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## **Foreign Direct Investment, Agricultural Output and Nigeria's Economic Growth**

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**Abstract:**

**Purpose:** *This study assessed the impact of foreign direct investment, agricultural output on Nigeria's economic growth.*

**Design/methodology approach:** *Secondary data used for the work was obtained from the Central Bank of Nigeria statistical bulletin 2024, National Bureau of Statistics and World Development Index WDI. The scope of study spanned from 1981 to 2024. The Autoregressive Distributed Lag (ARDL) was used to run the data analysis and it was discovered that the foreign direct investment had a negative relationship with the economic growth in the short run and a positive relationship in the long run. Inflation and interest rate were also unfavorable in the short run and long run.*

**Findings:** *The study concluded that foreign direct investment has both positive and negative effects on the economic growth in the short run and long run while the agricultural output has positive effects on economic growth in the long run.*

**Practical implications:** *The suggestions were that the government should fund the agricultural sector and tackle insecurity in order to attract foreign investors.*

**Originality value:**

**Keywords:** *Foreign direct investment, agricultural output, inflation rate, economic growth, Nigeria.*

**JEL Classification:** *F21, O13, O40, Q18, C23.*

**Paper Type:** *Research paper.*

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## **1. Introduction**

Economic growth unravels the general performance of the economy of every global nation and it is the goal of every country to achieve a sustainable economic growth. Economic growth encompasses a rise in the standard of living, low cost of living, good jobs, high per capita income, good infrastructural development and equilibrium in the balance of payments (Liu and Liu 2025).

Developed countries of the world were able to achieve this milestone while several developing and underdeveloped nations were finding it difficult to achieve this milestone due to the corruption, bribery, nepotism and the manner in which the governments neglected the needs of their people. This had a detrimental effect on agricultural output and foreign direct investment

Agriculture has historically been one of the pillars of the Nigeria's economy, providing jobs to a significant portion of the population and contributing to the GDP of the country (Ogbanje and Salami, 2022). Despite its benefits to the Nigerian economy, the agricultural sector has faced several challenges such as inadequate infrastructure, reduced productivity, and limited access to modern technology and finance.

These issues have hindered the sector's performance and its ability to meet the growing food demands of the population. In today's highly interconnected and competitive global economy, effective agricultural output is paramount for sustainable development as it will always attract foreign investors from outside the country (Kastratovic, 2024).

Foreign direct investment not only provides sufficient capital but also brings in new technologies, innovative practices, and managerial expertise that are essential for modernizing industries and enhancing productivity (Elmi, 2023). The role of foreign direct investment has become even more critical in the face of global challenges such as climate change, food insecurity, and economic uncertainties. By attracting foreign direct investment, countries can diversify their economies, reduce dependence on a single sector, and build resilience against external shocks (Rahman *et al.*, 2024).

Foreign Direct Investment enables the development of critical infrastructure such as irrigation systems, storage facilities, and transportation networks (Ananwude *et al.*, 2025). Improved infrastructure can reduce post-harvest losses, enhance market access, and increase the efficiency of agricultural value chains. Additionally, foreign direct investment enhances the adoption of the latest agricultural practices and technologies, such as precision farming, high-yield crop varieties, and advanced methods of controlling pests on farmlands.

These innovations can lead to a sharp rise in productivity, higher crop yields, and improved quality of agricultural produce (Owutuamor and Arene, 2018). Thus, foreign direct investment has the ability to transform the Nigerian agricultural sector by tackling the key challenges, improving productivity, and promoting a sound development (Fwah,

Abu and Aye, 2017). By attracting foreign direct investment, Nigeria can make use of the expertise, technology, and a large capital from foreign investors to modernize its agricultural sector, enhance food security, and achieve sustainable economic growth.

## **2. Literature Review**

### **2.1 Foreign Direct Investment**

Foreign direct investment can be understood in several distinct ways. Foremost, it is the investment made by a firm or individual in one country into business interests located in another country, typically involving the acquisition of significant ownership stakes or establishing operations and assets (Han, Smith and Wu, 2024).

Foreign direct investment encompasses the long-term interest and control exerted by a foreign entity in an enterprise within the host country, often characterized by the investor's lasting influence and involvement in management decisions (Kastratoviæ, 2024). Furthermore, foreign direct investment can be described as the movement of capital across international borders to purchase or establish income-generating assets, such as factories, equipment, or infrastructure, which contribute to economic growth and development (Ogbanje and Salami, 2022).

### **2.2 Agricultural Output**

Agricultural sector performance is a comprehensive measure that reflects the productivity efficiency, and overall output of the agricultural sector within an economy (Umar, 2024). This concept encompasses various elements, including crop yields, livestock production, forestry outputs, and fishing activities, which together contribute to the total agricultural output of a region or country (Bello *et al.*, 2024).

Assessing agricultural sector performance is crucial for understanding the health and sustainability of an agricultural system, as well as its capacity to meet the food, fiber, and bio-energy needs of a growing population. (Ananwude *et al.*, 2025). It also provides hints into the sector's ability to contribute to economic growth, rural development, and poverty alleviation

### **2.3 Economic Growth**

Economic growth refers to the sustained rise in the production of goods and services within an economy over time. It is one of the most important indicators used to assess a country's economic development and prosperity. Economic growth is typically measured using Gross Domestic Product (GDP), which shows the total value of goods and services produced over a specified period.

Other indicators include per capita income, employment rates, and levels of investment in key sectors (Aye *et al.*, 2024). Economic growth plays a fundamental role in

improving the quality of life by generating employment opportunities increasing household incomes, and expanding access to essential goods and services. It fosters technological advancements, stimulates investment, and accelerates trade and industrialization

## **2.4 Theoretical Review**

### ***2.4.1 Endogenous Growth Theory***

The theory was primarily developed by economists Paul Romer, Robert Lucas, and others who sought to explain long-term economic growth by focusing on factors that are determined within the economy itself, rather than relying on external factors. Paul Romer, in his seminal 1986 paper "Increasing Returns and Long-Run Growth," laid the foundation for the theory by emphasizing the role of knowledge and innovation as key drivers of economic growth (Romer, 1986).

Robert Lucas further expanded the theory in 1988 by introducing the concept of human capital as a central element in the growth process. The theory marked a significant shift in economic thought by integrating the roles of technology, innovation, and human capital into growth models, suggesting that these factors could sustain economic growth without relying solely on external influences (Roberts and Setterfield, 2007).

The core postulations of Endogenous Growth Theory revolve around the idea that economic growth is primarily driven by internal factors within an economy, rather than external shocks or diminishing returns to capital. The theory posits that investments in human capital, innovation, and knowledge creation lead to sustained economic growth because they generate increasing returns to scale.

Unlike neoclassical theories, which emphasize diminishing returns to physical capital, Endogenous Growth Theory argues that knowledge and technology, as non-rivalries and partially excludable goods, can lead to continuous improvements in productivity.

Additionally, the theory suggests that government policies, such as subsidies for Research and Development (RandD) and education, can positively influence long-term growth by fostering an environment conducive to innovation. The accumulation of human capital, technological advancements, and innovation are seen as self-reinforcing processes that fuel sustained economic growth from within the economy.

Endogenous Growth Theory is highly relevant to the study of the effect of foreign direct investment on agricultural performance in Nigeria, particularly when taking a disaggregated approach. According to the theory, foreign direct investment can act as a catalyst for endogenous growth by introducing new technologies, management practices, and innovations that are crucial for enhancing agricultural productivity (Ozawa and Castello, 2003).

When foreign investors bring advanced agricultural technologies and knowledge to Nigeria, it can lead to significant improvements in crop yields, livestock management, and

overall agricultural efficiency. This aligns with the theory's emphasis on knowledge and innovation as key drivers of growth. Furthermore, the theory underscores the importance of human capital development, which is vital for the successful adoption and implementation of these new technologies in the agricultural sector.

By improving the skills and knowledge of local farmers and agricultural workers through training and education, foreign direct investment can help sustain long-term growth in agricultural performance. Thus, Endogenous Growth Theory provides a valuable framework for understanding how foreign direct investment can contribute to the sustained development of Nigeria's agricultural sector by fostering innovation, technological advancement, and human capital accumulation from within the economy.

#### ***2.4.2 Harrod-Domar Growth Model Theory***

The Harrod-Domar model highlights the importance of investment in physical capital for economic growth. The positive and significant relationship between industrial output and RGDP in this study reflect the model's assertion that increased production capacity (industrial output) leads to higher economic growth. However, the insignificant impact of FDI suggests that not all forms of investment contribute equally to growth, possibly due to inefficiencies or misallocation of resources.

The model tells us that the rate of economic growth depends on the level of savings and the capital output ratio. In the aspect of savings, higher savings always enable higher investment and lower savings enables lower investment. And for the capital output ratio the investment will always be efficient and the growth rate will be higher. The limitation of the theory is that developing nation always find it hard to increase their savings as their citizens always find it difficult to survive.

Harrod also based his model on the years that came after the great depression in the United States especially in the aspect of industrialization in the nation's even though he later came to oppose the model because he knew that the model cannot fit in to providing a long-term framework on long term growth rates. The model also ignored factors such as labor productivity and corruption levels but the Harrod Domar model looks at the oversimplification of some factors that are very complex which also factor into the growth of the economy. The growth of nations like Thailand have experienced accelerated growth rates without savings which is in opposition to the Harrod Domar growth Model.

#### ***2.4.2 Solow Swan Neo-classical Growth Theory***

This theory was propounded by Solow and Swan in 1956 and the theory posits that economic growth is driven by labor, capital, and technological progress. The study's findings align with this theory in that industrial output, which encompasses capital and technological inputs, significantly contributes to RGDP.

However, the theory also suggested that foreign investment (FDI) should enhance growth by supplementing domestic capital. The insignificant impact of FDI in this study

may indicate structural inefficiencies or poor integration of FDI into the local economy, limiting its contribution to growth. The assumptions of the neoclassical model theory are that it is subject to the law of diminishing returns as long as it is a closed economy.

The law also has a less effect on the total output because the output of the accumulated capital will be less than the previous one. The rate of growth also decelerates as the law of diminishing returns begin to take place as the economy converts to a steady state economy where the economy is always in a constant state.

The limitation of this theory is that it overlooks the role of increase in technology that will boost and improve the economy. It also does an inaccurate determination of wages because it does not look at the importance of trade unions in the process of wage determination.

The theory concludes that output is a function of growth because the total output is a function of factor inputs, factor capital, labor and an increase in the level of technology. The long-term rate of growth is determined by the progress of technology or regression of technology. It also leads to an increase in the steady state of the per capital income. This progress in technology has a direct impact in agricultural output which will also attract foreign investors to invest in the economy.

### **3. Empirical Review**

Han, Smith, and Wu (2024) examined the impact of Foreign Direct Investment (FDI) spillover channels on the total factor productivity (TFP) of Chinese agricultural enterprises and investigated the moderating role of absorptive capacity (technological acumen) on TFP spillover effects. Based on data from 118 agricultural and related Chinese industries, they employed a multi-threshold regression model to empirically analyze the impact of FDI on the TFP of agricultural enterprises and the threshold effect of absorptive capacity.

The results suggest that foreign-invested agricultural enterprises are more likely to benefit from FDI, while the overall FDI spillover effect is negative for domestic agricultural enterprises. However, once threshold effects are introduced, firms close to the technological frontier experience statistically significant positive spillover effects, while those far from the frontier experience negative spillover effects. Similar results are observed across almost all FDI spillover channels for firms in both upstream and downstream industries. FDI spillovers, when they occur, can be a two-edged sword, benefiting some firms at the expense of others.

Mohamed and Abdullahi (2026) examined the impact of agriculture, education, foreign direct investment (FDI), and trade openness on Somalia's economic growth from 1990 to 2022. Using annual time series data sourced from the World Bank, SESRIC, and UNESCO, the study used the Autoregressive Distributed Lag (ARDL)

approach to investigate both short-run and long-run relationships among the variables.

The Fully Modified Ordinary Least Squares (FMOLS), Dynamic Ordinary Least Squares (DOLS), and Canonical Cointegration Regression (CCR) estimators are further employed to confirm the robustness of the long-run findings. The results of the unit root tests (ADF and PP) indicate that the series are integrated of mixed order,  $I(0)$  and  $I(1)$ , justifying the use of the ARDL framework.

The findings reveal that agriculture, education, and trade openness exert positive and statistically significant effects on economic growth in the long run, whereas FDI shows an insignificant impact during the study period. In the short run, agriculture and FDI are found to stimulate growth, while trade openness and education exhibits a temporary negative influence.

The Granger causality analysis identifies bidirectional causality between agriculture and growth, and unidirectional causality from education and trade openness to growth. These results underscore the critical roles of agriculture and human capital formation as long-term engines of Somalia's economic development, supported by open trade policies.

Policymakers are encouraged to enhance agricultural productivity through modernization, expand investment in education, and promote export diversification to sustain inclusive and resilient economic growth.

Adeagbo and Jimoh (2023) examined the impact of foreign direct investment on agricultural and manufacturing outputs in Nigeria from 2017 to 2022. The study employed an ex-post facto research design and judgmental sampling technique in selecting the years analyzed. Secondary data were obtained from the Federal Inland Revenue Service and CBN Statistical Bulletin. The data, covering six years, were analyzed using descriptive and inferential statistics.

The study model assessed the impact of FDI and other variables on agricultural and manufacturing sector outputs using the Augmented Dickey-Fuller (ADF) test and Engle-Granger co-integration for unit root and stationarity among the time series variables. It was discovered that FDI negatively impacts both manufacturing and agricultural output, indicating that FDI has been biased in favor of the extractive industry, rendering its impact on manufacturing and agricultural output insignificant.

The study recommends that the government implement policies to attract more FDI into the manufacturing and agricultural sectors by creating incentives that would attract more investors.

Ogbanje and Salami (2022) determined the impact of foreign direct investment on Nigeria's agricultural sector. The study utilized time series data from 1981 to 2019,

sourced from the databases of Central Bank and Food and Agriculture Organization. The Augmented Dickey-Fuller test results indicate that the variables were I(1), and Johansen's co-integration test suggested a long-run relationship among the variables. The findings reveal that agricultural productivity grew at a slower rate (6.28) compared to FDI (17.99).

Additionally, FDI and the exchange rate had statistically significant ( $p < 0.05$ ) negative impacts on agricultural productivity, while the implicit price deflator for the agricultural sector had a statistically significant ( $p < 0.001$ ) positive impact in the long run. The error correction term suggests a high speed of adjustment to short-run equilibrium (79.71%).

The study concludes that reliance on foreign direct investment could have an adverse effect on agricultural gross domestic product in the long run. It recommends that the Federal Ministry of Agriculture and Rural Development should implement policies to ensure a steady inflow of FDI into agriculture in a manner that reverses the negative impact, or alternatively, explore other options.

Martin-Odoom (2021) analyzed the effect of foreign direct investment (FDI) on the growth of the agricultural sector in Ghana. The existing literature on the FDI-Growth nexus, particularly concerning the impact of FDI on agricultural growth, is limited. Agriculture is a critical sector in developing economies like Ghana, employing the majority of the working population, including a significant portion of the poor.

Therefore, understanding the impact of investment on this essential sector is crucial for informed policy-making. The study examines Agriculture Value Added as the dependent variable, with FDI inflows as the independent variable, and inflation, Gross Fixed Capital.

Formation, and Trade Openness as control variables. Data on these variables were collected from 1984 to 2019. The study utilizes the Autoregressive Distributed Lag (ARDL) model to assess the nature and significance of FDI's impact on Ghana's agricultural sector. Various diagnostic tests were conducted to ensure the model's robustness and fit.

The findings reveal that in the long run, FDI has a negative and significant effect on the growth of the agricultural sector, while inflation has a positive and significant effect. In the short run, FDI shows a positive and significant association with the agricultural sector. The study suggests that the government should focus on improving human capital within the sector, investing in necessary infrastructure such as roads, and reforming restrictive laws and frameworks surrounding private business in agriculture.

Rauf and Oluwayemisi (2025) compared the impact of foreign and domestic agricultural capital investments on agricultural development in Nigeria. This study used the annual secondary data and the scope of study was from 1980 to 2023. This

study's adopted the Autoregressive Distributed Lagged Model technique to identify the correlation. The findings of the first objective of remittance inflows (REMIT) revealed a positive but statistically insignificant relation with agricultural development in Nigeria.

Net Official Development Assistance Received (ODA) established a negative and statistically insignificant relationship with agricultural development in Nigeria.

The second objective results showed that agricultural research and development was negative but statistically significant links was established with agricultural development; agricultural subsidy (AGSUB) revealed positive and statistically significant links with agricultural development the finding of fertilizer input (FERT) and ratio of irrigated land to total land (IRRIG) are both negative and statistically significant, and rural development result is positive but statistically insignificant related to agricultural development in Nigeria.

The study therefore concluded that agricultural development could only be improved if agricultural capital investments are increased and its implementation is monitored in Nigeria

#### 4. Research Methodolgy

##### 4.1 Model Specification

In order to look at the effect on employment on industries and international trade in Nigeria, we specify and estimate the dynamic growth model in the first equation

$$GDP_t = f(AGO_t, FDI_t, INFR_t, INTR_t, GFCF_t) \quad (1)$$

Where *GDP* is the dependent variable. The explanatory variables *AGO* denotes agricultural output, *FDI* stands for foreign direct investment, *INFR* means inflation rate, *INTR* means interest rate while *GFCF* means gross capital formation.

The economic model in equation 1 was converted to equation 2 with an error term which is as follows

$$GDP_t = \alpha_0 + \beta_1 AGO_t + \beta_2 FDI_t + \beta_3 INFR_t + \beta_4 INTR_t + \beta_5 GFCF_t + \varepsilon_t \quad (2)$$

Where the coefficients of  $\beta_1, \dots, \beta_5$  denotes the parameters,  $\alpha_0$  shows the constant term,  $t$  represents time,  $\varepsilon_t$  stands for the error term.

Apriori Expectation:  $\beta_1 > 0, \beta_2 > 0, \beta_3 < 0, \beta_4 < 0, \beta_5 > 0,$

## 4.2 Data Requirement and Sources

The data used for this study consists of data on the Gross Domestic Product, agricultural output, foreign direct investment, inflation rate, interest rate and gross capital formation for the period covering from 1981 to 2024. The research work makes use of secondary time series data which was collected from World Bank, Central Bank of Nigeria Statistical Bulletin and the National Bureau of Statistics. The choice for this period was based on data availability. Augmented Dickey Fuller was used to check the statistical properties of the data.

## 4.3 Techniques of Estimation

### *Unit root test:*

Time series data are prone to spurious regression. We subject our data to unit root test to avoid this. We tested for the stationarity of the series using the Augmented Dickey Fuller (ADF) tests

$$\Delta Y_t = \alpha_0 + \alpha_1 Y_{t-1} + \sum_{i=1}^p \delta_i \Delta Y_{t-i} + \varepsilon_t \quad (2a)$$

Where  $Y_t$  is the log of the variable in the time period  $t$  while  $t$  denotes the time trend,  $p$  indicates the lag length  $\Delta Y_{t-1}$  indicates the first difference at  $Y_t$  for example

$$Y_{t-1} - Y_{t-2}, y - \left[ \sum_{i=1}^p \alpha_i \right] \text{ and } \delta_1 = \sum_{j=1}^p \alpha_j \text{ while } \varepsilon_t \text{ is the stochastic error}$$

term with the mean 0.

The ADF test assumes a null hypothesis of a unit root in the  $Y_t$  series against the alternative of no unit root in the  $Y_t$  series. Equation (2a) is in first difference which makes us to test if the variable  $Y_t$  is a stationary series and contains the unit root if the estimated coefficient  $Y$  is equal to zero.

The ADF test is a null hypothesis of a unit root in the  $Y_t$  series against the alternative of no unit root in the  $Y_t$  series. Therefore  $H_1: y = 0$  which implies that there is a unit root and  $H_1: Y < 0$  which shows that there is no unit root.

### *Cointegration:*

The study used the ARDL bound testing approach for cointegration. An advantage of the ARDL bound testing is that it accommodates several variables with different orders of cointegration which makes it applicable even when the series is showing a non-uniform integration order.

Besides the ARDL is usually robust in cases of small sample sizes and it ensures a more reliable estimates in the long run relationships. This flexibility makes the

model to capture the cointegration regardless of a situation where the variables are integrated at I(0) and I(1) while fostering the accuracy and reliability of the long run model. This study employs the Autoregressive Distributed Lag (ARDL) model developed Pesaran *et al.* (2001). The ARDL model is useful in order to know if the order of integration is first order or mixed and does not put a restriction on sample size. Equation 3 shows the short run and the long run dynamics of equation 2.

$$\begin{aligned} \Delta GDP = & \alpha_0 + \sum_{k=1}^n \alpha_1 \Delta \ln GDP_{grt-k} + \sum_{k=1}^n \alpha_2 \Delta AGO_{t-k} + \sum_{k=1}^n \alpha_3 \Delta FDI_{t-k} + \\ & \sum_{k=1}^n \alpha_4 \Delta INFR_{t-k} + \sum_{k=1}^n \alpha_5 \Delta INTR_{t-k} + \sum_{k=1}^n \alpha_6 \Delta GFCF_{t-k} + \beta_1 GDP_{t-1} + \\ & \beta_2 AGO_{t-1} + \beta_3 FDI_{t-1} + \beta_4 INFR_{t-1} + \beta_5 INTR_{t-1} + \beta_6 GFCF_{t-1} + \varepsilon_t \end{aligned} \quad (3)$$

In the equation 3 above,  $\beta_1, \dots, \beta_6$  are the long run parameters while  $\alpha_0, \dots, \alpha_6$  are the short run parameters.  $\alpha_0$  is the drift component,  $\Delta$  is the difference operator while  $\varepsilon_t$  is the error term. ARDL Bound test is used to confirm the presence of a long run cointegrating relationships and it also compares the upper and lower bound critical values which was provided by Pesaran *et al.* (2001) with the value of the F-Statistic.

If the F-Statistic is higher than the upper bound critical values, we reject the null hypothesis which shows that there is an existence of the cointegrated variables in the model. But if the upper bound critical values are higher than the F-statistic, the null hypothesis is accepted indicating the absence of cointegration among the variables in the model. The error correction coefficient that shows the speed of adjustment from the short run disequilibrium to the long run equilibrium is shown in equation 4.

$$\begin{aligned} \Delta GDP_t = & \alpha_0 + \sum_{k=1}^n \alpha_1 \Delta GDP_{t-k} + \sum_{k=1}^n \alpha_2 \Delta AGO_{t-k} + \sum_{k=1}^n \alpha_3 \Delta FDI_{t-k} + \\ & \sum_{k=1}^n \alpha_4 \Delta INFR_{t-k} \\ & + \sum_{k=1}^n \alpha_5 \Delta INTR_{t-k} + \sum_{k=1}^n \alpha_6 \Delta GFCF_{t-k} + \phi ECM_{t-k} + \varepsilon_t \end{aligned} \quad (4)$$

Where  $\Delta$  is the first difference operator,  $\phi$  denotes the coefficients of the error correction term which shows the adjustment speed in the long run equilibrium after a shock in the short run.

**Description of variables:**

**i. Gross Domestic Product (GDP)** - GDP is the total monetary value of all final goods and services produced in a nation over a given period of time which is usually a year. GDP varies from nation to nation and it is used to determine the economic status of a nation.

**ii. Inflation rate (INFL)** - Inflation is a measure of the rate at which the prices of goods and services in the economy is rising. Inflation causes a decline in the purchasing power of a given currency for a period of time which leads to the

uncertainty of taking some future investment decisions in an inflation battered economy. This has a negative impact on the aggregate output.

**iii. Interest rate (INT)** -This is the interest charged to the borrower to the lender. It is often expressed as a percentage of the principal. Interest rates are directly proportional to the amount of risk that happens with the borrower. Interest rates are the rates that are paid by banks to their clients for keeping their deposits with the commercial bank.

**iv. Gross Fixed Capital Formation (GFCF)** - It consists of resident's producers' investments and net deposits of fixed assets during a specific time period. GFCFs also includes the additions to the value of non-produced assets which is realized by producers and non-economic agents in an economy. The inclusion of GFCF is to account for investment adjusted for inflation during the period under study

**v. Agricultural Output(AGO)** - It is the total market value of crops, livestock and other similar products from agriculture which are generated within a specific area or duration. The parts of agricultural output include grains, fruits, vegetables alongside milks, egg and fish. Agricultural output tracks food security and also determines the productivity of farming activities. Agricultural output is influenced by good weather and climate, farm inputs and market availability.

**vi. Foreign Direct Investment** - This is an investment in which a nation or individual invests in another country. This is to stamp their authority in the foreign market, have a good access to their natural resources, lower the costs of production and gain more advantages in the aspect of science and technology.

## **5. Data Presentation and Analysis**

### **5.1 Descriptive Statistics**

The table below shows the descriptive statistics of the variables that were used in the study. The mean of gross domestic product is N40,830billion with a median of N31,874 billion which shows the regular fluctuations of the GDP over the time frame. Agricultural output showed a mean of 11,515.87 with a median of 4418.73 which shows a lot of wide gaps in the output of agriculture.

Foreign direct investment recorded a mean of 2.46 and a median of 1.87 which shows that the flows of foreign direct investment is at a low trend. Inflation rate with a mean of 19.23% shows a high inflation rate while the average of interest rate at 2.38% shows a normal interest rate for the Nigerian economy. Gross capital formation of a mean of 24.53 portrays a steady fixed capital investment.

Besides, the gross domestic product and agricultural output values in terms of standard deviation were 21,992.31 and 15608.15 which is an indication of high

variability. Inflation rate has a high volatility at 16.12 which pinpoints an instable level of prices. Foreign direct investment and interest rate show a normal variability while gross capital formation displays a low level of dispersion which is an indication of a normal stability in the formation of capital.

Moreover, in terms of kurtosis, both inflation rate and agricultural output at 5.495 and 4.329 are leptokurtic which shows that the distributions are of high peaks with fat tails while foreign direct investment are normally leptokurtic. Gross Domestic product is platykurtic with a value of 1.566 which indicates a flat distribution. Interest rate and Gross capital formation are close to the normal distribution with the values of 2.281 and 2.272.

Furthermore, Jarque-Bera test revealed that the gross domestic product, gross capital formation and interest rate are normally distribution because their probability values are more than the 5% level of significance. On the other hand, the values of agricultural output, foreign direct investment and inflation rate are not normally distributed because their values of probabilities are at 5% significance level.

**Table 1.** *Descriptive Statistics*

	GDP	AGO	FDI	INFR	INTR	GFCF
Mean	40380.530	11515.870	2.460	19.225	2.378	24.530
Median	31874.990	4418.725	1.870	13.130	2.030	24.200
Maximum	79289.390	57498.630	8.840	72.840	6.080	26.300
Minimum	16048.310	17.050	0.187	5.390	0.090	23.000
Std. Dev.	21992.310	15608.150	2.473	16.119	1.735	0.896
Skewness	0.452	1.505	1.226	1.854	0.545	0.362
Kurtosis	1.566	4.329	3.425	5.495	2.281	2.272
Jarque-Bera	5.267	19.847	11.348	36.603	3.124	1.936
Probability	0.072	0.000	0.003	0.000	0.210	0.380

**Source:** *Eviews 12 output.*

## 5.2 Test for Unit Root

The unit root test results below shows that the gross domestic product, agricultural output, foreign direct investment and gross fixed capital formation were non stationary at levels but became stationary at first difference which means that they are integrated to the order of 1. On the other hand, inflation rate and interest rate was were stationary at levels which implies the integration to the order of zero. This justifies the use of Autoregressive Distributed Lag(ARDL).

**Table 2.** *Unit root test table*

VARIABLE	ADF		PP		REMARK
	LEVEL	FIRST DIFFERENCE	LEVEL	FIRST DIFFERENCE	
GDP	2.491 (0.996)	-13.076 (0.000)***	3.933 (0.999)	-11.759 (0.000)***	I(1)

AGO	20.212 (1.000)	-12.120 (0.000)***	17.729 (0.258)	-14.314 (0.000)***	I(1)
FDI	-1.084 (0.248)	-8.356 (0.000)***	-1.056 (0.258)	-8.149 (0.000)***	I(1)
INFR	-18.610 (0.000)***	-6.869 (0.000)***	-1.712 (0.000)***	-11.279 (0.000)***	I(0)
INTR	-3.058 (0.001)***	-8.269 (0.000)***	-3.014 (0.000)***	-8.511 (0.000)***	I(0)
GFCF	0.354 (0.783)	-7.522 (0.000)***	0.370 (0.787)	-7.521 (0.000)***	I(1)

*Source:* Eviews 12 output.

### 5.3 Bound Test

The F-bound test presented in Table 3 shows that the f-statistic of 22.189 is larger than the upper critical limits at all the significance level of 1%, 5% and 10% which is 4.15, 3.38 and 3 respectively. This reveals that the null hypothesis of no cointegration is rejected which confirms the existence of a stable long run relationship between the dependent and the independent variables.

Besides the ARDL model is suitable for both the dynamics of the short run and the long run equilibrium relationships in this regard.

**Table 3.** Bound test

Test Statistic	Value	Signif.	I(0)	I(1)
F-statistic	22.189	10%	2.08	3
K	5	5%	2.39	3.38
		2.50%	2.7	3.73
		1%	3.06	4.15

*Source:* Eviews 12 output.

### 5.4 Short Run

Table 4 shows the short run effects of foreign direct investment and agricultural output on the growth of the economy. Foreign direct investment (FDI) had a negative relationship with the economic growth as a unit increase in the foreign direct investment will cause a 26.812-unit decline in the growth of the national economy at an insignificance level which does not conform to the apriori expectation.

This is because the foreign direct investment is as a result of input from foreign investors which adds its quota to the growth of the economy. It did not obey the apriori expectation because it made some local parameters to be redundant. The lagged value of foreign direct investment FDI(-1) also had an unfavorable relationship with the Gross Domestic Product as a 1 unit rise in the lagged value of foreign direct investment will cause a 291.041 unit fall in the economic

transformation of the national economy at a significance level of 5% as it is not in accordance with the apriori expectation.

This is because the lagged value of foreign direct investment in the current year is not the same as the lagged value of the foreign direct investment in the previous year due to changes in the government policies and the attitude of the government towards foreign policies.

Inflation rate (INFR) had a negative relationship with the growth rate of the economy as a 1 unit rise in the inflation rate led to a 41.575-unit decline in the economic growth at a 1% significance level as it conforms to the apriori expectation. This is because the inflation leads to the persistent rise in the general price level of goods and services.

Also, the lagged value of inflation rate (INFR (-1)) had a positive relationship with the growth rate of the economy as a 1 unit rise in the lagged value of the inflation rate led to a 28.70-unit increase in the economic growth at a 5% significance level as it does not conform to the apriori expectation.

This is because the inflation in the previous year was utilized by the citizens and the industries to their highest advantage as inflation leads to the increase in the value of assets for man and industries, leads to increased paycheck and reduces the burden of debt for the people and industries.

Interest rate (INT) had unfavorable relationship with the economic growth of the nation as a unit increase in the interest rate led to a 363.291 unit fall in the gross domestic product of the nation at an insignificance level as it obeys the apriori expectation because higher interest rates will discourage several people from taking loans from banks and other financial institutions in the nation.

Besides the interest rate lagged value (INT (-1)) had a favorable relationship with the economic growth of the nation as a unit increase in the interest rate led to a 758.255 unit rise in the gross domestic product of the nation at a 10% significance level as it disobeys the apriori expectation because interest rates will make people to be innovative and financially self-sufficient to the extent that they will not think of taking loans from banks.

The coefficient for CointEq (-1) was -0.183 at the 1% level of significance indicates that approximately 18.3% of any short run disequilibrium in economic growth was corrected each period which guides the economy back to its long run equilibrium.

The negative sign confirms that the deviations from equilibrium were gradually reduced over a period of time which confirms that Nigeria economy showed a tendency to stabilize and align with a long-term path.

**Table 4. Short run table**

Variable	Coefficient	Std. Error	t-Statistic	Prob.
FDI	-26.812	118.214	-0.227	0.822
FDI(-1)	-291.041	120.625	-2.413	0.022
INFR	-41.575	10.688	-3.890	0.001
INFR(-1)	28.700	9.976	2.877	0.008
INTR	-363.291	235.016	-1.546	0.133
INTR(-1)	758.255	258.950	2.928	0.007
CointEq(-1)*	-0.183	0.013	-13.692	0.000

*Source: Views 12 output.*

## 5.5 Long Run

Table 5 shows the long run analysis as the findings revealed that there is a healthy relationship between the agricultural output and the economic growth of the nation as a 1 unit rise in agricultural output (AGO) will lead to 0.826-unit acceleration in economic growth at a 1% level of significance. This agrees with the apriori expectation in the sense that agricultural output boosts the agricultural sector of the economy as it will reduce starvation of the citizens, create a lot of jobs for the people because it has created a lot of jobs for people and improve their quality of lives.

Also, there is a long run positive relationship between the foreign direct investment and the economic growth in the long run in the sense that a unit increase in foreign direct investment(FDI) will lead to 2695.225-unit progress in the growth of the national economy at 1% level of significance.

This supports the apriori expectation in the sense that foreign direct investment will attract foreign investors that will come in invest their assets in the key assets of the economy like education, agriculture and the health sectors thereby reducing death rates and providing food and jobs for families in the nation.

Moreover, there is a negative relationship between the inflation rate (INFR) and economic growth at the long run because a unit increase in the inflation rate (INFR) will lead to a 226.197-unit decline in the gross domestic product at a significance level of 10%. This supports the apriori expectation because inflation will lead to market uncertainty which will make the business environment to be more challenging for manufacturing companies and individuals in projecting new prices and revenue costs.

Inflation also chases away local and foreign investors from investing in the nation's economy and finally reduces the level of savings as people will be struggling to survive. In addition, there is a negative connectivity between the interest rate (INTR) and gross domestic product in the long run because a 1 unit upward rise in interest rate (INTR) will lead to 5113.660-unit decrease in economic growth at a 1% level of significance.

This supports the apriori expectation in the sense that high interest rate increases the consumer's debts, reduced the disposable income and slows the growth of the manufacturing industries in the nation because a rise in the debt of consumers as a result of high interest rate will reduce their purchase of industrial products.

Furthermore, there is a positive relationship between the gross capital formation and economic growth in the long run because a unit rise in gross capital formation (GFCF) will lead to 82.7 increase in the economic growth at a significance level. This supports the apriori expectation in the sense that gross capital formation makes the authorities to have enough capital expansion to run the affairs of the economy which will be beneficial to the people.

**Table 5. Long run table**

Variable	Coefficient	Std. Error	t-Statistic	Prob.
AGO	0.826	0.114	7.276	0.000
FDI	2695.225	636.802	4.232	0.000
INFR	-226.197	80.735	-2.802	0.009
INTR	-5113.660	1040.730	-4.914	0.000
GFCF	82.738	1515.856	0.055	0.957
C	45629.190	36413.140	1.253	0.220

*Source: Eviews 12 output.*

## 6. Diagnostic Tests

### 6.1 Test for Serial Correlation and Heteroskedasticity

The Breusch-Godfrey Serial Correlation LM test and the Breusch-Pagan-Godfrey Heteroskedasticity test was conducted on the regression to test for the serial correlation and the presence of heteroskedasticity and the result was presented in Table 6 and Table 7.

From the result the Breusch-Godfrey Serial Correlation LM test has an Obs R Squared value of 0.68 with a probability value that is greater than 5% level of significance which shows the rejection of a null hypothesis of no serial correlation in the residuals.

Also, the Obs R-Square value of the Breusch-Pagan-Godfrey Heteroskedasticity test is 0.773 which is greater than the significance level of 5%. This confirms that the null hypothesis of no heteroskedasticity cannot be rejected therefore we conclude that the regression model is free from serial correlation and heteroscedasticity.

**Table 6. Serial Correlation**

Breusch-Godfrey Serial Correlation LM Test:			
Null hypothesis: No serial correlation at up to 2 lags			
F-statistic	0.680	Prob. F(2,27)	0.934

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Obs*R-squared	0.212	Prob. Chi-Square(2)	0.899
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Source: Eviews 12 output.

**Table 7. Test for heteroscedasticity**

Heteroscedasticity Test: Breusch-Pagan-Godfrey

Null hypothesis: Homoscedasticity

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F-statistic	0.773	Prob. F(12,29)	0.672
Obs*R-squared	10.183	Prob. Chi-Square(12)	0.600
Scaled explained SS	3.377	Prob. Chi-Square(12)	0.992

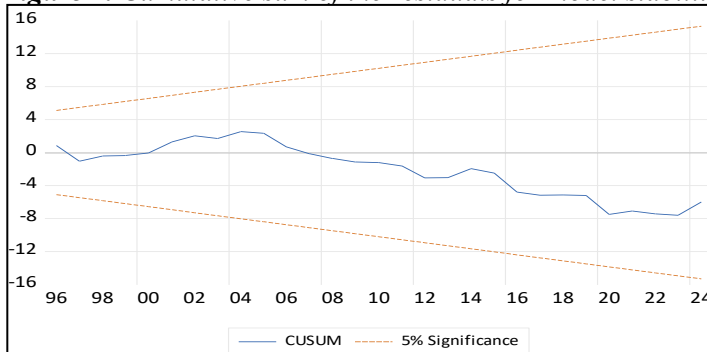
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Source: Eviews 12 output.

### 6.2 Stability Test

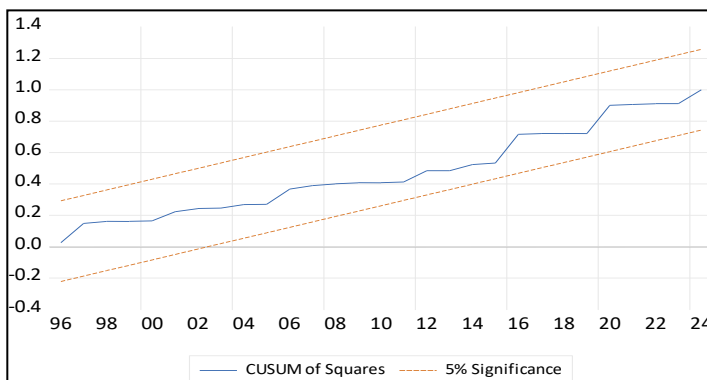
The Cumulative Sum of the Residuals (CUSUM) and the CUSUM of Square (CUSUM SQ) tests was applied to assess the stability of the parameters of the model. Figure 1 and 2 plots the graphs of CUSUM and CUSUM SQ tests.

**Figure 1. Cumulative sum of the residuals for model stability**



Source: Eviews 12 output.

**Figure 2. Cumulative Sum of Squares for model stability**



Source: Eviews 12 output.

Similarly, from the result of CUSUMSQ, the blue line also falls within the critical bands which are the red lines of the 5% confidence interval of the stability of the parameters which validates the estimates of the CUSUM that the mode is stable during the period.

## **7. Summary, Conclusion and Recommendations**

This study looks at the effect of foreign direct investment and agricultural output on the nation's economic growth with an annual time series data from 1981 to 2024. The variables that were used in the study includes Gross Domestic Product (GDP), Agricultural output (AGO), Inflation rate (INFR), Gross Capital Formation (GFCF), Foreign Direct Investment(FDI) and Interest Rate (INTR). The autoregressive distributed Lag (ARDL) was used to assess the relationship between the foreign direct investment, agricultural output and economic growth.

The Augmented Dickey Fuller (ADF) test and Phillips-Perron (PP) test were used to conduct the unit root test to prevent a spurious regression of the model while the ARDL bound test was used to test for cointegration among the variables. From the ADF and PP results, interest rate and inflation rate were stationary at level while the gross domestic product, foreign direct investment, agricultural output and gross capital formation were stationary at first differencing.

Cointegration relationship were found among the variables of the study which implies the existence of long run relationships among the variables. A significant positive and negative relationship was discovered to exist between foreign direct investment and economic growth in the short run but significantly positive in the long run during the period of study.

Agricultural output and gross capital formation also had a positive effect on economic growth in the long run. The study concludes that foreign direct investment is negatively related to economic growth in the short run but positively related to economic growth in the long run while agricultural output is positively related to economic growth in the long run. From the summary of the analysis so far, the following was recommended for policy purposes:

1. The authorities should find ways of increasing the nation's gross domestic product by investing in human capital like funding educational infrastructures and funding students' scholarships and training nationally and internationally. They should also invest in bridges, roads and commercial transportation all over the state as all these will boost the gross domestic product of the nation.
2. For the agricultural output, the authorities should fund the agricultural sector of the economy by funding the farmers by loaning them and selling latest farm machineries to farmers at higher purchase. This will lead to a surge in

- agricultural productivity. This will reduce the full reliance on crude oil and encourage diversification.
3. Interest rates should be reduced by the authorities so that investments on the banking sector will not be hindered. It will also give room to technologies that can transform the economy of the nation and also make borrowing to be affordable to the people.
  4. Inflation rates should be moderate by redenominating the national currency through the removal of the last two zero digits. They can also implement contractionary monetary policies so that our devalued currency can attract good value. This will reduce poverty rate among the people, encourage investment from local and foreign entities and accelerate the purchasing power of the people as people will have more cash to purchase goods and services at affordable prices.
  5. For foreign direct investment, the government should tackle rising insecurity in the nation. This will create a good atmosphere for investors to come and invest in the country especially the agricultural sector.
  6. For the gross capital formation, the government should establish more factories and buy many factory machines for the agricultural sector in order to increase the productive capacity for the agricultural sector of the economy.

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