Rate (EXR).

5.3 Policy Recommendations

At this point, in the light of the findings (i.e obtained from the result of ARDL) derived from this research, it is paramount that the following recommendations be made. They include:

1. Government should focus on diversifying the agricultural sector to reduce its reliance on traditional crops and explore opportunities in high-value agricultural products. This could involve investing in research and development, promoting modern farming techniques, and providing support to smallholder farmers to enhance productivity and market access, as findings of this research reveals significant negative impact of agricultural output on real GDP.
2. Support for Non-Oil Export Promotion: The finding that non-oil exports Granger cause economic growth suggests the importance of promoting non-oil export activities as a driver of economic development. Policymakers should implement policies to support and incentivize non-oil export sectors, including providing export financing, streamlining trade procedures, and investing in export-oriented infrastructure. Diversifying export earnings away from oil can enhance economic resilience, reduce vulnerability to commodity price volatility, and foster sustainable growth

REFERENCES

Adamu, B., & Ibrahim, I. A. (2016) 'Poverty alleviation in Nigeria: An Assessment of Government Policies'. Proceedings of Academics World 46th International Conference, Dubai, UAE, 29th -30th September 2016.

Aminu, U., & Anono, A.Z. (2012). Agricultural output and economic growth in Nigeria. Journal of Economics and sustainable Development,3(2), 35-42.

Aregbeyen, O., Olajide, O. J., & Ogunmuyiwa, M. S. (2019). Impact of agricultural output on economic growth in Nigeria. Journal of Economics and Sustainable Development, 10(13), 50-59.

Boosting Agric exports for increased revenue generation. (2023). THISDAYLIVE. Retrieved from https://www.thisdaylive.com/index.php/2023/01/31/boosting-agric-exports-for-increased-revenue-generation/

Central Bank of Nigeria (CBN). (2021). Statistical bulletin. Abuja, Nigeria: CBN.

Chambers, R., & Conway, G. (1991). Sustainable rural livelihoods: Practical concepts for the 21st century. Institute of Development Studies (IDS) Discussion Paper No. 296.

Chukwu, B. C. (2023). Impact of Agricultural Sector on Economic Growth in Nigeria (1981-2020). SSRN.

Chukwu, B. C. (2023). Impact of Agricultural Sector on Economic Growth in Nigeria (1981-2020). SSRN.

Emmanuel, Y. E., Azara, A. I., Dishok, N. I., Yilkes, D. O., & Mutgap, L. D. (2021). Agriculture and economic growth in Nigeria. Arts and Social Science Research, 11, September.

Eze O. M. (2017). Agricultural Sector Performance and Nigeria's Economic Growth. Asian Journal of Agricultural Extension, Economics & Sociology 15(1): 1-13, 2017; Article no.AJAEES.31828 ISSN: 2320-7027

Food and Agriculture Organization (FAO). (2025). Global report on food crises 2025: Nigeria. Retrieved from https://www.fao.org

Food and Agriculture Organization (FAO). (2025). Global report on food crises 2025: Nigeria. Retrieved from https://www.fao.org

Granger, C. W. J. (1969). Investigating causal relations by econometric models and cross-spectral methods. Econometrica, 37(3), 424–438.

International Monetary Fund (IMF). (2016). Nigeria: 2016 Article IV Consultation. Washington, DC: IMF.

Ishola, J. O., Adeleke, S. O., & Olawale, L. S. (2013). The role of agriculture in economic growth and development: Nigeria's experience. Journal of Economics and Sustainable Development, 4(8), 1-8.

Lewis, W. A. (1954). Economic development with unlimited supplies of labour. The Manchester School, 22(2), 139–191.

Lewis, W. A. (1954). The Theory of Economic Growth. Allen & Unwin.

Matthew, O. A., & Mordecai, B. D. (2016). The impact of agricultural output on economic development in Nigeria (1986–2014). International Journal of Business and Economic Development, 4(2), 1-12.

Musa, S. (2016). Towards a diversified Nigerian economy: The role of agriculture. Journal of Economics and Finance, 7(3), 1-10.

National Bureau of Statistics (NBS). (2024). Annual economic indicators report. Abuja, Nigeria: NBS.

Nigeria's Ministry of Finance. (2020). Fiscal strategy report. Abuja, Nigeria: Ministry of Finance.

Ohwofasa, B. O., & Matthew, O. A. (2022). Agricultural productivity and economic growth in Nigeria (1986–2021): An ARDL approach. African Journal of Agricultural Research, 18(4), 321-335.

Olajide, O.T., Akinlabi, B. H., & Tijani, A.A.(2016). AGRICULTURE RESOURCE AND ECONOMIC GROWTH IN NIGERIA. European Scientific Journal October edition vol. 8, No.22 ISSN: 1857 – 7881 (Print) e - ISSN 1857- 7431

Olawale, A. (2024). Export diversification drive: The role of Nigerian manufacturing sector. Journal of Business and Econometrics Studies, 1(3), 1–9.

Orok, B. O., & Ayim, S. K. (2017). Agricultural productivity and economic development in Nigeria: A sectoral analysis. International Journal of Advanced Research in Public Policy, Social Development, and Enterprise Studies, 2(1), 1-15.

Oyinbo, O., & Rekwot, G. Z. (2014). Agricultural production and economic growth in Nigeria: Implications for rural poverty alleviation. Quarterly Journal of International Agriculture, 53(3), 207-223.

Schaffnit-Chatterjee, C. (2014). Agricultural Value Chains in Sub Saharan Africa. From a Development Challenge to a Business Opportunity. Current Issues: Emerging Markets. Deusche Bank Research. Germany.

Schaffnit-Chatterjee, C. (2014). Agriculture in Africa: Potential versus reality. Frankfurt, Germany: Deutsche Bank Research.

World Bank. (2022). Nigeria economic update. Retrieved from https://www.worldbank.org

World Bank. (2022). Nigeria Economic Update: COVID-19 Impact Assessment and Policy Responses. World Bank.

Yusuf Sulaimon Aremu (2014). Role of Agriculture in Economic Growth and Development: Nigeria Perspective. Online at https://mpra.ub.uni-muenchen.de/55536/ MPRA Paper No. 55536, posted 28 Apr 2014 13:18 UTC.