UMARU MUSA YAR'ADUA UNIVERSITY, KATSINA (UMYUK)
Journal of Economics and Development (UJED)

# FOREIGN DIRECT INVESTMENT, AGRICULTURAL PERFORMANCE AND ECONOMIC DEVELOPMENT IN NIGERIA

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**Journal Info:**
**ISSN** (e): 3026-8028
ISSN (p): 3027-0928

**Vol**: 01
**Issue**: 01
**June** 2024

**Pages**: 1 - 18

**Keywords**:
Human Development Index, economy, Nigeria, ARDL

## ABSTRACT

*This study examined foreign direct investment, agricultural performance and economic development in Nigeria from 1982 to 2022. The study objectives were achieved by analyzing annual time series data sourced from the World Development Indicators and United Nations Development Program. Relevant descriptive and econometric analyses were employed. The econometric tests used include the unit root tests, and Auto-Regressive Distributed Lag (ARDL) techniques for both the short run and the long run. The result revealed that foreign direct investment has an insignificant negative effect on economic development, while agricultural performance has a significant positive effect on economic development. The long run result showed that there is a positive and significant relationship between agricultural performance and economic development. There is a positive relationship between foreign direct investment and economic development at the long run. The study therefore concluded that agricultural performance is a catalyst for economic development because it has a positive and significant relationship. In view of these findings, the study recommended, amongst others, that it was necessary for the government of Nigeria to improve on agricultural performance and funding in order to achieve economic development. Also, the study encourages Nigerian government to put more foreign direct investment inflows into the real sector (Agriculture), so that the economy can feel the impacts more significantly.*

## 1.0 Introduction

Nigeria is known as a sovereign state that is naturally endowed with abundant resources, that is, human and material resources. The nation's resources should be fully utilized in a manner that is possible with the mineral deposits of the nation as a whole, which can only be harnessed by rational and efficient use of the natural resources. Therefore, the importance of resources in an economy depends on the roles the resources play in economic growth and development of the country. In developing economies like Nigeria, agriculture makes up the backbone and critical sector of the economy, as the contributions of the sector to the growth and sustainable development of the country cannot be overemphasized. It contributes vastly to economic growth and development of the economy in various ways, such as creation of employment opportunities for the country's workforce, provision of food requirement of the economy and industrial raw materials to industries, generates foreign exchange earnings and revenue to the government, and as well eradicates

extreme poverty in the country. In addition, it has been revealed that poor performance of economic growth in an economy especially, in the developing economies is due to slump in agricultural sector performance (Abayomi, 2017).

In most developing countries, Foreign Direct Investment (FDI) serves as a means of earning foreign reserves through investments, businesses and foreign aids from advanced countries. FDI is considered a valuable source of finance and capital formation, Technology-Transfer and know-how, as well as a viable medium for trade among countries. The Spillover effect also allows for the transfer of innovations and invention to the receiving countries, one of which Nigeria belongs. According to the requirement for accelerated growth in association with the Sustainable Development Goals is not completely clear, however, for economies to experience sustainable and inclusive development, cross-border trade is paramount (UNCTAD, 2019).

Presently, Nigeria is the first host economy of FDI in Sub-Saharan Africa, and the third in the continent. Recently, Nigeria has witnessed several trade policies which aim at diversifying the economy away from oil revenue. These policies are focused on improving the industrial sector, and of course, results in austerity. In 2018, the total FDI inflow to the country was around USD 1.9 billion, while in 2017, FDI inflow was around USD 3.5 billion, showing a decrease due to the consequence of the austerity measures imposed in 2018. At the third quarter of 2019, the FDI was only 3.37% (USD 200.08 million) of the total capital inflow for the period. Traditionally, FDI is designed to improve the recipient economies thereby enhancing economic growth and development, it is in this view that many developing countries attract foreign investors with the hope of strengthening their economy by increasing the foreign investment portfolio. (Oyegoke and Aras, 2021)

Nigeria as a country, with the abundant natural resource and large market size (a population of about 160 million), qualifies to be a major recipient of FDI in Africa and indeed, is among the top three FDI receiving economies in Africa in the past decade. However, the level of FDI attracted especially to agriculture is small compared to the resource base and potential need. Nigeria's share of FDI inflow to Africa averaged around 20.68% between 1985 and 2021. The percentage of FDI inflow to the agricultural sector in Nigeria during the same period is less than 1%. Between 1985 and 2000, it was 2.46% which was the highest and stood at 0.37% in subsequent years (Ajuwon and Ogwumike, 2021). Nigeria as a country has the potentials of becoming the largest economy in Africa, and a major player in the global economy because of its rich human and natural resources, with which she can build an affluent economy, reduce poverty, and provide good health care for her citizens. This has not been achieved because of the drawback of major productive sectors of the economy due to over dependence on oil. This has drastically affected the agriculture of Nigeria which has been the main source of resources of revenue earning to the economy. This continued deterioration of budgetary allocation to the sector, decline in agricultural output and the perception that if properly taken into consideration, the sector could bounce back to its position motivated by the urge to investigate the alternative ways of revamping the sector through FDI.

The need for this research is to analyze the effect of foreign direct investment (FDI) and agricultural performance on economic development in Nigeria through the involvement of the FDI and agricultural performance as a catalyst of change, the economic development in Nigeria. However, FDI and growth debates are country specific. Earlier studies (for instance, Oyejide, 2015; Akinlo, 2014) examined only the importance of FDI on growth and channels through which it may be benefiting the economy. This study however will

examine the effect of FDI and agricultural performance on the development of the Nigerian economy.

The broad objective of this study is to investigate the link between agricultural performance, FDI and economic development in Nigeria from 1982 to 2022. The specific objectives are to; To analyze the trend of agricultural performance and FDI in Nigeria, to examine the relationship between foreign direct investment (FDI), agricultural performance and economic development in Nigeria and to look at the interactive effect of FDI and agricultural performance on economic development in Nigeria.

## 2.0 Literature Review

### 2.1 Theoretical Review

Traditional theory suggests that savings from advanced economies can be exported to developing countries to improve production output, creates jobs, enhance skills, increase productivity, and improve technical efficiency. It is believed that these actions will lead to improved economic growth and development in developing countries (Nnamdi and Daniel 2018). This theory rejects any restriction on capital flows and assumes that capital will flow freely to economies with higher yields. (Grubel, 1981). Neoclassical economists also expect capital to move from developed and industrialized nations to developing countries due to the potential for higher investment returns.

Lewis theory associate economic growth with the agricultural sector, proposing that transferring surplus labor from agriculture to other sectors will enhance economic growth (Lewis, 1979). In this model, less developed economy consists of two sectors: A traditional, overpopulated rural subsistence sector characterized by zero marginal labor productivity-a situation that permits Lewis to classify this as surplus labor in the sense that it can be withdrawn from the traditional agricultural sector without any loss of output and a high productivity modern urban industrial sector into which labor from the subsistence sector is gradually transferred. The primary focus of this model is on both process of labor transfer, the growth of output and employment in the modern sector. According to this theory, an increase in agricultural production would lower food prices and leave more capital for investment, thereby stimulating economic growth. (Onuoha, Kromtit and Abimiku, 2015).

### 2.2 Empirical Review

Baban, Al-kake, Mohd, Othman, and Shivan (2019) investigated the impact of foreign direct investment from 1988-2018 in United Kingdom. The study employs the vast empirical literature available on the matter plus data gathered from various organizations. The study first examines the role of foreign direct investment plays on economic growth in the United Kingdom and its impacts on domestic investment. The study made use of regression analysis to investigate the relationship between foreign direct investment and economic growth of the United Kingdom. The study made use of different econometric models to establish the relationship between FDI and economic growth. Data for analysis was collected from reputable organizations such as the IMF, Fraser Institution and United Nations Educational Scientific and Cultural Organization (UNESCO) reports. Secondary data was used for this study and the data were analyzed using the Statistical Package for the Social Sciences (SPSS). Correlation results helps in examining the role played by various host country conditions in determining foreign direct investment. Also, the results emphasized the significance of the different institutional factors in determining foreign direct investment. Ogbanje and Salami (2022) investigated the impact of foreign direct investment on Nigeria's agricultural sector, using Johansen's co-integration test. The result showed that FDI has a significant negative impact on the agricultural productivity. The study suggest that the Federal Ministry of

Agriculture and Rural Development should evolve policies that would guarantee steady inflow of FDI into agricultural sector.

Muhia (2019) examined the effect of FDI on economic growth on the major sector of Kenya's economy. In his article, he investigates the influence of foreign direct investment on Kenya's economic growth using Quantitative data. The researchers collected data from the World Bank and the Kenya National Bureau of Statistics (KNBS) from 2000 to 2017. The result of their findings showed that foreign direct investment in the infrastructure sector has a significant effect on economic growth while FDI invested in manufacturing and Agricultural sector has no significant effect on economic growth. Giwa, Goerge, Okodua and Adeniran (2020) examined the effects of FDI on Nigerian real gross domestic products (RGDP) between 1981 and 2017, using the robust GMM technique. The study established that quality of labour exhibited significant impacts on RGDP while the use of capital demonstrated negative effects on RGDP in Nigeria within the time series used. Therefore, the external inflows could help to achieve the goals for enhancing emerging economy.

Tarasa and Ahmad (2023) examined the impact of FDI on Nigeria economic growth from 1999-2020, using both primary and secondary data. The study reveals that FDI positively affect Nigeria EG. The research suggests that there is need for government to enhance the FDIs environment so as to enjoy the latest benefits of international interest by applying macroeconomic strategies, encouraging innovation and improving good and quality infrastructure. Oyegoke and Aras (2021) investigated the effects of FDI both on the owner and the host country, using Nigeria as a case study. This study adopted the OLS regression technique to analyze data sourced from World Bank Indicators. The result shows that FDI inflow has a positive impact on the economy while FDI outflow has a negative impact on the economy.

Olasehinde and Ajayi (2022) examined the relationship between foreign direct investment and economic growth in Nigeria using ARDL technique. The result shows that FDI has a significant long-run relationship on economic growth. The study recommended that adequate exportation of Nigerian products should be encouraged by export-promotion decree in order to boost trade openness which will also have significant effect on economic growth. Ugonna and John (2022) empirically investigated foreign direct investment and the economic growth in Nigeria from 1990 to 2021. The study adopted OLS approach to carry out the short run analysis while Johansen co-integration test was used to carry out the long run analysis. The result shows that there is positive and significant relationship between FDI and economic growth during the period.

Many studies have been conducted on the impact of foreign direct investment on economic growth and sectoral performance, however, the impact of FDI on agricultural sector is scanty. Several authors evaluate the impact of foreign direct investment on manufacturing sector in Nigeria. With the huge role played by foreign direct investment in Nigerian economy and the declining activities of the agricultural sector, the need to evaluate the effect of foreign direct investment and agricultural performance on economic development in Nigeria which is the main thrust of this study.

## 3.0 Methodology

### 3.1 Theoretical Framework

This is a macroeconomic theory of total spending in the economy and its effects on output, employment and inflation. It was developed by British economist, John Maynard Keynes during the 1930s in an attempt to understand the great depression. The main idea of Keynes theory is the assertion that aggregate demand-measured as the sum of spending by households, businesses and the government-is the most

driving force in an economy. Keynes further asserted that free market has no self-balancing mechanisms that leads to full employment. Keynes economists justify government intervention through public policies that aim to achieve full employment and price stability which aids in the development of a nation. Also, government intervention is necessary to moderate the booms and busts in economic activity otherwise known as the business cycle. An economy's output of goods and services is the sum of four components: consumption, investment, government purchase, and net exports (the difference between what a country sells to and buy from foreign countries). Any increase in demand has come from one of these four components.

$$Y = C + I + G + (X - M) \qquad (1)$$

This theory holds particular relevance in Nigeria, where foreign direct investment and agricultural output fluctuate. To address this issue, the government should intervene in the market with effective policies, as market forces alone cannot stabilize the economy during periods of inflation and deflation. Policies supporting farmers can boost the agricultural sector, leading to increased agricultural output and attracting foreign direct investment. With the appropriate infrastructure and favorable policies, foreign investors may be encouraged to invest in the country.

## 3.2 Data Description and Model Specification

The study utilized annual time series data spanning from 1982-2022. The data were obtained from the World Development Indicators (WDI) and United Nations Development Program (UNDP) data 2022. Theoretically, the model can be specified as Human Development Index (HDI) and Per capita Income (PCI), which are the dependent variable of economic development, while the explanatory variables are foreign direct investment (FDI), agricultural performance (AGP), the inflation rate (INF), gross fixed capital formation (GFCF), exchange rate (EXR) and interest rate (INT).

To find the effect of foreign direct investment, inflation rate on economic development in Nigeria, this study adopts and modifies the model used by Eze (2017) which uses human development index, foreign direct investment, agricultural output, exchange rate and others.

**Model 1**: In its implicit form, the model is given as:

HDI = f (FDI, AGP, INF, GFCF, EXR, INT)

In stochastic form, it is given as:

$$HDI_t = \beta_0 + \beta_1 FDI_t + \beta_2 AGP_t + \beta_3 INF_t + \beta_4 GFCF_t + \beta_5 EXR_t + \beta_6 INT_t + \mu_t$$

**Model 2**: In its implicit form, the model is given as:

PCI = f (FDI, AGP, INF, GFCF, EXR, INT)

In stochastic form, it is given as:

$$PCI_t = \beta_0 + \beta_1 FDI_t + \beta_2 AGP_t + \beta_3 INF_t + \beta_4 GFCF_t + \beta_5 EXR_t + \beta_6 INT_t + \mu_t$$

A priori expectation: $\beta_1, \beta_2, \beta_4 > 0$; $\beta_3, \beta_5, \beta_6 < 0$

## 3.3 Estimation Techniques

The autoregressive distributed lag (ARDL) bounds testing technique was used to estimate the effect of foreign direct investment and agricultural performance on economic development in Nigeria. This estimation technique was informed by the result of Augmented Dickey Fuller (ADF) and Phillip-Perron unit root tests which revealed that the series used in the study are either stationery at level I(0), or first difference I(1). The ARDL estimation technique enables the estimation short-run effects, long-run effects and the speed of adjustment from short-run disequilibrium to long-run equilibrium

## 4.0 Analysis and Discussion of Result

### 4.1 Trend Analysis

The trend of foreign direct investment and agricultural performance shown in the figure below clearly exemplified the movement of foreign direct investment and agricultural performance in the period under investigation.

**The Trend of Foreign Direct Investment**

The trend of foreign direct investment is represented in figure 4.1

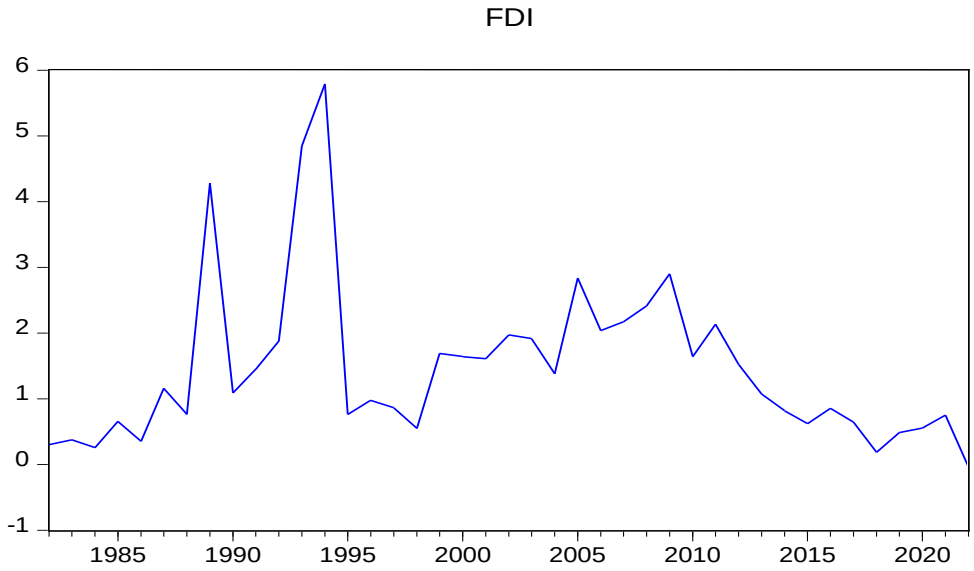


***Figure 1**: The Trend of Foreign direct investment*

**Source: Author's Compilation based on E-views 10**

Figure 4.1 shows FDI as a percentage of the gross domestic product (GDP) in Nigeria. The percentage has been fluctuating. From 1982 to 1989, it increased from 0.2% to 4.4% and later fell to 1.5% in 1992. This was because at that time the inflation rate was high and government policy in the country was favorable which led to the increase in foreign direct investment. Also, the exchange rate of naira to other currency was low compared to now. From 1993 to 1994, there was a tremendous increase to 5.9%. This was because for two years, the inflation rate was the same which was 57% wish also aid foreign investors to invest more in the country because the inflation was not increasing. Also, there was an increase in the exchange rate from 54% to 101%, where by the investors can get more for less investment in the country. From 1995 to 2005, it started fluctuating from 0.8% to 2.8%, this was because the exchange rate increased in 1995 to 1999 which lead to the reduction of foreign investment in the country, which later reduced significantly from 2000 to 2005 and encouraged foreign investors. From 2010 to 2022, the value of foreign direct investment has been fluctuating. This is due to the decrease in inflation rate and bad government policy which does not encourage the flow of investment from foreign investors into the country. In addition, the current increase in debt owed by the country to foreign countries has also affected foreign investment in the country. Reasons why FDI has been fluctuating ranges from increase or decrease in wage rate, increase or decrease in tax rate, adequate or inadequate infrastructural facilities etc.

## The Trend of Agricultural Performance

The trend of agricultural performance is represented in figure 4.2

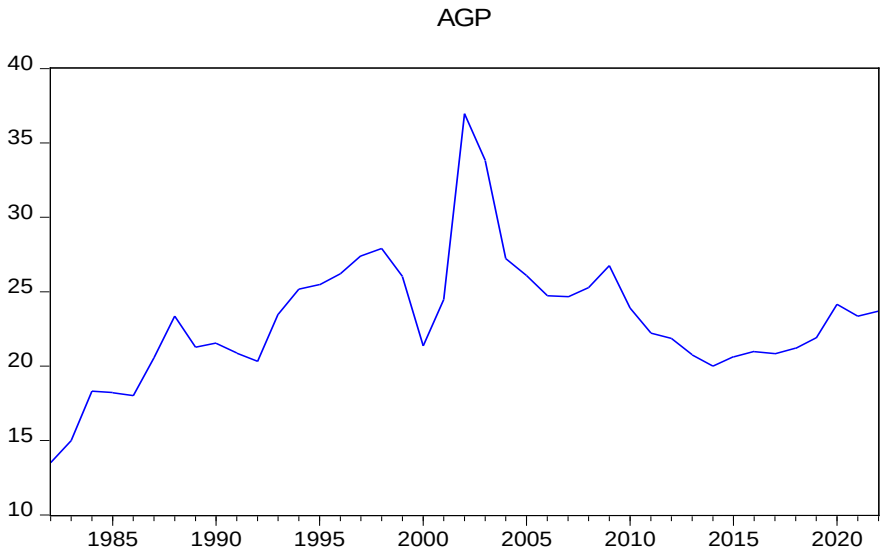


***Figure 2:*** *The Trend of Agricultural Performance*

**Source: Author's Compilation based on E-views 10**

The value for agricultural performance measured by agricultural output shows that there is a rapid increase from 1982 to 1989. The increase in the value of agricultural output is due to favorable government policies which were implemented during these periods and also provision of funds to farmer to encourage them. The government also reduce the interest rate paid by farmers on loans borrowed from bank to improve the agricultural sector. From 1989 to 1992, there was a reduction in agricultural performance from 23.4% to 20.3% due to the devaluation of the currency which had an effect on the exchange rate and also on the agricultural sector in the country. Also, at that time in the country the interest rate was high which also discourage the farmer from borrowing funds which could help with the development of the agricultural sector. There was an increase in the agricultural performance from 1993 to 1999 due to implementation of government policies and development of programs that aid the increase in agricultural output and also farmers. From 2000 to 2002, agricultural performance increased from 21.4% to 37% and reduced to 26.7% in 2009. Since 2010 till present agricultural output has been fluctuating and reducing due to the over dependence on the oil sector in the country and neglect of the agricultural sector. Also, the exchange rate of the country's currency to other foreign currencies is low, which means there is a devaluation of the country's currency (Naira). Presently, there are only few agricultural policies that are still implemented by the government, which are not enough to improve the sector and increase the agricultural output that also led to the reduction in the agricultural performance in the country.

***Table 1:*** *Descriptive Statistics Results*

| | HDI | FDI | AGP | INF | GFCF | EXR | INT | PCI |
|---|---|---|---|---|---|---|---|---|
| **Mean** | *0.244732* | *1.467174* | *23.16068* | *18.90111* | *34.25793* | *142.8017* | *11.03734* | *0.781662* |
| **Median** | *0.000000* | *1.087951* | *23.35706* | *12.87658* | *33.10736* | *100.6309* | *10.10833* | *1.182828* |
| **Maximum** | *0.538000* | *5.790847* | *36.96508* | *72.83550* | *85.94140* | *536.9105* | *23.24167* | *12.27614* |
| **Minimum** | *0.000000* | *-0.039128* | *13.50269* | *5.388008* | *14.16873* | *49.77628* | *4.206848* | *-13.12823* |
| **Std. Dev.** | *0.254594* | *1.245677* | *4.262829* | *16.65670* | *16.90638* | *112.4157* | *4.074404* | *4.562208* |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Skewness** | *0.065202* | *1.721257* | *0.744144* | *1.863759* | *0.969606* | *2.152441* | *0.765139* | *-0.489718* |
| **Kurtosis** | *1.025592* | *6.087099* | *5.141699* | *5.331598* | *3.879291* | *6.966515* | *3.641188* | *4.504353* |
| **Jarque-Bera** | *6.688624* | *36.52602* | *11.61987* | *33.02335* | *7.745068* | *58.53648* | *4.702828* | *5.504887* |
| **Probability** | *0.035284* | *0.000000* | *0.002998* | *0.000000* | *0.020806* | *0.000000* | *0.095234* | *0.063772* |
| **Sum** | *10.03400* | *60.15415* | *949.5878* | *774.9454* | *1404.575* | *5854.869* | *452.5311* | *32.04813* |
| **Sum Sq. Dev.** | *2.592730* | *62.06842* | *726.8685* | *11097.83* | *11433.03* | *505491.4* | *664.0309* | *832.5497* |
| **Observations** | *41* | *41* | *41* | *41* | *41* | *41* | *41* | *41* |

Source: Author's Compilation based on E-views 10

The table above shows the descriptive statistics of the variables used in the analysis. The mean of the variables HDI, FDI, AGP, INF, GFCF, EXC, INT and PCI are 0.244732, 1.467174, 23.16068, 18.90111, 34.25793, 142.8017, 11.03734 and 0.781662 respectively. The mean measures the average value of the series. It is obtained by adding up the values of the series in the current sample and dividing by the number of observations, which in this case is 41. The median of the variables HDI, FDI, AGP, INF, GFCF, EXR, INT and PCI are 0.000000, 1.087951, 23.35706, 12.87658, 33.10736, 100.6309, 10.10833 and 1.182828 respectively, which shows the variable in the middle either in ascending or descending order. The maximum and the minimum statistics of HDI are 0.538000 and 0.000000, the maximum and the minimum of FDI are 5.790847 and -0.039128, the maximum and the minimum of AGP are 36.96508 and 13.50269, the maximum and the minimum of INF are 72.83550 and 5.388008, the maximum and the minimum of GFCF are 85.94140 and 14.16873, the maximum and the minimum of EXR are 536.9105 and 49.77628, the maximum and the minimum of INT are 23.24167 and 4.206848, the maximum and the minimum of PCI are 12.27614 and -13.12823.

The standard deviation of HDI, FDI, AGP, INF, GFCF, EXR, INT and PCI are 0.254594, 1.245677, 4.262829, 16.65670, 16.90638, 42.4157, 4.074404 and 4.562208 respectively. The standard deviation measures the level of dispersion or spread in the series around its mean. Thus, the higher the value, the higher the deviation of the series from its mean and vice versa. The result of the skewness statistics shows that all the variables HDI, FDI, AGP, INF, GFCF, EXR and INT are positively skewed since their values are greater than zero, except for PCI which is negatively skewed since its value is less than zero. For kurtosis, the normal distribution is 3, but if it exceeds this value, the distribution is assumed to be peaked (Leptokurtosis) relative to the normal, but if it is less than 3, the distribution is flat (Platykurtosis) relative to the normal. In the case of the variable used in this study, the result shows that all except HDI are more than 3 which means that their distribution is at the peak while that of HDI is flat.

Jarque-bera, has a test statistic for testing whether a series is normally distributed measures the difference of the skewness and kurtosis of the series with those from the normal distribution. The probability of the jarque-bera is used to determine if the series is a normal distribution. From the result FDI, AGP, INF and EXR are not normally distributed while HDI, GFCF, INT and PCI are normally distributed. This result is supported by the skewness and kurtosis statistics for the series. Also, the sum of all the variables as well as the sum of the square deviation are shown in the table.

## 4.2 Unit Root Test

The table below present the result of the time series properties of the variables included in the model. The variable for the analysis is subjected to one basic test of unit root as a measure to determine if the unit root is stationary or not. The dependent variable HDI as well as the independent variables AGP, EXR and INT are all stationary at first difference while the dependent variable PCI as well as the independent variables FDI, INF and GFCF are stationary at level at 5%.

*Table 2: Unit Root Tests Results – ADF Procedure*

| Variables | ADF with the constant at levels | Critical value at 5% | ADF with the constant at the first difference | Critical value at 5% | Order of integration |
|---|---|---|---|---|---|
| ***HDI*** | *-0.757804* | *-2.936942* | *-10.14578* | *-2.938987* | *I(1)* |
| ***PCI*** | *-4.129048* | *-2.936942* | *-6.129976* | *-2.938987* | *I(0)* |
| ***FDI*** | *-3.794794* | *-2.936942* | *-8.210038* | *-2.938987* | *I(0)* |
| ***AGP*** | *-2.176152* | *-2.941145* | *-7.201282* | *-2.941145* | *I(1)* |
| ***INF*** | *-3.630554* | *-2.938987* | *-2.312814* | *-2.957110* | *I(0)* |
| ***GFCF*** | *-4.100524* | *-2.936942* | *-4.864916* | *-2.938987* | *I(0)* |
| ***EXR*** | *-2.261107* | *-2.936942* | *-4.430488* | *-2.938987* | *I(1)* |
| ***INT*** | *-1.416411* | *-2.945842* | *-3.825909* | *-2.945842* | *I(1)* |

Source: Author's Compilation based on E-views 10.

***Table 3****: Unit Root Tests Results – Philip-Perron Procedure*

| Variables | PP with the constant at levels | Critical value at 5% | PP with the constant at the first difference | Critical value at 5% | Order of integration |
|---|---|---|---|---|---|
| ***HDI*** | *-2.449987* | *-3.029970* | *-3.262414* | *-3.040391* | *I(1)* |
| ***PCI*** | *0.397808* | *-3.029970* | *-0.750180* | *-3.081002* | *I(0)* |
| ***FDI*** | *-3.766235* | *-2.936942* | *-13.53739* | *-2.938987* | *I(0)* |
| ***AGP*** | *-2.873825* | *-2.936942* | *-6.823716* | *-2.938987* | *I(1)* |
| ***INF*** | *-2.939784* | *-2.936942* | *-11.41532* | *-2.938987* | *I(0)* |
| ***GFCF*** | *-3.858869* | *-2.936942* | *-4.781532* | *-2.938987* | *I(0)* |
| ***EXR*** | *-1.991048* | *-2.936942* | *-4.218098* | *-2.938987* | *I(1)* |
| ***INT*** | *-2.469393* | *-2.936942* | *-7.658446* | *-2.938987* | *I(1)* |

Source: The Author's Compilation based on the E-views 10

### 4.3 The Interactive effect of agricultural performance and foreign direct investment on economic development

The Interactive effect is derived by multiplying agricultural performance value with foreign direct investment value and carrying out the analysis to find its effect on economic development. From table 3, HDI is taken as the economic development variable, and it shows that there is a negative relationship between the variables. Agricultural performance and foreign direct investment have a significant interactive effect on human development index.

***Table 4****: The Interactive Effect of AGP and FDI on HDI*

*Dependent Variable: HDI*
*Method: Least Squares*

| *Variable* | *Coefficient* | *Std. Error* | *t-Statistic* | *Prob.* |
|---|---|---|---|---|
| *INE* | *-0.000856* | *0.000119* | *-7.165636* | *0.0000* |

Source: The Author's Compilation based on E-views 10

From table 4, PCI is taken as the economic development variable and it shows that there is a positive relationship between the variables. Agricultural performance and foreign direct investment have a significant interactive effect on GNP per capita income.

*Table 5: Interactive Effect of AGP and FDI on PCI*

*Dependent Variable: PCI*
*Method: Least Squares*

| *Variable* | *Coefficient* | *Std. Error* | *t-Statistic* | *Prob.* |
|---|---|---|---|---|
| *INE* | *0.014234* | *0.004812* | *2.958017* | *0.0069* |

Source: The Author's Compilation based on E-views 10

**PART A: When HDI is the dependent variable**

### 4.4 Auto Regressive Distributed Lag Result for short run analysis

The aim of this research is to determine the impact of all independent variables on the dependent variable. Auto Regression Distributed Lag is run based on the unit roots properties of the variables of interest.

***Table 6**: ARDL Results*

Number of models evaluated: 64
Selected Model: ARDL(1, 0, 1, 0, 0, 0, 0)

| Variable | Coefficient | Std. Error | t-Statistic | Prob.* |
|---|---|---|---|---|
| HDI(-1) | 0.943227 | 0.091405 | 10.31925 | 0.0000 |
| FDI | -0.004695 | 0.010815 | -0.434117 | 0.6672 |
| AGP | -0.000649 | 0.004485 | -0.144609 | 0.8860 |
| AGP(-1) | 0.010044 | 0.004082 | 2.460386 | 0.0197 |
| INF | -0.000212 | 0.000762 | -0.278492 | 0.7825 |
| GFCF | -0.000305 | 0.001453 | -0.209618 | 0.8353 |
| EXR | 7.14E-05 | 0.000149 | 0.479792 | 0.6347 |
| INT | 0.001014 | 0.004383 | 0.231307 | 0.8186 |
| C | -0.190471 | 0.146538 | -1.299801 | 0.2033 |

| | | | |
|---|---|---|---|
| R-squared | 0.948277 | Mean dependent var | 0.250850 |
| Adjusted R-squared | 0.934930 | S.D. dependent var | 0.254767 |
| S.E. of regression | 0.064988 | Akaike info criterion | -2.434113 |
| Sum squared resid | 0.130928 | Schwarz criterion | -2.054115 |
| Log likelihood | 57.68225 | Hannan-Quinn criter. | -2.296717 |
| F-statistic | 71.04377 | Durbin-Watson stat | 2.092564 |
| Prob(F-statistic) | 0.000000 | | |

**Source: The Author's Compilation based on E-views 10**

## Interpretation of Regression Results

Automatic selection (using the Akaike Information Criterion) was used with a maximum of 1 lags for the dependent variable and 1 lags for the regressor. Out of the 64 models evaluated, the procedure has selected an ARDL (1, 0, 1, 0, 0, 0, 0) the model – 1 lag of the dependent variable, Human Development Index (HDI), 0 lag for the first independent variable, Foreign Direct Investment (FDI), 1 lag for the second independent variable, Agricultural Performance (AGP), 0 lag for the third independent variable, Inflation Rate (INF), 0 lag for the fourth independent variable, The Gross Fixed Capital Formation (GFCF), 0 lag for the fifth independent variable, Exchange Rate (EXR) and 0 lag for the sixth independent variable, Interest Rate (INT).

The first lag of the Human Development Index has a significant effect on the dependent variable itself and also a positive relationship. A 1% increase in the first period lag of the dependent variable of human development index will lead to a 0.94% increase in the human development index on average respectively and vice versa when other variables are held constant.

The estimated value for $\beta_1$ which is the coefficient of the first independent variable, foreign direct investment has an insignificant negative effect on the dependent variable, human development index. The value of the coefficient of $\beta_1$ is -0.004695 with the probability value of 0.6672. The study shows that for every 1% increase in foreign direct investment there will be a

0.46% decrease on average in foreign direct investment and vice versa when other variables are held constant.

The estimated value for $\beta_2$ which is the coefficient of the second independent variable, agricultural performance has a significant positive effect on the dependent variable, human development index. The value of the coefficient of $\beta_1$ is 0.010044 with the probability value of 0.0197, this means that for every 1% increase in agricultural performance, there will be a 0.19% increase on average in human development index and vice versa when other variables are held constant.

The estimated value for $\beta_3$ which is the coefficient of the third independent variable, inflation rate, has an insignificant negative effect on the dependent variable, human development index. The value of the coefficient of $\beta_3$ is -0.000212 with the probability value of, 0.7825, this means that for every 1% increase in inflation rate, there will be a 0.21% decrease on average in human development index and vice versa when other variables are held constant.

The estimated value for $\beta_4$ which is the coefficient of the fourth independent variable, gross fixed capital formation, has an insignificant negative effect on the dependent variable, human development index. The value of the coefficient of $\beta_4$ is -0.000305 with the probability value of, 0.8353, this means that for every 1% increase in gross fixed capital formation, there will be a 0.30% decrease on average in human development index and vice versa when other variables are held constant.

The estimated value for $\beta_5$ which is the coefficient of the fifth independent variable, exchange rate, has an insignificant positive effect on the dependent variable, human development index. The value of the coefficient of $\beta_5$ is 7.14E-05 with the probability value of, 0.6347, this means that for every 1% increase in exchange rate, there will be a 7.14% increase on average in human development index and vice versa when other variables are held constant.

The estimated value for $\beta_5$ which is the coefficient of the fifth independent variable, interest rate, has an insignificant positive effect on the dependent variable, human development index. The value of the coefficient of $\beta_5$ is 0.001014 with the probability value of, 0.8186, this means that for every 1% increase in interest rate, there will be a 0.10% increase on average in human development index and vice versa when other variables are held constant.

The expected value of $\beta_0$ which is the intercept, is -0.190471 with the probability level of 0.2033. This means that if the values of the independent variables are zero, the human development index will reduce by 0.19%. It has an insignificant negative effect on the human development index.

## Co-Efficient of Determination ($R^2$) and Adjusted ($R^2$)

The co-efficient of determination ($R^2$) shows the total variation in the dependent variable, human development index that is accounted for by the independent variables included in the model. The six independent variables explain about 94.82% variation in human development index. The adjusted co-efficient of determination $R^2$ is 0.934930, it implies that the explanatory variables are able to explain 93.49% of the total variable in the dependent variable.

The value of the F-statistics is 71.04377 with the probability value of 0.000000. The P-value of F-statistics is less than 0.05%. This means that all the independent variables have a jointly significant influence on the dependent variable. We reject the null hypothesis ($H_0$) and accept the alternative hypothesis ($H_1$). The value of Durbin-Watson statistics is 2.092564. It implies that there is no auto-correlation.

### 4.5 Co-integration Test (Bounds Test)

Since it has been ascertained that all the variables in consideration are stationary at level I(0), and the first order difference I(1), we therefore proceed to test if there is co-integration among the six variables. This test is to be carried out using the bounds testing approach to co-integration. The results of the bound test are displayed below.

*Table 7: Co-integration Results*

| *Null Hypothesis: No long-run relationships exist* | | |
|---|---|---|
| *Test Statistic* | *Value* | *K* |
| *F-statistic* | *1.920179* | *6* |
| *Critical Value Bounds* | | |
| *Significance* | *I0 Bound* | *I1 Bound* |
| *10%* | *1.99* | *2.94* |
| *5%* | *2.27* | *3.28* |
| *2.5%* | *2.55* | *3.61* |
| *1%* | *2.88* | *3.99* |

**Source: Author's Compilation based on E-views 10**

The calculated F-statistics is 1.920179, which is lower than I0 and I1 bound at 5% level therefore we say that there is no long run relationship between the variables.

### 4.6 Pair-wise Granger Causality Tests

This test shows if there is any causality between two different variables which is derived through the probability value less than 0.05.

*Table 8: Causality Tests 1*

*Pairwise Granger Causality Tests*
*Sample: 1982 2022*
*Lags: 1*

| *Null Hypothesis:* | *Obs* | *F-Statistic* | *Prob.* |
|---|---|---|---|
| *FDI does not Granger Cause HDI* | *40* | *0.09264* | *0.7626* |
| *HDI does not Granger Cause FDI* | | *0.76610* | *0.3871* |
| *AGP does not Granger Cause HDI* | *40* | *15.8827* | *0.0003** |
| *HDI does not Granger Cause AGP* | | *2.03082* | *0.1625* |
| *INF does not Granger Cause HDI* | *40* | *0.59569* | *0.4451* |
| *HDI does not Granger Cause INF* | | *1.53695* | *0.2229* |
| *GFCF does not Granger Cause HDI* | *40* | *3.89604* | *0.0559* |
| *HDI does not Granger Cause GFCF* | | *1.75923* | *0.1928* |
| *EXR does not Granger Cause HDI* | *40* | *0.90330* | *0.3481* |
| *HDI does not Granger Cause EXR* | | *0.00199* | *0.9647* |
| *INT does not Granger Cause HDI* | *40* | *1.14685* | *0.2911* |
| *HDI does not Granger Cause INT* | | *5.83212* | *0.0208** |

**Source: The Author's computation**

Note: * indicates the significance at the 5% probability level

There is a statistically significant unidirectional causality running from human development index to agricultural performance and gross fixed capital formation, thus, indicating that AGP and GFCF has an effect in causing changes in HDI. On the other hand, there is a unilateral causality running from HDI to INT, which means that human development index is significant in causing changes in interest rate.

*Table 9: Causality Tests 2*

*Pairwise Granger Causality Tests*
*Sample: 1982 2022*
*Lags: 1*

| *Null Hypothesis:* | *Obs* | *F-Statistic* | *Prob.* |
|---|---|---|---|
| *FDI does not Granger Cause PCI* | *40* | *1.84777* | *0.1823* |
| *PCI does not Granger Cause FDI* | | *2.68079* | *0.1100* |
| *AGP does not Granger Cause PCI* | *40* | *2.70246* | *0.1087* |

| | | | |
|---|---|---|---|
| *PCI does not Granger Cause AGP* | | *0.00316* | *0.9555* |
| *INF does not Granger Cause PCI* | *40* | *0.06143* | *0.8056* |
| *PCI does not Granger Cause INF* | | *0.47631* | *0.4944* |
| *GFCF does not Granger Cause PCI* | *40* | *1.34722* | *0.2532* |
| *PCI does not Granger Cause GFCF* | | *1.68650* | *0.2021* |
| *EXR does not Granger Cause PCI* | *40* | *0.95247* | *0.3354* |
| *PCI does not Granger Cause EXR* | | *10.1833* | *0.0029** |
| *INT does not Granger Cause PCI* | *40* | *0.00922* | *0.9240* |
| *PCI does not Granger Cause INT* | | *0.05761* | *0.8116* |

**Source: The Author's computation**

Note: * indicates the significance at the 5% probability level

There is a one-way causality running from real effective exchange rate to per capita income. This means that exchange rate in causing changes in per capita income.

**PART B: When PCI is the dependent variable**

## 4.7 Auto Regressive Distributed Lag Result for short run analysis

The aim of this research is to determine the impact of all independent variables on the dependent variable. Auto Regression Distributed Lag is run based on the unit roots properties of the variables of interest.

***Table 10**: ARDL Results*

*Dependent Variable: PCI*
*Method: ARDL*
*Number of models evaluated: 64*
*Selected Model: ARDL(1, 1, 0, 0, 0, 0, 0)*

| *Variable* | *Coefficient* | *Std. Error* | *t-Statistic* | *Prob.** |
|---|---|---|---|---|
| *PCI(-1)* | *0.123250* | *0.161287* | *0.764165* | *0.4505* |
| *FDI* | *-0.665099* | *0.545391* | *-1.219489* | *0.2319* |
| *FDI(-1)* | *0.706072* | *0.507238* | *1.391995* | *0.1738* |
| *AGP* | *0.315608* | *0.154134* | *2.047619* | *0.0492* |
| *INF* | *-0.087673* | *0.041638* | *-2.105620* | *0.0434* |
| *GFCF* | *-0.086239* | *0.052610* | *-1.639203* | *0.1113* |
| *EXR* | *0.002177* | *0.007387* | *0.294650* | *0.7702* |
| *INT* | *0.445335* | *0.184746* | *2.410523* | *0.0221* |
| *C* | *-7.241202* | *3.887254* | *-1.862807* | *0.0720* |

| | | | |
|---|---|---|---|
| *R-squared* | *0.565712* | *Mean dependent var* | *1.037905* |
| *Adjusted R-squared* | *0.453637* | *S.D. dependent var* | *4.311185* |
| *S.E. of regression* | *3.186670* | *Akaike info criterion* | *5.350938* |
| *Sum squared resid* | *314.8008* | *Schwarz criterion* | *5.730936* |
| *Log likelihood* | *-98.01876* | *Hannan-Quinn criter.* | *5.488333* |
| *F-statistic* | *5.047647* | *Durbin-Watson stat* | *2.421856* |
| *Prob(F-statistic)* | *0.000451* | | |

**Source: Author's Compilation based on E-views 10**

### Interpretation of Regression Results

Automatic selection (using the Akaike Information Criterion) was used with a maximum of 1 lag for the dependent variables and 1 lag for the regressor. Out of the 64 models evaluated, the procedure has selected an ARDL (1, 1, 0, 0, 0, 0, 0) the model – 1 lag of the dependent variable, Per capita Income (PCI), 1 lag for the first independent

variable, Foreign Direct Investment (FDI), 0 lag for the second independent variable, Agricultural Performance (AGP), 0 lag for the third independent variable, Inflation Rate (INF), 0 lag for the fourth independent variable, The Gross Fixed Capital Formation (GFCF), 0 lag for the fifth, independent variable, Exchange Rate (EXR) and 0 lag for the sixth independent variable, Interest Rate (INT).

The first lag of the Per capita Income has an insignificant effect on the dependent variable itself and also a positive relationship. A 1% increase in the first period lag of the dependent variable of per capita income will lead to a 0.12% decrease in per capita income on average respectively and vice versa when other variables are held constant.

The estimated value for $\beta_1$ which is the coefficient of the first independent variable, foreign direct investment has an insignificant positive effect on the dependent variable, per capita income. The value of the coefficient of $\beta_1$ is 0.706072 with the probability value of 0.1738. The study shows that for every 1% increase in foreign direct investment there will be a 0.70% increase on average in per capita income and vice versa when other variables are held constant.

The estimated value for $\beta_2$ which is the coefficient of the second independent variable, agricultural performance has a significant positive effect on the dependent variable, per capita income. The value of the coefficient of $\beta_1$ is 0.315608 with the probability value of 0.0492, this means that for every 1% increase in agricultural performance, there will be a 0.31% increase on average in per capita income and vice versa when other variables are held constant.

The estimated value for $\beta_3$ which is the coefficient of the third independent variable, inflation rate, has a significant negative effect on the dependent variable, per capita income. The value of the coefficient of $\beta_3$ is -0.087673 with the probability value of, 0.0434, this means that for every 1% increase in inflation rate, there will be a 0.087% decrease on average in per capita income and vice versa when other variables are held constant.

The estimated value for $\beta_4$ which is the coefficient of the fourth independent variable, gross fixed capital formation, has an insignificant negative effect on the dependent variable, per capita income. The value of the coefficient of $\beta_4$ is -0.086239 with the probability value of, 0.1113, this means that for every 1% increase in gross fixed capital formation, there will be a 0.086% decrease on average in per capita income and vice versa when other variables are held constant.

The estimated value for $\beta_5$ which is the coefficient of the fifth independent variable, exchange rate, has an insignificant positive effect on the dependent variable, per capita income. The value of the coefficient of $\beta_5$ is 0.002177 with the probability value of 0.7702, this means that for every 1% increase in exchange rate, there will be an 0.002% increase on average in per capita income and vice versa when other variables are held constant.

The estimated value for $\beta_6$ which is the coefficient of the fifth independent variable, interest rate, has a significant positive effect on the dependent variable, per capita income. The value of the coefficient of $\beta_6$ is 0.445335 with the probability value of 0.0221, this means that for every 1% increase in interest rate, there will be a 0.44% increase on average in per capita income and vice versa when other variables are held constant.

The expected value of $\beta_0$ which is the intercept, is -7.241202 with the probability level of 0.0720. This means that if the values of the independent variables are zero, the per capita income will reduce by 7.24%. It has an insignificant negative effect on per capita income.

### Co-Efficient of Determination ($R^2$) and Adjusted ($R^2$)

The co-efficient of determination ($R^2$) shows the total variation in the dependent variable, per capita income that is accounted for by the independent variables included in the model. The six independent variables explain about 56.57% variation in per capita income. The adjusted co-efficient of determination $R^2$ is 0.453637, it implies that the explanatory variables are able to explain 45.36% of the total variable in the dependent variable.

The value of the F-statistics is 5.047647 with the probability value of 0.000451. The P-value of F-statistics is less than 0.05%. This means that all the independent variables have a jointly significant influence on the dependent variable. We reject the null hypothesis ($H_0$) and accept the alternative hypothesis ($H_1$). The value of Durbin-Watson statistics is 2.421856. It implies that there is no auto-correlation.

### 4.8 Co-integration Test (Bounds Test)

Since it has been ascertained that all the variables in consideration are stationary at level, I(0) and the first order difference I(1), we therefore proceed to test if there is co-integration among the six variables. This test is to be carried out using the bounds testing approach to co-integration. The results of the bounds test are displayed below.

*Table 11: Co-integration Results*

| *Null Hypothesis: No long-run relationships exist* | | |
|---|---|---|
| *Test Statistic* | *Value* | *K* |
| *F-statistic* | *4.892855* | *6* |
| *Critical Value Bounds* | | |
| *Significance* | *I0 Bound* | *I1 Bound* |
| *10%* | *1.99* | *2.94* |
| *5%* | *2.27* | *3.28* |
| *2.5%* | *2.55* | *3.61* |
| *1%* | *2.88* | *3.99* |

**Source: Author's Compilation based on E-views 10**

The calculated F-statistics is 4.8 which is higher than I0 and I1 bound at 5% level therefore we say that there is a long run relationship between the variables.

### 4.9 ARDL Co-integration and Long Run Form

Since the F-statistics is higher than I0 and I1 bound we estimate the long run relationship between the variables. The result is presented in Table 4.15 below.

*Table 12: Long Run Form*

| *Variable* | *Coefficient* | *Std. Error* | *t-Statistic* | *Prob.* |
|---|---|---|---|---|
| *FDI* | *0.046733* | *0.767939* | *0.060855* | *0.9519* |
| *AGP* | *0.359975* | *0.168914* | *2.131118* | *0.0411* |
| *INF* | *-0.099998* | *0.044599* | *-2.242133* | *0.0322* |
| *GFCF* | *-0.098362* | *0.061011* | *-1.612191* | *0.1171* |
| *EXR* | *0.002483* | *0.008610* | *0.288332* | *0.7750* |
| *INT* | *0.507939* | *0.225714* | *2.250364* | *0.0317* |
| *C* | *-8.259142* | *4.571202* | *-1.806777* | *0.0805* |

**Source: The Author's Compilation based on E-views 10**

From the result there is a long run relationship between the dependent variable, per capita income and some independent variables like agricultural performance, inflation rate and interest rate, because the probability value of these variables are less than 5%. Also, there is no long run relationship between the independent variable; foreign direct investment, gross fixed capital formation, exchange rate, and also the constant term (intercept) and dependent variable, per capita income because the P-value is greater than 5%.

## 5.0 Summary, Conclusion and Recommendations

### 5.1 Summary

The study provides insightful evidence on the effect of agricultural performance and foreign direct investment on Nigeria economic development using the Auto Regressive Distributed Lag (ARDL) for the short run and the long run. The study also employed Augmented Dickey fuller (ADF) the unit root test and bound test in its econometrics analysis. The unit root test was carried out to establish that the time series data on all the variables are stationary, which is a perquisite for the bound test. The bound test is used to find if there is a relationship between the dependent and independent variables. The trend of all factors affecting agricultural performance and foreign direct investment in Nigeria used in this study were examined using a line graph.

The Result from the model 1 showed that there is a negative and significant relationship between human development index and foreign direct investment in Nigeria. There is a positive and significant relationship between human development index and agricultural performance in Nigeria. There is no long run relationship. The Result from the model 2 showed that there is a positive and insignificant relationship between per capita income and foreign direct investment in Nigeria. There is a positive and significant relationship between per capita income and agricultural performance in Nigeria. se in per capita income. In the long run, there is a long run relationship between the dependent variable, per capita income and some independent variables like agricultural performance, the inflation rate and interest rate.

### 5.2 Conclusion

In conclusion, since all, the econometric test applied in this study show a statistically significant relationship between the dependent variable (PCI) and independent variables (agricultural performance, inflation rate and interest rate) and an insignificant relationship with independent variables (foreign direct investment, gross fixed capital formation and exchange rate) from the model. The study accepts that agricultural performance has significant implications on the economic development in Nigeria and foreign direct investment has an insignificant implication on economic development. Therefore, the empirical findings reveal that agricultural performance and foreign direct investment are the catalyst for economic development.

### 5.3 Recommendations

It is recommended that the government should make a concerted effort to attract foreign investors to the country, and for the promotion of production and the creation of jobs, including the: provision of essential infrastructure, as well as public transport network, electricity, water and so on. All of the above mentioned, it can be one of the most important drivers of FDI attraction. Also, thought is that common markets should be encouraged by the government, which could be an inspiring factor for foreign investors. A critical review needs to be made on the pattern of investment in agriculture. Rather than focusing on production only, the entire value – chain of agricultural produce through investment in machinery, storage, processing plants/mills, etc. should be considered so as to produce for export and diversify the economy, thereby help to reduce poverty in the country in the long run. Also, a stable political and economic environment should be provided for investment to thrive.

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