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REGULAR ARTICLE

THE IMPACT OF FOREIGN DIRECT INVESTMENT (FDI) ON AGRICULTURAL GROWTH IN NIGERIA (1979-2014)

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ABSTRACT

This study examining the impact of foreign direct investment (FDI) and other macroeconomic variables on agricultural growth in Nigeria from 1981 to 2014, using annual time series data from Central Bank of Nigeria (CBN), World Bank and the United States of America (US) Federal Reserve System. Data was analysed using trend analyses, unit root tests, co-integration tests, ordinary least squares (OLS) regression and Granger causality tests, while the hypothesis was tested with F-test. Results revealed very low FDI inflow into agriculture, not commensurate with the share of agriculture to GDP. All significance were taken at the 5% probability level, i.e. $p<0.05$. There was positive non-significant relationship between agricultural growth and FDI in agriculture, meaning that FDI in agriculture has no direct impact on agricultural growth or the impact on agricultural growth is masked by other macroeconomic variables. Significant positive relationship exists between agricultural growth and macroeconomic instability, while interest rate differential had a significant negative relationship. There was unidirectional causality running from FDI in agriculture, stock of gross external debts, and variability of consumers' price index to agricultural growth, while agricultural growth was significant in granger causing macroeconomic instability. Recommendations are government should not involve itself in business, but seek for and encourage more FDI for the agricultural sector, encourage joint ventures between foreign and domestic investors/entrepreneurs, ensure stability and consistency in its macroeconomic policies, while monetary policy rates should be fixed in such a way that it would attract the right amount of investments in agriculture.

Keywords: FDI; Agricultural Growth; Nigeria
JEL codes: C32, F21, O11, Q14

INTRODUCTION

Nigeria is one of the economies with great demand for goods and services and has attracted some FDI over the years. **Danja (2012)** explained that the amount of FDI inflow into Nigeria reached US$2.23 billion in 2003 and rose to US$5.31 billion in 2004 (a 138% increase), which rose again to US$9.92 billion (an 87% increase) in 2005 and then declined slightly to US$9.44 billion (a 5% decrease) in 2006. The question that comes to mind is: do these FDIs actually contribute to agricultural growth in all cases and at all times in Nigeria, in recognition of its role in economic transformation?

Chakraborty and Nunnenkamp (2006) reported that traditionally, FDI was a phenomenon that primarily concerned highly developed economies and that these developed countries still attract a higher share of worldwide FDI than developing countries (to which Nigeria belongs). However, **Fingar (2015)** showed that Africa witnessed the largest increase in inward investment, with US$87 billion of FDI announced in 2014. In the former, for instance, agricultural FDI inflows in 2008-2010 represented an average increased share of 1.0% of gross fixed capital formation, compared to 0.1% in developed countries. Inward FDI stocks of developing countries in 1998 amounted to 20% of their GDP, compared to 12% in developed countries. In relative terms, it is believed that agricultural FDI plays a more important role in developing countries than in developed countries. And as such, it has therefore become essentially imperative to empirically fill the knowledge gap that exists by establishing the trend of FDI and that of agricultural growth generally in developing countries and Nigeria in particular.

The agricultural sector has long been neglected as a motor of development and poverty reduction, and a lack of private and public investment has led to lower productivity growth rates and stagnated production in many developing countries (**Oloyede 2014**). But, **Smaller (2014)** reported that the global community was taken by surprise at the sharp rise of investor interest in agricultural land and water after the 2008 food crisis, a phenomenon that is now commonly referred to as "land grabs". Nigeria as a country, given her natural resource

base and large market size (a population of over 160 million), qualifies to be a major recipient of FDI in Africa and indeed, is one of the top three leading African countries that received FDI in 2014 (**Loewendahl 2015**). However, **Ajuwon and Ogwumike (2013)** reported that the level of FDI attracted especially to agriculture is small compared to the resource base and potential needs and that Nigeria's share of FDI inflow to Africa averaged around 20.68% between 1976 and 2007. They further posited that the percentage of FDI inflow to the agricultural sector in Nigeria during the same period is less than 1% and that between 1980 and 1984, it was 2.46% which was the highest and now currently stood at 0.37%. **FAO (2009)** advised that to achieve food supply for a potential world population of 9.1 billion in 2050, US$83 billion (in 2009 US$) should be invested annually in the agricultural sector of developing countries (**Heumesser & Schmid 2012**). In furtherance, **Oloyede (2014)** is of the opinion that most of the investment is expected to come, not just from farmers themselves, but also from the public sector providing infrastructure, institutions, and research development as public investment is found to be most effective to ensure food security and poverty reduction in agriculture, but might not be able to meet these investment needs.

UNCTAD (2009b) reported that world inflow of FDI to agriculture was small in the past (i.e. less than 1% of total world inflows) between 2005 and 2007, however, increased FDI in agriculture could contribute to bridge this investment gap. Public actors could therefore be effective in stimulating private investment into the sector while at the same time reducing risks and securing benefits of the investment by, for instance, ensuring that FDI support the country's development strategy and spill-overs to smallholder production systems (**Miller, Richter, McNellis & Mhlanga 2010**). Results obtained by **Oloyede (2014)** showed that FDI has positive impacts on the agricultural sector, but FDI in Nigeria is majorly driven by natural resources and as such, the government can play an important role in promoting and developing its natural resources to encourage more investments to the country. Thus, prompting **Shiro (2009)** to proffer that the country needs to juxtapose foreign investment with domestic investment in order to maintain high levels of income and employment. Foreign investment can be effective if it is directed at improving and expanding managerial and labour skills. In other words, FDI into Nigeria will not on its own lead to sustainable agricultural growth except it is combined with the right structures and infrastructures that could facilitate fruitful results (**Oloyede 2014**). **Idowu and Ying (2013)** found support for the view that there is a very low level of FDI that flows into the agricultural sector of Nigeria, thus insinuating that FDI inflow to the agricultural sector does not significantly affect the output of the agricultural sector while it has a positive significant relationship on labour generation, and also that FDI inflow to the agricultural sector does not have a complimentary long-run relationship with output of the agricultural sector while a complimentary long-run relationship exists with labour generation. They further asserted that the reason for this non-significant relationship between FDI inflows into the agricultural sector and the sector's output could be a combination of two factors. First, because of the low level of FDI in the agricultural sector and second, the type of FDI that flows into the sector is not technology-oriented, i.e. the kind of FDI that the sector receives focuses more on enhancing the sector's capacity and capability of providing jobs for the unemployed (irrespective of how crude or meagre these jobs might be) and focuses less on providing the necessary level of technology required to improve output in the sector.

UNCTAD (2009a) reported that already in the last decades, FDI and Transnational Corporations (TNCs) have been particularly involved in the up and downstream segment of the global agric-food value chain of agriculture in developing countries, and sometimes through non-equity participation such as contract farming. They further noted that increased food prices have attracted "new investors" in agriculture, pursuing large scale land acquisitions in developing countries and that these developments have led to the discussions about the forms of FDI and alternative business models in developing countries' agriculture, the potentials and challenges, and the economic, social, institutional and policy requirements to enable them (developing countries) benefit from FDI.

Most of the earlier studies, (**Otepola 2002; Oyejide 2005; Ayanwale 2007; Adelegan 2008; Shiro 2009; Adofu 2010; Egbo 2011; Umoh and Jacob 2012; Olusanya 2013; Adeleke et al 2014; and Osuji 2015**) examined only the importance of FDI on growth and the channels through which it may be benefiting the economy. Moreover, the results of studies carried out on the linkage between FDI and economic growth in Nigeria are not unanimous in their submissions. A closer examination of these previous studies reveal that conscious effort was not made to take care of the fact that according to **Olusanya (2013)**, more than 60% of the FDI inflows into Nigeria is made into the extractive (oil and gas) industry. Moreover, a lot of researches concerning FDI and the Nigerian economy are however, concentrated on the petroleum (oil and gas) sector where the largest chunk of these investments have been going to. Hence, those studies actually modelled the influence of FDI in the extraction of natural resources on Nigeria's economic growth without particularly giving any preference to agriculture, despite the role it plays in economic growth and development. The low level of FDI in the agricultural sector might be one major reason why not much work has been done to analyse its impact on Nigeria's agricultural sector, however, no matter how little the FDI in agriculture is, it is still important to determine the impact it (FDI) has on agricultural growth so as to know whether to encourage or discourage the continuous inflow of FDI into agriculture in Nigeria, in addressing the country's specific dimension to the FDI-growth debate. More so, that statistics gathered from **UNCTAD (2012)** indicated that agricultural FDI (i.e. combined FDI in agriculture, forestry and fishery, and food and beverages) world over is still small, but rising and in recent years, however, the increase in agricultural FDI flows to developing countries (Nigeria inclusive) turned out to be higher than the increase in agricultural

FDI flows to developed countries. In addition, there is also an increasing resistance to further liberalization within the economy, this limits the options available to the government to source funds for agricultural development purposes and make the option of seeking FDI for the sector much more critical. Furthermore, the empirical linkage between FDI and agricultural growth in Nigeria is yet unclear, despite numerous studies that have examined the influence of FDI on Nigeria's economic growth with varying outcomes (**Akinlo 2004; Osuji 2015**).

The main objective of this study is to examine the impact of FDI inflows to agriculture on agricultural growth. The specific objectives are to (i) analyse the effects of FDI and associated macroeconomic determinants on agricultural growth in Nigeria; and (ii) analyse the causal relationship between FDI and agricultural growth in Nigeria. The hypothesis to be tested is: FDI in agriculture and other macroeconomic variables do not have statistically significant impact on agricultural growth in Nigeria.

METHODS AND DATA

Analytical framework

Evidence from different literature show that various forms of analytical techniques have been developed and applied by economists for data analysis (**Nwani 2015**). There are various econometric methods that can be used to derive estimates of the parameters of economic relationships from statistical observations (**Koutsoyiannis 2008**). These methods, according to **Eboh (2009)** can be either quantitative or qualitative.

The relationship between agricultural growth and FDI in agriculture is often analysed using the standard models of economic growth, we apply the **Solow (1956)** growth model in which the growth of economies is broken down into basics in the production function:

$$Y = f(K, L) \quad (1)$$

According to **Mankiw, Romer and Weil (1992)**, in adopting the Cobb Douglas model (**Cobb and Douglas 1928**), we make output i.e. growth a function of capital, human capital, labour and productivity at time, t. That is:

$$Y(t) = A(t)\, K(t)\alpha H(t)\lambda\, L(t)\gamma \quad (2)$$

Where
Y output (growth)
A total factor productivity, i.e. growth not accounted for by the factors of production
K capital
H human capital
L labour

We then specify capital as the stock of foreign and domestic capital components, based on the assumption that the capital stock is made up of foreign and domestic stocks, ceteris paribus. i.e.:

$$K = K_{fc} + K_{dc} \quad (3)$$

Where:
K = total capital stock
K_{fc} = foreign capital component
K_{dc} = domestic capital

As such the growth equation becomes:

$$Y(t) = A(t)\, K(t)_{fc^{\alpha}} + K(t)_{dc^{\beta}}\, H(t)^{\lambda}\, L(t)^{\gamma} \quad (4)$$

By taking logs and differentiating Eq. 4 above with respect to time, we derive the equation 5:

$$y_t = a_t + \alpha k_{fct} + \beta k_{dct} + \lambda h_t + \gamma l_t \quad (5)$$

Where:
α, β, λ and γ coefficients of the variables

Assuming there is perfect competition and constant returns to scale, Eq. (5) above is a standard growth accounting equation, in which the rate of growth is decomposed into the growth rates of the total factor productivity, capital stock, human capital and labour. On a priori, the coefficients, α, λ and γ are said to be positive, while the coefficient, β depends on the relative strength of competition, the linkage effects and other externalities that FDI generates (**Ayanwale 2007**). The components of capital (K_{fc} and K_{dc}) are usually estimated by the FDI to GDP ratio (I_{fdi}) and the domestic investment to GDP ratio (I_{dom}) respectively, based on established practice in the literature.

$$y_{(t)} = a + \alpha I_{fdi(t)} + \beta I_{dom(t)} + \lambda h_{(t)} + \varepsilon_{(t)} \quad (6)$$

Where:
$\varepsilon_{(t)}$ the error term

Assuming there is a steady state, say a linear relationship, as seen in standard growth models, growth is estimated by ordinary least squares (OLS) in the linear form in Eq. 6 above, which formed the basis for the estimation of the model in this study.

The study area

The study area is officially known as the Federal Republic of Nigeria, but oftentimes referred to as Nigeria. It is a country in the lower middle income group with a gross national per capita income of US$1,190.00, and its currency is the Naira, which is equal to the subdivision of 100 Kobo (**FAO 2012**). The major exports of the country are: crude oil (petroleum), natural gas, sesame, cashew nuts, leather, tobacco, shrimps and prawns, cocoa, cassava, rubber, food, live animals, aluminium alloys and other solid minerals, (**CIA World Factbook 2015**) while major imports are: refined petroleum products, wheat, rice, sugar, herbicides, fertilizers, chemicals, vehicles, aircraft parts, vessels, vegetable products, processed food, beverages, spirits and vinegar, equipment, machines and tools (**NBS 2015**). Despite its considerable agricultural resources, Nigeria is still a net importer of food and agricultural products in general (**USAID 2009**) and as such the agricultural sector has been one of the least attractive sectors for FDI in

Nigeria, this is evident in the fact that through 1970 to 2001, the sector comprised only 1.7% of the total FDI (**FAO 2012**).

Data

This work basically made use of secondary data in the form of annual time series data of agricultural output, measured by the share of agriculture to GDP, FDI inflows into agriculture and other macroeconomic variables such as exchange rates, stock of gross external debts, macroeconomic instability, political instability and annual variability of consumer price index in Nigeria, interest rates in Nigeria and the United States of America (USA) spanning from 1981-2014. The dataset for share of agriculture to GDP, FDI, exchange rate, domestic interest rate, stock of gross external debts and consumers' price index were sourced from the statistics database of the Central Bank of Nigeria (CBN), dataset for political instability was sourced from the World Bank World Development Indicators, while that for the interest rate of the USA, known as the US Federal Funds Rate was sourced from the Federal Reserve System of the USA.

This study covering a 34-year period, spanning from 1981 to 2014 employed descriptive statistics aided by the use of Microsoft Excel to draw up percentages, tables, graphs and trends to achieve objectives one and two. To achieve objective three, inferential statistics in the form of the econometric regression method of the ordinary least squares (OLS) was applied as the estimation technique in evaluating the relationship between the dependent variable (agricultural growth) and the independent variables (FDI inflows into the agricultural sector, exchange rate, interest rate differential, stock of gross external debts, macroeconomic instability, political instability and annual variability of consumer price index) in different years with the aid of the STATA 10.1 software. The regression equation was estimated after carrying out pre-estimation tests for stationarity, in order to avoid multicollinearity of explanatory variables. For objective four the causal relationship between agricultural growth and the independent variables were determined by carrying out pairwise Granger causality tests, using STATA 10.1 software.

To eliminate the presence of autocorrelation in the model, this study applied the Augmented Dickey Fuller (ADF) test to detect the stationarity of the variables at the 5% level of significance and also identify the order of integration of the variables in the model. The ADF test was based on the following regression.

$$\Delta Y_t = \alpha + \beta Y_{t-1} + \delta t + \sum_{k=1}^{P} \varsigma_k \Delta Y_{t-k} + \varepsilon_t \quad (7)$$

H_0: $\delta = 0$ (Y has no unit root);
H_1: $\delta \neq 0$ (Y has unit root)
Where:
Y Variable tested ($lnGDP_{AGR}$, $lnFDI_{AGR}$, $lnEXR$, and so on)
α Intercept (constant term)
δt Coefficient on a time trend
β Parameter of the variable in regression
P Lag order
Δ Difference operator

To ensure that the error term, *Ut* in the test model is empirically white noise, the optimum lag order, P was chosen where the Akaike Information Criterion (AIC) is minimum within the lag range as directed by the **Schwert (1989)** I12 rule, which is given as:

$$P_{Max} = [\left(12\frac{T}{100}\right)^{0.25}] \quad (8)$$

Where:
T Sample Size

Furthermore, the significance of the coefficient, β was tested against the null hypothesis of the unit root based on the computed ADF and the tabulated Mackinnon critical values. The null hypothesis of the unit root was accepted if the computed ADF statistic is greater than the critical value at the 5% level of significance; where otherwise, it was rejected. The objective of applying the ADF unit root test for individual series included in the model is to provide evidence as to whether or not the variables used in the regression are stationary and to indicate the order of integration.

The **Johansen (1991)** co-integration method was used to find out whether there is long-term relationship between the variables. This involves looking for linear combinations of I in Eq. (9) time series that are stationary or more generally, linear combinations of I(d) time series that are integrated of an order lower than d. This procedure focuses on the rank of the Π-matrix as shown in Eq. (9).

$$\Delta Z_t = \varphi + \Pi Z_{t-1} + \sum_{i=1}^{P-1} \Gamma_1 \Delta Z_{t-i} + \varepsilon_t \quad (9)$$

Where:
Z n x 1 vector of variables that are integrated of order one, often denoted as I(1)
Π co-efficient matrix
Γ number of co-integrating relationships

Such that if the Π-matrix has reduced rank, implying that αβ = Π, the endogenous variables depicted by Z are co-integrated, with α as the co-integrating vector. However, if the variables are stationary in levels, Π would have full rank. Johansen proposed a different likelihood ratio test of the significance of the canonical correlations, hence, the reduced rank of the Π matrix is depicted by the trace test as shown in Eq. (10).

$$J_{trace} = -T \sum_{i=r+1}^{n} ln(1 - \lambda_i) \quad (10)$$

Where:
T sample size
λ_i i:th largest canonical correlation

The trace test was applied to test the null hypothesis of Γ co-integrating vectors against the alternative hypothesis of n co-integrating vectors.
The causal relationship between agricultural output and FDI in agriculture and the other variables were tested using the pairwise Granger Causality model for the standard growth accounting model. This is given in the empirical bivariate regressions (Eq. 11, Eq. 12).

$$Y_t = \alpha_0 + \sum_{i=1}^{p} \alpha_i X_t + \sum_{i=1}^{p} \beta_i Y_t + \varepsilon_{1t} \quad (11)$$

$$X_t = \lambda_0 + \sum_{i=1}^{p} \lambda_i Y_t + \sum_{i=1}^{p} \delta_i X_t + \varepsilon_{2t} \quad (12)$$

Where:
Y_t dependent variable in Eq. (11), independent variable in Eq. (12)
X_t independent variable in Eq. (11), dependent variable in Eq. (12)
ε_{1t} and ε_{2t} error terms, assumed to be uncorrelated
α, β, λ and δ coefficients to be estimated

The Eq. (11) postulates that current values of variable *Y* is related to past values of itself as well as those of variable *X* and the next Eq. (12) presents a similar behaviour to *X*. It should be noted that the two variables to be used in each set of pairwise standard Granger causality test need to be stationary.

We have basically four cases of causality, which are: Unidirectional causality from *X* to *Y* is indicated if the estimated coefficient on the lagged *X* in Eq. (11) is statistically different from zero as a group ($\sum\alpha_i \neq 0$) and the set of estimated coefficients on the lagged *Y* in Eq. (12) is not statistically different from zero ($\sum\delta_i = 0$);

Unidirectional causality from *Y* to *X* exists if the set of lagged *X* coefficients is not statistically different from zero ($\sum\alpha_i = 0$) and the set of lagged *Y* coefficients is statistically different from zero ($\sum\delta \neq 0$);

Feedback or bidirectional causality, which is suggested when the sets of X and Y coefficients are statistically significantly different from zero in both regressions, i. e. ($\sum\alpha_i \neq 0$) and ($\sum\delta_i \neq 0$);

Independent, if the set of *X* and *Y* coefficients are not statistically significant in both regressions, i. e. ($\sum\alpha_i = 0$) and ($\sum\delta_i = 0$).

Model specification

The effect of FDI on agricultural growth was analysed in the standard growth accounting framework. The validity or strength of the OLS method used in this study is based on the Gauss-Markov assumptions in which the dependent (GDP_{AGR}) and independent variables (FDI_{AGR}, *EXR*, INT_D, *EXD*, *MIN*, *POL* and *INF*) are expected to be linearly correlated, with the estimators (β_0, β_1, β_2, β_3, β_4, β_5, β_6, β_7) being BLUE with an expected value of zero i.e. E(εi) = 0, which implies that, on average the errors cancel out each other.

The statistical formulation of the model is therefore presented in the functional form (Eq. 13).

$$GDP_{AGR} = f(FDI_{AGR}, EXR, INT_D, EXD, MIN, POL, INF) \quad (13)$$

Suppose, Eq. (13) has a linear relationship, the linear regression equation becomes:

$$GDP_{AGR} = \beta_0 + \beta_1 FDI_{AGR} + \beta_2 EXR + \beta_3 INT_D + \beta_4 EXD + \beta_5 MIN + \beta_6 POL + \beta_7 INF + \varepsilon \quad (14)$$

In order to improve the linearity of the equation, **Obansa and Maduekwe (2013)** advised that there is need to log linearize all the incorporated variables in order to avoid multicollinearity and also to revert the mean generating process. As such, natural log is introduced into Eq. (14), thereby giving the econometric model as:

$$lnGDP_{AGR_t} = \beta_{0_t} + \beta_1 lnFDI_{AGR_t} + \beta_2 lnEXR_t + \beta_3 lnINT_{D_t} + \beta_4 lnEXD_t + \beta_5 lnMIN_t + \beta_6 lnPOL_t + \beta_7 lnINF_t + \varepsilon \quad (15)$$

Where:
l*nGDP*$_{AGR}$ Share of agriculture to GDP
l*nFDI*$_{AGR}$ Aggregate FDI inflows into agriculture
lnEXR Exchange rate
lnINT$_D$ Interest rate differential measured by the difference between domestic interest rate and the United States of America interest rate
lnEXD Stock of gross external debts
lnMIN Macroeconomic stability captured by the standard deviation of GDP
lnPOL Political instability captured by political freedom indicator
lnINF Annual variability of consumer price index
β_0 Intercept
$\beta_1, \beta_2, \beta_3, \ldots$ Estimation coefficients
t Time series
ε Stochastic error term

A priori expectations:
On a priori, the following relationships are expected:

$$\frac{\delta lnGDP_{AGR}}{\Delta lnFDI_{AGR}} > \text{Positive relationship}$$

$$\frac{\delta lnGDP_{AGR}}{\Delta lnEXR} > \text{Negative relationship}$$

$$\frac{\delta lnGDP_{AGR}}{\Delta lnINT_D} > \text{Positive relationship}$$

$$\frac{\delta lnGDP_{AGR}}{\Delta lnEXD} > \text{Negative relationship}$$

$$\frac{\delta lnGDP_{AGR}}{\Delta lnMIN} > \text{Negative relationship}$$

$$\frac{\delta lnGDP_{AGR}}{\Delta lnPOL} > \text{Negative relationship}$$

$$\frac{\delta lnGDP_{AGR}}{\Delta lnINF} > \text{Negative relationship}$$

The null hypothesis, H_0 was tested using the F-statistic at the five percent (5%) level of significance. The calculated F value (F_{cal}) was compared to the critical value of F (F_{tab}), if the value of the F_{cal} is greater than that of the F_{tab} at the 5% level of significance, the null hypothesis is rejected, if otherwise, then it is accepted.

The formula is given as:

$$F = \frac{R^2/(K-1)}{(1-R^2)/(N-K)} \quad (16)$$

Where:
K Number of β's (including the intercept, β_0)
N Sample size (Number of years)
R^2 Coefficient of determination

RESULTS AND DISCUSSIONS

Trend analysis of agricultural growth in Nigeria

The gross domestic product (GDP) of Nigeria, which is aggregated from five major sectors, measured at current basic prices in billions of Naira (N 'B) and their overall percentage contribution to the economy. The table showed that the industrial sector contributed the highest share to GDP, averaging 28.5%. This is followed by the services sector which averaged 27.5% and then the agricultural sector with 25.6%, the building and construction sector contributed the least with about 2.6%, after the wholesale and retail trade sector that averaged 15.8% (Table 1).

Overall share of agriculture to GDP had a steady, but gentle upward trend from 1981 until 2008, dipped in 2009, rose again in 2010 and kept rising gently up until 2014 (Figure 1). This rise was however not proportionate to the rise in overall GDP.

While the amount contributed by agriculture to GDP in billions of Naira was increasing, The percentage contribution of agriculture to the GDP, compared to other sectors was however undulating, peaking at 40.1% in 1998, thereafter keeps undulating till 2009, dropped sharply in 2010 and maintained a downward trend till 2014 (Figure 2). FDI inflows to Nigeria classified into business types by the CBN (Table 2, Table 3).

Although, FDI inflows to agriculture on the average is rising year on year, but, the percentage it attracts have been very low when compared to other business types. FDI into various sectors of the Nigerian economy as business types, measured in millions of Naira (N' Million) (Table 2), FDI into agriculture is so low, such that it is almost indistinguishable from the zero line, that is almost negligible when compared to FDI in the other sectors, but this cannot be neglected as the amount invested so far from 1981 to 2014 is about N118.62 billion, which is by no means small.

FDI in agriculture is very meagre, taking up a mere average of 0.87% of the aggregate FDI inflows from 1981 to 2014 and not exceeding 2% in any one year, except in 2007 where it achieved 3.14% of the total FDI for that year (Table 3).

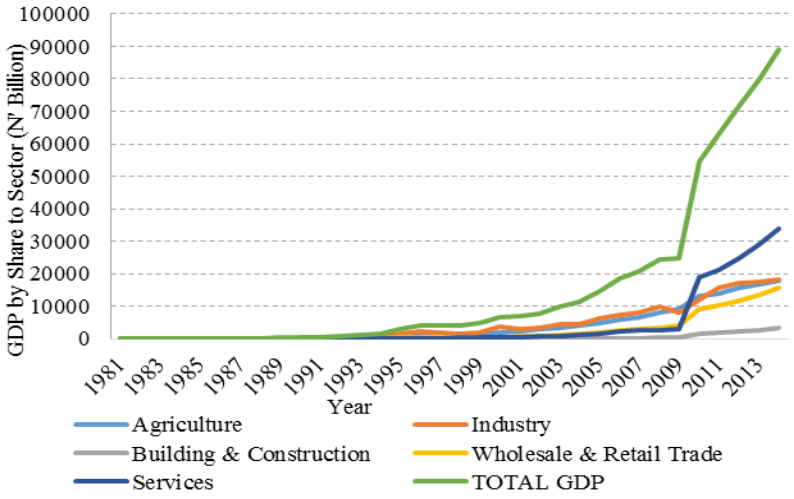

Figure 1: Nigeria GDP by sectoral contributions, 1981-2014
Source: Author's computation

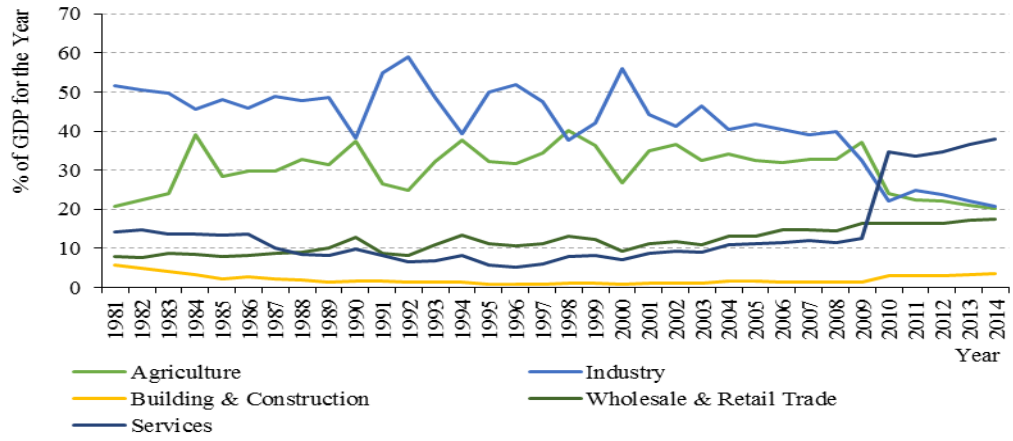

Figure 2: Nigeria GDP by percentage contribution, 1981-2014
Source: Author's computation

Table 1: Sectoral distribution of the GDP of Nigeria from 1981-2014

Year	Agriculture		Industry		Building & Construction		Wholesale & Retail Trade		Services		TOTAL GDP	
	(N 'B)	(%)	(N 'B)	(%)	(N 'B)	(%)	(N 'B)	(%)	(N 'B)	(%)	(N 'B)	(%)
1981	19.53	20.7	48.46	51.5	5.37	5.7	7.40	7.8	13.56	14.3	94.33	100
1982	22.56	22.3	51.15	50.6	4.83	4.8	7.58	7.5	14.90	14.8	101.01	100
1983	26.44	24.0	54.70	49.7	4.37	4.0	9.52	8.6	15.05	13.7	110.06	100
1984	33.78	39.0	53.13	45.7	3.69	3.2	9.85	8.5	15.83	13.6	116.27	100
1985	38.24	28.4	64.88	48.2	2.96	2.2	10.55	7.9	17.95	13.3	134.59	100
1986	39.93	29.7	61.70	45.8	3.72	2.8	10.87	8.1	18.38	13.6	134.60	100
1987	57.58	29.8	94.69	49.0	4.21	2.2	16.97	8.8	19.69	10.2	193.13	100
1988	86.58	32.9	126.13	47.9	4.77	1.8	23.76	9.0	22.04	8.4	263.29	100
1989	120.06	31.4	185.99	48.7	5.46	1.4	39.07	10.2	31.69	8.3	382.26	100
1990	122.23	37.3	125.66	38.2	5.67	1.7	42.41	12.9	32.64	9.9	328.61	100
1991	144.70	26.5	299.57	54.9	9.48	1.7	47.95	8.8	43.97	8.1	545.67	100
1992	217.42	24.8	515.98	59.0	11.81	1.3	72.28	8.3	57.85	6.6	875.34	100
1993	350.05	32.1	530.34	48.7	15.50	1.4	118.12	10.9	75.67	6.9	1,089.68	100
1994	528.95	37.8	549.73	39.3	19.94	1.4	186.62	13.3	114.46	8.2	1,399.70	100
1995	940.30	32.3	1,450.00	49.9	26.61	0.9	324.10	11.2	166.34	5.7	2,907.36	100
1996	1,275.75	31.6	2,094.17	51.9	30.97	0.8	423.02	10.5	208.39	5.2	4,032.30	100
1997	1,445.15	34.4	1,992.40	47.6	36.24	0.9	464.95	11.1	250.51	6.0	4,189.25	100
1998	1,600.58	40.1	1,505.13	37.7	48.01	1.2	526.96	13.2	308.77	7.8	3,989.45	100
1999	1,704.82	36.4	1,968.35	42.1	53.12	1.1	575.91	12.3	377.01	8.1	4,679.21	100
2000	1,801.48	26.8	3,757.05	56.0	59.06	0.9	625.62	9.3	470.37	7.0	6,713.57	100
2001	2,410.05	34.9	3,044.91	44.2	78.60	1.1	762.74	11.1	598.90	8.7	6,895.20	100
2002	2,847.11	36.5	3,212.38	41.2	94.40	1.2	916.83	11.8	725.03	9.3	7,795.76	100
2003	3,231.44	32.6	4,589.70	46.3	118.56	1.2	1,094.64	11.0	879.18	8.9	9,913.52	100
2004	3,903.76	34.2	4,610.08	40.4	166.08	1.5	1,484.42	13.0	1,246.72	10.9	11,411.07	100
2005	4,752.98	32.5	6,090.55	41.7	215.34	1.5	1,930.78	13.2	1,621.23	11.1	14,610.88	100
2006	5,940.24	32.0	7,488.74	40.3	250.33	1.4	2,741.79	14.8	2,143.49	11.5	18,564.59	100
2007	6,757.87	32.7	8,085.38	39.1	266.46	1.3	3,044.77	14.8	2,502.83	12.1	20,657.32	100
2008	7,981.40	32.9	9,719.51	40.0	306.58	1.3	3,503.18	14.4	2,785.65	11.4	24,296.33	100
2009	9,186.31	37.1	8,071.07	32.5	347.69	1.4	4,082.35	16.5	3,106.82	12.5	24,794.24	100
2010	13,048.89	23.9	12,033.20	22.0	1,570.97	2.9	8,992.65	16.5	18,966.55	34.7	54,612.26	100
2011	14,037.83	22.3	15,626.42	24.8	1,905.57	3.0	10,325.57	16.4	21,085.01	33.5	62,980.40	100
2012	15,816.00	22.0	16,975.34	23.7	2,188.72	3.1	11,843.53	16.5	24,890.35	34.7	71,713.94	100
2013	16,816.55	21.0	17,614.29	22.0	2,676.28	3.3	13,702.84	17.1	29,282.60	36.6	80,092.56	100
2014	18,018.61	20.2	18,402.19	20.7	3,188.82	3.6	15,704.13	17.6	33,729.86	37.9	89,043.62	100
TOTAL	135,325.17	25.6	151,092.97	28.5	13,730.19	2.6	83,673.73	15.8	145,839.29	27.5	529,661.37	100

Source: **Central Bank of Nigeria Statistics Database (2016)**

Table 2: FDI in Nigeria by business type (N' Million)

Year	Agriculture Forestry & Fisheries	Mining & Quarrying	Manufacturing & Processing	Transport & Communication	Building & Construction	Trading & Business Services	Miscellaneous Activities	TOTAL
1981	141.89	1,944.90	3,015.90	103.97	987.99	1,486.65	284.63	7,965.93
1982	127.33	2,391.74	3,642.56	111.11	1,292.69	2,157.28	505.18	10,227.89
1983	166.21	1,917.25	3,852.17	128.30	1,066.12	3,055.63	498.57	10,684.25
1984	167.04	2,288.68	4,015.17	134.35	1,033.39	3,703.70	485.51	11,827.84
1985	166.09	2,384.44	4,384.71	143.66	1,047.10	3,885.94	616.68	12,628.62
1986	150.75	4,214.02	5,201.92	104.17	655.39	3,382.36	610.13	14,318.74
1987	139.85	4,104.59	5,899.83	101.93	617.52	4,246.95	640.43	15,751.10
1988	221.09	5,448.32	6,893.05	245.85	1,303.78	5,248.96	719.86	20,080.91
1989	263.50	2,876.21	10,422.22	248.58	1,438.43	5,784.77	1,037.02	22,070.73
1990	443.65	6,066.10	15,040.06	751.82	2,108.56	5,263.50	587.82	30,261.51
1991	494.00	4,689.78	19,054.63	871.77	3,099.46	5,779.52	1,293.52	35,282.68
1992	698.88	12,756.48	22,504.38	732.42	3,487.69	6,032.68	7,897.16	54,109.69
1993	1,823.99	34,930.51	36,048.04	812.34	3,075.38	7,166.71	35,603.33	119,460.30
1994	1,805.44	34,776.27	42,998.54	470.97	5,186.59	7,911.26	42,675.35	135,824.42
1995	1,807.65	169,155.37	82,094.27	14,069.75	6,043.34	10,872.17	48,976.69	333,019.24
1996	1,807.65	214,270.22	97,995.31	14,421.99	7,081.92	15,322.91	53,047.68	403,947.68
1997	1,819.90	218,220.25	101,850.82	18,319.87	7,057.84	15,539.28	57,056.77	419,864.73
1998	1,904.00	222,393.51	105,131.74	14,903.20	10,223.39	22,939.07	67,743.16	445,238.07
1999	1,903.96	221,311.56	105,639.39	15,118.25	9,505.38	23,595.72	67,882.11	444,956.37
2000	1,907.83	223,242.42	111,346.37	15,118.25	10,215.26	23,551.43	30,855.45	416,237.01
2001	1,910.78	224,155.08	113,224.13	15,273.13	11,372.62	24,597.08	70,550.64	461,083.46
2002	1,913.91	224,248.94	118,596.78	16,079.91	11,464.02	24,906.17	72,748.82	469,958.55
2003	1,913.91	225,227.43	124,226.30	29,682.16	13,062.53	27,581.23	78,146.35	499,839.91
2004	1,913.91	227,089.16	188,920.86	77,582.42	16,302.76	38,306.36	86,749.94	636,865.41
2005	1,913.91	247,257.99	227,237.53	48,457.50	20,397.90	43,919.08	108,905.23	698,089.14
2006	2,553.53	274,980.99	320,567.06	58,558.67	29,313.67	59,382.25	151,491.63	896,847.80
2007	33,824.40	339,624.15	338,138.42	79,927.42	34,653.97	68,267.98	182,882.01	1,077,318.35
2008	3,171.78	828,333.78	266,258.60	70,424.18	31,036.10	51,296.19	149,812.98	1,400,333.61
2009	11,217.90	262,755.62	266,972.83	95,710.90	26,499.09	49,514.77	165,432.03	878,103.14
2010	1,588.90	4,300.90	132,258.80	74,603.40	7,415.10	670,938.00	37.10	891,142.20
2011	6,815.50	3,788.60	199,469.60	52,574.70	160,705.30	1,029,063.50	17,681.20	1,470,098.40
2012	14,219.70	31,129.80	86,875.60	35,353.10	11,055.20	2,433,668.40	4,694.80	2,616,996.60
2013	13,756.80	21,421.80	67,438.50	148,499.10	175,960.60	3,090,762.50	2,407.50	3,520,246.80
2014	3,943.50	39,548.50	149,670.20	159,625.00	11,369.90	6,092,791.00	4,191.00	6,461,139.10
TOTAL	118,619.13	4,343,245.36	3,386,886.29	1,059,264.14	637,135.98	13,881,921.00	1,514,748.28	24,823,201.05

Source: **Central Bank of Nigeria Statistics Database (2016)**

Table 3: Percentage FDI inflows to Nigeria by business type (%)

Year	Agriculture, Forestry & Fisheries	Mining & Quarrying	Manufacturing & Processing	Transport & Communication	Building & Construction	Trading & Business Services	Miscellaneous Activities	TOTAL
1981	1.78	24.42	37.86	1.31	12.40	18.66	3.57	100
1982	1.24	23.38	35.61	1.10	12.64	21.09	4.94	100
1983	1.56	17.94	36.05	1.20	9.98	28.60	4.67	100
1984	1.41	19.35	33.95	1.14	8.74	31.31	4.10	100
1985	1.32	18.88	34.72	1.14	8.29	30.77	4.88	100
1986	1.05	29.43	36.33	0.73	4.58	23.62	4.26	100
1987	0.89	26.06	37.46	0.65	3.92	26.95	4.07	100
1988	1.10	27.13	34.33	1.22	6.49	26.14	3.59	100
1989	1.19	13.03	47.22	1.13	6.52	26.21	4.70	100
1990	1.47	20.05	49.70	2.48	6.97	17.39	1.94	100
1991	1.40	13.29	54.01	2.47	8.78	16.38	3.67	100
1992	1.29	23.58	41.59	1.35	6.45	11.15	14.59	100
1993	1.53	29.24	30.18	0.68	2.57	6.00	29.80	100
1994	1.33	25.60	31.66	0.35	3.82	5.82	31.42	100
1995	0.54	50.80	24.65	4.22	1.82	3.26	14.71	100
1996	0.45	53.05	24.26	3.57	1.75	3.79	13.13	100
1997	0.43	51.97	24.26	4.36	1.68	3.70	13.60	100
1998	0.43	49.95	23.61	3.35	2.30	5.14	15.22	100
1999	0.43	49.74	23.74	3.40	2.14	5.30	15.25	100
2000	0.46	53.63	26.75	3.63	2.45	5.66	7.42	100
2001	0.41	48.61	24.56	3.32	2.47	5.33	15.30	100
2002	0.40	47.72	25.24	3.42	2.44	5.30	15.48	100
2003	0.38	45.06	24.85	5.94	2.62	5.52	15.63	100
2004	0.30	35.66	29.66	12.18	2.56	6.02	13.62	100
2005	0.27	35.42	32.55	6.95	2.92	6.29	15.60	100
2006	0.28	30.66	35.74	6.54	3.27	6.62	16.89	100
2007	3.14	31.52	31.38	7.42	3.22	6.34	16.98	100
2008	0.23	59.15	19.01	5.03	2.22	3.66	10.70	100
2009	1.28	29.92	30.40	10.90	3.02	5.64	18.84	100
2010	0.18	0.48	14.84	8.37	0.83	75.30	0.00	100
2011	0.46	0.26	13.57	3.58	10.93	70.00	1.20	100
2012	0.54	1.20	3.32	1.35	0.42	92.99	0.18	100
2013	0.39	0.60	1.92	4.22	5.00	87.80	0.07	100
2014	0.06	0.61	2.32	2.47	0.18	94.30	0.06	100
MEAN	0.87	29.04	28.74	3.56	4.60	23.18	10.00	100

Source: Author's computation

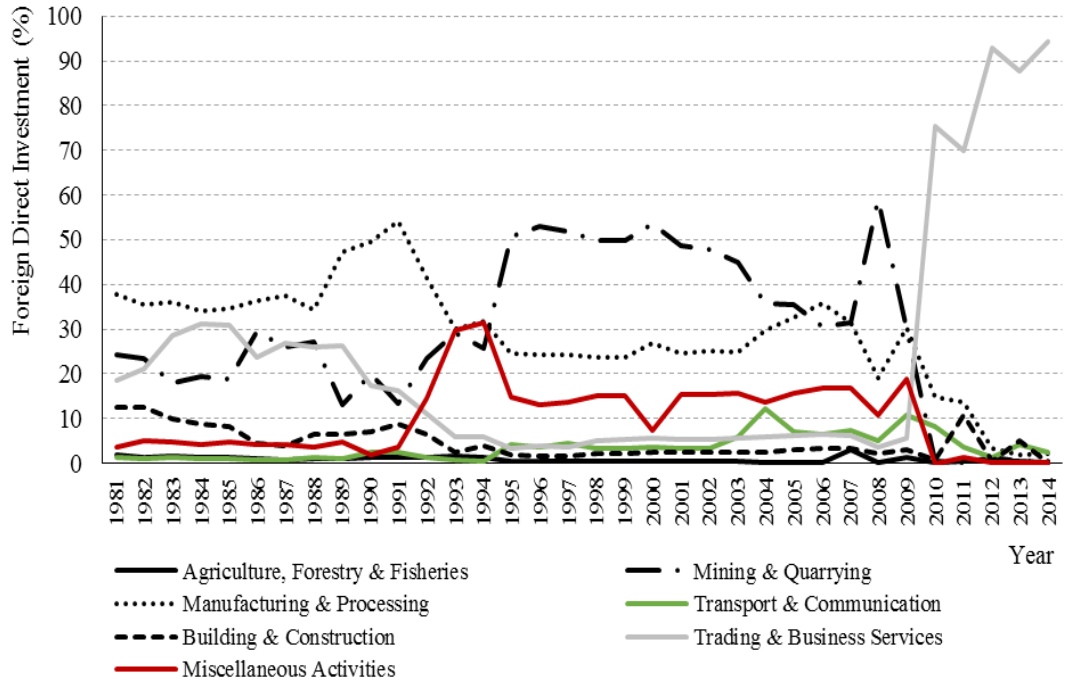

Figure 3: FDI inflows to Nigeria by business type
Source: Author's computation

FDI in manufacturing and processing businesses initially attracted the highest proportions of FDI inflows, until 1994 when it was overtaken first by, FDI in mining and quarrying businesses which rose steeply, started undulating downward and later dipped in 2006 (Figure 3). However, in 2010, FDI in trading and business services attracted the highest proportion of FDI inflows and grew astronomically while the others undulated downwards.

The Augmented Dickey Fuller test and the Johansen Co-integration test were carried out before estimating the model to test for stationarity and co-integration respectively.

The results of the unit root test carried out on the variables by using the Augmented Dickey Fuller (ADF) test to determine their stationarity with constant and time trend (Eq. 7) (Table 4). All the other variables had unit root at levels except $lnFDI_{AGR}$. After applying the ADF test to the first differences, all the variables ($lnGDP_{AGR}$, $lnFDI_{AGR}$, *lnEXR*, $lnINT_D$, *lnEXD*, *lnMIN*, *lnPOL and lnINF*) became stationary, indicating that there is no unit root in the series. Thus, implying that all the variables are integrated of order one, I (1).

In order to properly determine whether there is co-integration among the variables and its rank, the lag length is determined first, as follows. The lag length selection criteria showed the Final Prediction Error (FPE), Likelihood Ratio (LR) and Akaike Information Criterion (AIC) (Table 5). The test statistics in this study are based on a constant trend and a lag interval of 2 (two), which was chosen based on the output of the AIC and reinforced by the LR.

The result from the Johansen co-integration test (Table 6) showed that there are at most 2 co-integrating equations, thus, indicating that the variables are co-integrated and therefore have long run causal relationship among themselves, meaning they are moving together over time.

The estimated model has an R^2 of 0.9945, adjusted R^2 of 0.9930, a calculated F-statistic value of 667.15 and a highly statistically significant probability (Prob > F) of 0.000, the diagnostic checks as shown in the results of the OLS output from Stata 10.0 (Table 7). The Durbin-Watson (DW) test which was conducted to test for serial correlation (autocorrelation) in the model is a confirmation of the precision of this analysis. The Durbin-Watson (DW) test indicated that there is no serial correlation. The rule of thumb dictates that when the R^2 is greater than the DW statistic in a model, not minding the significance, such model is said to suffer from multicollinearity, positive first order autocorrelation and spurious regression (**Usman & Arene, 2014**). Since the R^2 is lower than the DW statistic (1.636), the model is therefore said to be free from multicollinearity, positive first order autocorrelation, estimation bias emanating from wrong specification of the model and spurious regression. The Jarque-Bera normality test showed that the errors in the residual are normally distributed in the model, while the Breusch-Pagan/Cook-Weisberg test is indicative that the estimated model is homoskedastic, i. e. it does not suffer from heteroskedasticity.

From the results of the OLS regression (Table 7) the estimated equation is given by Eq. 17.

$$lnGDP_{AGR} = 0.7236138 + 0.0514415lnFDI_{AGR} + 0.2666166lnEXR - 0.1265351lnINT_D * - 0.0415383lnEXD + 0.8680816lnMIN * - 0.2054449lnPOL - 0.0056328lnINF + \varepsilon \quad (17)$$

The independent variables jointly explain about 99% of changes in the output or productivity of the agricultural sector in Nigeria, while the remaining 1% captures the error term and all other explanatory variables that were not included in the model (Table 7). The coefficient of the intercept (β_0) which is positive showed that without these explanatory variables the value of agricultural output will still be positive. The intercept is found to be statistically insignificant and inconsistent with theoretical expectation, thus, indicating that agricultural output in Nigeria depends most significantly on interest rate differentials and macroeconomic instability, while the relationship exhibited by other variables such as FDI in agriculture, exchange rate, stock of gross external debts, political instability and variability of consumer price index were insignificant in causing changes in agricultural output.

Interest rate differential has an inverse relationship with agricultural output. It is at variance with the a priori expectation as it is significant in causing changes in agricultural output in the model, ceteris paribus. This means that as the interest rate differential decreases by one unit, agricultural output increases by 0.1265351 and so also, as interest rate differential increases by as much as one unit, agricultural output decreases by 0.1265351. This is similar to findings by **Ajudua, Davis and Osmond (2015)**, which showed that an increase in interest rate reduces agricultural growth. So also, findings by **Usman and Arene (2014)** also showed that agricultural output has an inverse relationship with interest rate differentials.

Macroeconomic instability violated the a priori expectation as it has a positive relationship with agricultural output, indicating that they are both increasing or decreasing in the same direction ceteris paribus. This violated the a priori expectation. If macroeconomic instability increases by one unit, agricultural output will most likely increase by as much as 0.8680816 units and so also as, macroeconomic instability decreases by one unit, agricultural output reduces by 0.8680816 units. This might be based on the fact that agriculture is seen as a default mode or fall-back position whenever there is instability in macroeconomic policies often prevalent in developing economies. As macroeconomic parameters become more unstable, the ease of doing business or enterprising becomes more difficult and as such, more people go back to their default or fall-back position, usually agriculture, which they had been engaged in hitherto and had always taken as a leisure or fill-in-the-gap activity before they divested into other forms of entrepreneurship. This is however, in contrast with findings by **Saibu and Keke (2014)** and **Usman and Arene (2014)**, who in their studies inferred that macroeconomic instability moves in opposite direction with agricultural output, hence, macroeconomic instability had significant adverse impact on agricultural or economic growth.

Having ascertained that there is co-integration among the variables ($lnGDP_{AGR}$, $lnFDI_{AGR}$, *lnEXR*, $lnINT_D$, *lnEXD*, *lnMIN*, *lnPOL* and*lnINF*), then there must be causality between them, either in one-way or in both directions. Since some of the variables are non-stationary (whether or not they are co-integrated) at levels, the usual Wald test was used following the Toda-Yamamoto procedure proposed by **Toda and Yamamoto (1995)** as applied by **Oladipo (2009)** and **Alimi and Ofonyelu (2013)**. The results of the Granger causality Wald tests (Table 8) shows that all of the independent variables put together, jointly causes changes in agricultural growth (dependent variable).

Table 4: Unit root test for stationarity based on the ADF test

Variables	At the levels		After first difference		Decision
	Test Statistic	Stationarity Position	Test Statistic	Stationarity Position	
$lnGDP_{AGR}$	-0.322	Not Stationary	-15.299*	Stationary	I (1)
$lnFDI_{AGR}$	-4.688*	Stationary	-10.436*	Stationary	I (1)
lnEXR	-0.868	Not Stationary	-5.401*	Stationary	I (1)
$lnINT_D$	-2.730	Not Stationary	-7.107*	Stationary	I (1)
lnEXD	-2.185	Not Stationary	-3.594*	Stationary	I (1)
lnMIN	-2.148	Not Stationary	-6.366*	Stationary	I (1)
lnPOL	-2.734	Not Stationary	-8.174*	Stationary	I (1)
lnINF	-3.561	Not Stationary	-5.748*	Stationary	I (1)

Source: Author's computation using STATA 10.1
Note: * denotes significance at 5% critical level

Table 5: Lag length selection criteria

Lag	LR	FPE	AIC
0		6.8e-06	10.8002
1	401.30	1.5e-09*	2.2596
2	152.29*	1.6e-09	1.5007*

Source: Author's computation using STATA 10.1
Note: * indicates lag length selected by the criterion

Table 6: Determination of the co-integrating rank (Johansen Co-integration test)

Hypothesized No. of Co-integration	Trace Eigenvalue Test		Maximum Eigenvalue Test	
	Trace Statistic	Critical value at 5%	Max Statistic	Critical value at 5%
None	234.5616*	156.00	75.1845*	51.42
At most 1	159.3770*	124.24	67.8658*	45.28
At most 2	91.5113	94.15	38.0217	39.37
At most 3	53.4895	68.52	18.8445	33.46
At most 4	34.6450	47.21	14.1265	27.07
At most 5	20.5185	29.68	11.5515	20.97
At most 6	8.9670	15.41	5.3873	14.07
At most 7	3.5797	3.76	3.5797	3.76

Source: Author's computation using STATA 10.1
Note: * indicates rejection of the null hypothesis.

Table 7: Impact of FDI in agriculture and other macroeconomic variables on agricultural growth (OLS results)

Variable	Coefficient	Standard Error	t-statistic	p > |t|
Constant	0.7236138	0.4601062	1.57	0.128
$lnFDI_{AGR}$	0.0514415	0.0574101	0.90	0.378
lnEXR	0.2666166	0.1439220	1.85	0.075
$lnINT_D$	-0.1265351	0.0813524	-1.56	0.027*
lnEXD	-0.0415383	0.0672171	-0.62	0.542
lnMIN	0.8680816	0.0745067	11.65	0.000*
lnPOL	-0.2054449	0.2154110	-0.95	0.349
lnINF	-0.0056328	0.0482942	-0.12	0.908
Diagnostic tests				
R^2				0.9945
Adjusted R^2				0.9930
F-statistic (7, 26)				667.1500
Prob > F				0.0000
Durbin-Watson d-statistic (8, 34)				1.6360
Normality (Jarque-Bera) Test (Prob > Chi^2)				0.0062
Breusch-Pagan/Cook-Weisberg Test for Heteroskedasticity (Prob > Chi^2)				0.4038

Source: Author's computation
Note: * indicates significance at the 5% probability level

Table 8: Short run Granger Causality (Results of the Wald Tests)

Regression type	Chi2	Prob > Chi2
lnFDIAGR→ lnGDPAGR	8.639*	0.013
lnGDPAGR → lnFDIAGR	1.750	0.417
lnEXR → lnGDPAGR	1.097	0.578
lnGDPAGR → lnEXR	16.999*	0.000
lnINTD → lnGDPAGR	14.434*	0.001
lnGDPAGR → lnINTD	1.173	0.556
lnEXD → lnGDPAGR	3.565	0.168
lnGDPAGR → lnEXD	5.541	0.063
lnMIN → lnGDPAGR	1.385	0.500
lnGDPAGR → lnMIN	56.195*	0.000
lnPOL → lnGDPAGR	4.679	0.096
lnGDPAGR → lnPOL	1.187	0.552
lnINF → lnGDPAGR	15.532*	0.000
lnGDPAGR → lnINF	5.018	0.081
ALL → *lnGDPAGR*	57.891*	0.000

Source: Author's computation
Note: * indicates significance at the 5% probability level

There is a statistically significant unidirectional causality running from FDI in agriculture to agricultural growth (Table 8), thus, indicating that FDI in agriculture has effect in causing changes in agricultural growth. This is in consonance with earlier studies by **Obansa and Maduekwe (2013)** and **Oloyede (2014)**, that agricultural growth can be induced by FDI. Changes in agricultural growth is significant in causing changes in exchange rate and macroeconomic instability in Nigeria, thus, indicating a unilateral causality running from agricultural growth to exchange rate and macroeconomic instability. On the other hand, there was a one-way causality running from interest rate differentials and annual variability of consumers' price index to agricultural growth.

The hypothesis earlier postulated for this study above was tested using the f-statistic test criterion. The statistical level of significance for the acceptance of the hypothesis where appropriate was done at the 0.05 (5%) significant level. The values of both the f_{cal} (Table 7) and f_{tab} are given as follows:

f_{cal} (7, 26) = 667.15

f_{tab} (7, 26) = 2.39

Since the calculated value of the f-statistic (667.15) is greater than the tabulated value of the f-statistic (2.39), i. e. ($f_{cal} > f_{tab}$) (667.15 > 2.39) and the probability of the regression (prob > f) is equal to 0.0000, we therefore reject the null hypothesis (H_0) and accept the alternative hypothesis (H_1). This means that FDI in agriculture and other macroeconomic variables have a positive and statistically significant impact on agricultural growth in Nigeria.

CONCLUSIONS AND RECOMMENDATIONS

This study was carried out to primarily analyse the impact of FDI inflows to agriculture on agricultural growth, measured by agricultural output (GDP) in Nigeria. It describes the trends in agricultural growth and FDI in agriculture vis-à-vis other sectors of the Nigerian economy and empirically analysed the effects of FDI in agriculture and other macroeconomic variables such as exchange rate, interest rate differential, stock of gross external debts, macroeconomic instability, political instability and inflation, represented by the annual variability of consumer price index as independent variables on agricultural growth, the dependent variable. It also examined the causal relationship between agricultural growth and FDI in agriculture and the other macroeconomic variables listed above in Nigeria within the years from 1981 to 2014.

The empirical results show that about 99 percent of the total variation in agricultural growth can be explained by FDI in agriculture and other macro-economic variables considered, whereas less than one percent is accounted for by the error term and other variables not included in the model. Although, there was a positive relationship between agricultural growth and FDI in agriculture, this was not significant. Macroeconomic instability has a positive significant relationship with agricultural growth, while interest rate differentials had a significant negative relationship with agricultural growth. The positive relationship between FDI in agriculture and agricultural growth was statistically insignificant contrary to some earlier findings. This insignificant relationship could be as a result of the very low level of FDI inflow into the agricultural sector in Nigeria which has not been able to significantly impact on agricultural growth. It can therefore, be said that domestic investment was also responsible for Nigeria's agricultural growth within the period under review, as FDI inflows to Nigeria will not on its own lead to sustainable agricultural growth, except it is combined with the right proportions of domestic investment. This provides an understanding that domestic investment should also be considered as a major factor that contributes to the growth of agricultural output in Nigeria. Furthermore, understanding the direction of causality between agricultural growth and FDI in agriculture and other macroeconomic variables is very important for formulating policies to encourage private investments in Nigeria, particularly in this period of economic recession.

The findings in this study have important policy implications which are recommended as follows:

The government should seek for and encourage more FDI for the agricultural sector in Nigeria with a view to enhancing domestic investment and capacity in agriculture.

There should be deliberate efforts in encouraging joint ventures between foreign and domestic investors/entrepreneurs that would be beneficial to the agricultural sector.

Interest (monetary policy) rates should be fixed in such a way that the differentials between the domestic interest rates and the prevailing interest rates in most agricultural FDI sources be reduced to the barest minimum.

The government should endeavour to position agriculture in a more commercial sense as a business venture rather than a leisure activity and as such improve both foreign and domestic investment, as well as output in the sector. There should be stability and consistency in macroeconomic policies.

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