CONTRIBUTION OF FOREIGN DIRECT INVESTMENT AND OTHER SELECTED VARIABLES TO AGRICULTURAL PRODUCTIVITY IN NIGERIA: 1990-2016

***Edewor, S. E.[1] Dipeolu, A. O.[1]., Ashaolu O. F.[1]., Akinbode, S. O.[2]., Ogbe, A. O, Edewor, A. O[1]., Tolorunju, E. T.[1] and Oladeji S. O.[1]**

[1]Department of Agricultural Economics and Farm Management
[2]Department of Economics

Federal University of Agriculture Abeokuta Ogun State, Nigeria
Corresponding author: saradowe@yahoo.co.uk;
Phone +2348052615401

Abstract
Over the past few years, Nigeria has been faced with a series of policy changes and political instability that has led to the incidence of capital flight from Nigeria. This study sought to examine the contribution of Foreign Direct Investment (FDI) and other selected variables to the Agricultural productivity. The study made use of annual time series of some macroeconomic variables and agricultural productivity spanning the period1990 to 2016. The data were analysed using descriptive statistics and Multiple Regression Model. The data were further tested for stationarity using the Augmented Dicky-Fuller unit root test where it was ascertained that the entire hypothesized variable were stationary and significant ($p<0.01$) at first difference. The study revealed that the amount allocated to the agricultural sector declined steadily over the years with the highest value in 2014. Similarly, the determinants of agricultural productivity included exchange rate, inflation rates, GDP, Government regime and per capita arable land (ha). The study therefore recommends that balanced exchange rate should be controlled for to encourage FDI inflow into the country and funds disbursed should be properly monitored and a system put in place to ensure proper implementation of the purpose for which the funds was disbursed by the Ministry of Agriculture.

Keywords: Foreign Direct Investment (FDI), Agricultural productivity, GDP, Exchange Rate, Nigeria

Introduction

Agriculture plays a major role in the development of any economy and this is more so in Africa where it supports the survival and well-being of 70% of her population both directly and indirectly and contributes over 20% to the Gross Domestic Product (GDP) (Wiggins, Farrington, Henley, Grist, & Anne, 2013; Nchuchume and Adejuwon, 2012). Despite the efforts made towards achieving the Sustainable Development Goals, African countries still require a substantial growth in agricultural investments through domestic and foreign investments (FAO, 2014).

Despite the fact that Nigeria has the potential to become a leading economy in Africa, it still has the challenge that stems from over dependence on the oil sector which happens to be detrimental to the agriculture sector in the economy (Oloyede, 2014 & Idialu, 2011). In recent times, several efforts have been made by the Government to boost agricultural production and promote its viability for both

existing and potential domestic and foreign investors. The large population size, land mass and large deposit of material resources have been the major attraction for investors in the Nigerian economy thus making the country one of the major recipients of Foreign Direct Investment (FDI) into its economy (Ajuwon and Ogwumike, 2013).

The Organisation for Economic Cooperation and Development – (OECD), (2008) defined FDI as a group of investment that is aimed at revealing the objective of a direct investor in one economy through the formation of a continued interest in a direct investment enterprise that is present in another economy. This produces a long-standing relationship between the direct investor and the direct investment enterprise as well as an ample degree of control on the enterprise administration. OECD (2008) regarded FDI to be a key catalyst to fostering deeper international economic integration.

There have been contentions on how FDI will affect a host economy as some schools of thoughts stated that it will increase productivity as well as promote technology advancement and competiveness to domestic firms (Yusuff, 2015). It is also argued that FDI may likely improve managerial skills, create market access, and increase access to capitals and loans and ultimately aid in unemployment reduction in the recipient economy (Dauda, 2007). The other schools of thought stated that FDI may threaten domestic industries and negatively affect economic development. United Nations Conference on Trade and Development (2017) reported that FDI inflows into Africa in 2016 declined to$59 billion by 3 percent while the outflows from Africa was constant. Global FDI reduced by 0.1 percent from 3.5 to 3.4 percent with FDI outflows in Nigeria reducing substantially by 9 percent in 2015 to $1.3 billion in 2016; while the inflows reduced to $4.4 billion in 2016.

Nigeria as a nation has rich human and natural resources to build a prosperous economy and reduce the poverty status of her population. This has not been accomplished because of the shrinking nature of productive sectors such as agriculture due to dependence on oil (Oloyede, 2014). Agricultural output has declined based on the deterioration of budget allocation to the sector. The sector is constrained by high cost of farm inputs, inadequate storage facilities, poor access to investible funds, low mechanization of farms and poor access to markets. It thus becomes highly paramount to critically examine the effect of FDI on the performance of the agricultural sector despite the recent bout of recession. This study therefore analysed how FDI contributes to agricultural productivity in Nigeria by specifically analysing the trend of FDI into the agricultural sector in Nigeria and determining the factors that influence agricultural productivity in Nigeria.

Literature Review

The agricultural sector plays an important role in national development because it provides food, employs labour and contributes to national income generation. The role of agriculture is obvious in developing economies where a higher proportion of their population reside in the rural area and depend largely on agriculture for survival (World Bank, 2008). Although the agricultural sector remains the mainstay of most developing countries, this sector has been faced with neglect and under investment in favour of other sectors in developing countries. The lack of private and public investment in this sector has led to lower productivity growth and stagnation in production (Oloyede, 2014). Most investment in agriculture comes from farmers although; investment from the public is the most effective to ensure food security and reduction in poverty (Oloyede, 2014).

Developing countries, countries in transition and emerging economies offer special incentives to attract external investment in form of foreign direct investment (FDI) inflow to their economy (Kurtishi-kastrati, 2013). In Nigeria, the Nigerian Investment Promotion Council (NIPC) and the Liberalisation of foreign exchange market are the main policy framework established to encourage the inflow of foreign direct investment (Akande and Biam, 2013). The rationale for this is rooted on the fact that FDI

is believed to contribute to financing of agricultural projects which produces externalities in the form of technological transfer among famers and other spill over effects (Msuya, 2007). Akande and Biam, (2013), further stated that FDI not only leads to the transfer of technology and business know-how but it also has the capacity to boost the productivity of firms as well as have a spill over effect on the entire economy.

Foreign direct investment inflows (FDI) are external finance that forms a component of international capital inflows to developing economies and countries especially in the Sub-Saharan Africa targeted at accelerating economic growth and development in those countries/economies (Dabour, 2000; Moses *et al*., 2013). World inflow of foreign direct investment (FDI) to agriculture in the past is small – less than 1% of total world inflows between 2005 and 2007 (UNCTAD, 2009). According to Bennett (2005), FDI play an important role in promoting economic growth as well as poverty reduction by stimulating market competition, capital provision, enterprise development improvement and enhancement of competitive business environment. Investments through FDI have the potential to contribute to food production, increase food security and welfare in recipient country (Akpan, *et al.,* 2017). Furthermore, the gains from FDI inflow also include transfer of technology, provision of long term finance and acquisition of technical, managerial and marketing experience, skills training and creation of employment opportunities with these gains leading to improvement in economy through economic growth (Aitken and Harrison, 1999).

The theories that explain the growth and existence of FDI can be grouped under: the neo-classical theory of economic growth, the investment theory (the two gap model), the product cycle theory and the location theory/eclectic theory. Following the neo-classical theory, the theory assumes that interdependence among countries benefited the developing countries more compared to the developed countries. This is solely based on the premise that capital flow from rich to poor regions where return on capital investment is highest aim at bringing transformation to backward economies. It is predicted by the theory that poor nations grow faster as a result of diminishing returns on capital and poor countries would catch up with rich ones over time because of higher capacity for absorbing capital. Based on the fact that growth is associated with increased productivity, inflow of FDI is suited to affect positive growth (Dunning and Sarianna, 2008).

Harrod-Domar's growth model or the investment theory differentiates between two gaps in an economy; that is the domestic savings and foreign exchange gaps. The former is the difference between investment necessary for the flow of goods and services and saving coming from those incomes while the latter refers to the amount by which the imports required for an output exceed exports. The model identifies deficiency in domestic economy and the need for stimulating this demand from external sources. It justifies those developing and transitional economies that are deficient in domestic savings needed to look outward for investment in their search for economic growth (Offiong and Atsu, 2014).

Vernon, (1974) developed the product cycle theory and stated that based on the comparative advantages from factor endowment patterns, a product that is invented in the home country usually enjoys competitive advantage initially in technology and inventory capability and serves the local market. This is because producers in the home country require consumers' feedback to be relevant in the business (Offiong and Atsu, 2014, Danmola, *et al*., 2017). Since countries have different stages of development, expansion into overseas market can only be through export. When the product become standardised and has gained acceptance, other countries may then offer relative cost advantage aimed at shifting production to other countries.

Several literatures have provided evidence of the effects of FDI on recipient countries. Liu *et al.* (2001) and Keho, (2015) reported that inward flow of FDI increases host country's export capacity thereby causing an increase in its foreign exchange earnings. Romer (1986) and Lucas (1988) provided evidence in their research that FDI spur long term growth through human capital development and research and development. Girma *et al*. (2001) and Msuya (2007) all echoed the positive impact of FDI in term of growth and higher productivity levels in both developing and developed countries. However, FDI may have negative impact on economic development and crowd out local enterprises. Jansen (1995) and UNCTAD (2002) in their research revealed that FDI could have a negative impact when large profit outflows and high import content are associated with multinational capital inflow. This view was also shared by Boyd and Smith (1992) that FDI activities may affect resource allocation and slow economic growth where price distortions (through the negative effect of inflation on saving) exist. Akande and Biam (2013) studied the causal relations between foreign direct investment in agriculture and agricultural output in Nigeria using error correction model, augmented dickey-fuller test, Johansen co-integration procedure, granger causality test and impulse response. The study revealed that no long run equilibrium relationship exists between FDI in agriculture and agricultural output both in the absence and presence of inflation shock. however, FDI in agriculture and agricultural output experienced a causal influence in the short run, with no short run causal influenced flow from the latter to the former with inflation having a negative role on influence of FDI in agriculture and agricultural output in the short run. Similarly, Izuchukwu *et al*., (2014) investigated the impact of FDI, trade and its effect on agricultural sector development between the periods of 1980 – 2009 in Nigeria and found out that there was no causality between FDI and agricultural output. The potential impact (positive or negative effects) on the economy depends to some extend the nature of the sector where the investment is taking place.

Methodology

This study made use of annual time series data spanning over the periods of 1990 – 2016 (27 years). Data were obtained from various sources. Table 1 presents the data type, the data sources and the period covered. The food production index for food crops was used as a proxy for agricultural productivity in Nigeria. The food production index for food crops obtained from is inclusive of all edible and nutritive food crops with the exception of tea and coffee because despite the fact that they are edible, they are perceived to have no nutritive value. Data on Official Development Assistance (ODA) into agriculture in Nigeria obtained from Food and Agriculture Organisation (FAO) was used as a proxy for FDI into agriculture in Nigeria.

The data were analysed using descriptive statistics and Multiple Regression model (OLS). The Augmented Dickey Fuller Unit roots test was used to test for stationarity of all the variables over the period studied. The choice of OLS was because the variables were all stationary at first difference and because it also shows the cause and effect relationship that exists between the dependent and the independent variables. The OLS Regression Model was used to determine the factors that affect agricultural productivity. It is specified thus:

$$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \cdots + \beta_6 X_6 + \varepsilon_i \quad \text{..... (1)}$$

Where, Y = Food Production Index (Proxy for agricultural productivity); X_1 = Foreign Direct Investment into Agriculture (US$); X_2 = Exchange rate; X_3 = Governance regime (D; Civilian =1, Military= 0; X_4 = Inflation Rate; X_5 = *Per capita* arable land (ha); X_6 = Gross Domestic Product (US$); ε_i= Error Term.

Results and Discussion

This section presents the result for the study. Table 2 presents the result of the descriptive statistics. The result shows that all the variables had positive means. Similarly, the kurtosis coefficient showed mixed results for all variables. Some (FDI to agriculture and inflation rates) had values more than 3 (leptokurtic distribution) implying that abnormal values were relatively frequent for the series while GDP, Exchange Rate, *Per Capita* Arable (ha), Government regime and Agricultural production index were below 3. This was also evident from the Jarque-Bera normality test where some of the variables had normal distribution because they were significant below ($p<0.5$).

Figure 1 presents the trend of GDP between the periods 1990 to 2016. The trend revealed a consistent and almost the same GDP amount between 1994 and 2000. The trend further showed a steady upward rise in GDP between the years 2002 till date. A sudden decline in GDP was evidence between 2008 and 2010 and between 2013 and 2014. The general trend of the GDP just shows a steady upward increase.

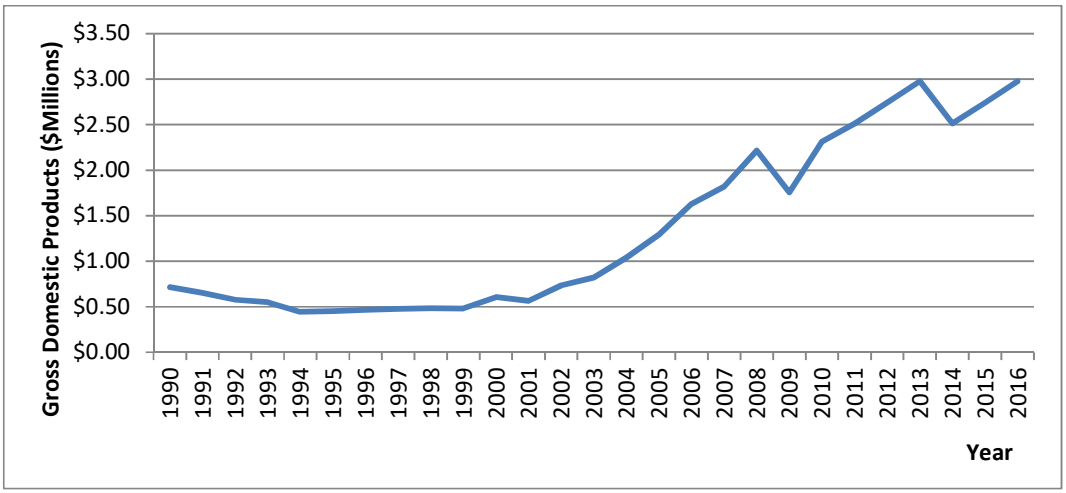

Figure 1: Trend of Gross Domestic Products in Nigeria ($Millions)

Figure 2 presents the trend of Foreign Direct Investments (FDI) into the agriculture sector in Nigeria. The FDI inflow into the agricultural sector was steady between 1990 and 2002 and below a $100million from all development partners. There was a steady upward trend between 2002 and 2015 with an all-time high in 2015. The rise in FDI investment into agriculture between these periods may have been as a result of various fiscal and monetary policies embarked upon by the Nigerian Government. During this period, the Government started the Agricultural Transformation Agenda which sought to enhance the role of agriculture as an engine of inclusive growth by promoting wealth creation, rural employment and the diversification of the economy

Also, the Government focused on improving access to agricultural credits through schemes such as the Nigeria Incentive-Based Risk-Sharing System for Agricultural Lending (NIRSAL) targeted at facilitating credit flows to agribusinesses by collaborating with various Stakeholders in order to promote agricultural value chains in Nigeria through its five pillars namely, Risk Sharing Facility, Insurance Facility, Technical Assistance Facility, Agricultural Bank Rating System and bank Incentive Mechanism.

However, the inflow of FDI has been on a slight decrease since 2015 as a result of the exchange rate fluctuations. Other factors affecting the decline of FDI into the country include insecurity in some parts of the country most especially in the Northern parts of the country. This has led to the relocation of some businesses from the North to other peaceful parts of the country (Nwagbosa (2012) or completely out of the country.

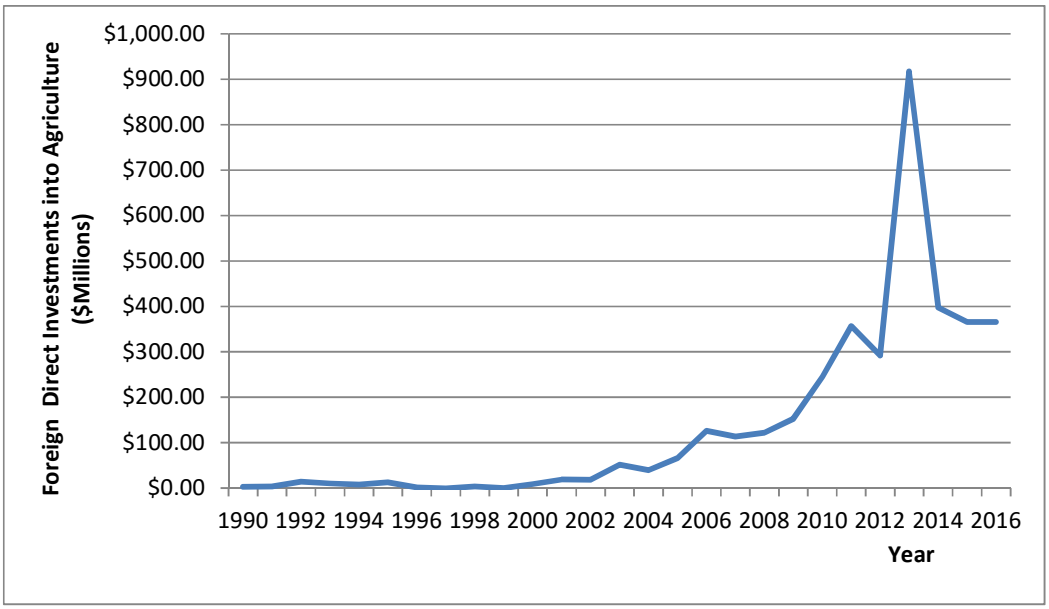

Figure 2: Trend of Foreign Direct Investment into the agricultural sector in Nigeria

Figure 3 presents the agricultural productivity growth rate in Nigeria between 1990 -2016. Agricultural productivity growth experienced an undulating growth within the period of 1990 to 2016, with the exception of 1998, 2007 – 2008, 2010 – 2011 and 2016 where it declined.

The periods between 2006 and 2016 were marked with series of sudden spikes and decreases in the growth of the agricultural productivity with the highest decrease in agricultural productivity growth rate between 2008 and 2009 and the highest point in the growth rate between 2009 and 2010. Akande and Biam (2013) reiterated that increased productivity growth within the agricultural sector will have a spill over effect on the entire economy.

Table 3 presents the result of the Augmented Dickey Fuller test for unit root. The test was conducted to determine if the data series had unit root. The result revealed that none of the variables tested were stationary at level rather, they were all stationary at first difference. All hypothesized variables were statistically significant at 1 percent with their statistical values greater than their critical values at first difference. The use of the Ordinary Least Square Regression was based on the fact that all the variables were stationary at first difference.

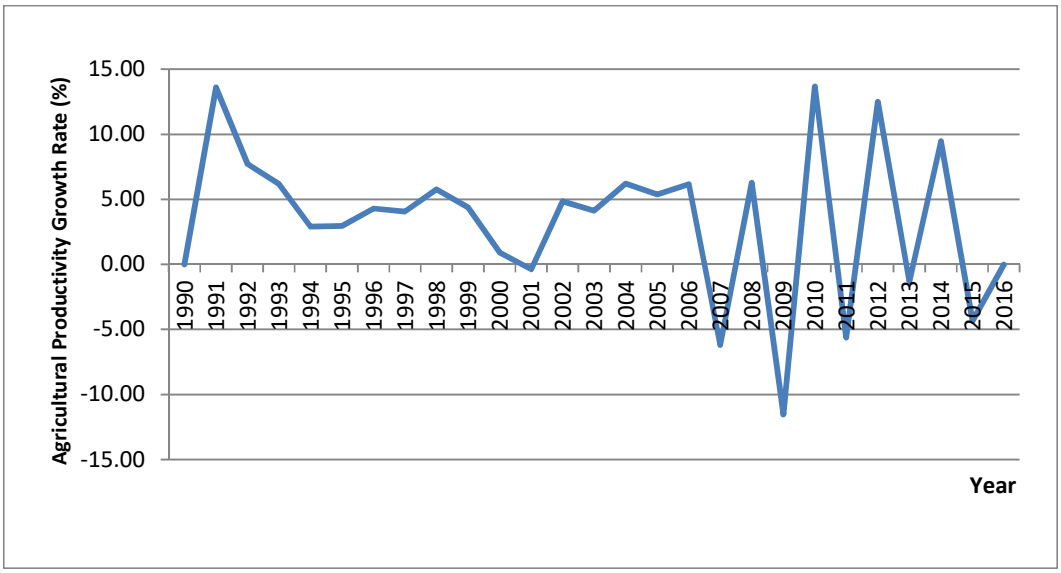

Figure 3: Agricultural productivity growth rate in Nigeria, 1990-2016

Table 4 presents the result of the factors affecting agricultural productivity in Nigeria. Out of the six (6) variables fitted for the model, five were statistically significant however at different levels. The Adjusted R^2 was 0.968 implying that 96.8 percent of the variation in agricultural productivity was explained by the independent variables. Exchange rate was statistically significant ($p<0.01$) and positive implying that increase in the exchange of $1 for N will decrease agricultural productivity. This contradicts *a prior* expectation because a lower exchange rate is expected to increase the purchasing power of the farmers. Also, Government regime was statistically significant ($p<0.01$) and negative connoting that agricultural productivity declined during the civilian regime and increased during the military regime. Similarly, inflation rate was negative and statistically significant ($p<0.05$) thus implying that an increase in inflation will result in a reduction in agricultural productivity.

Similarly, per capita arable land (ha) was positive and statistically significant ($p<0.01$). The implication of this is that a one-hectare increase in the land cultivated by an individual will result in an increase in agricultural productivity. Boyd and Smith (1992) Similarly, GDP was statistically significant ($p<0.01$) and positive connoting that an increase in GDP in Nigeria will lead to an increase in agricultural productivity. This is in line with *a prior* expectation because agriculture is one of the major contributors to GDP in Nigeria (Wiggins *et al*., 2013). Furthermore, FDI into the agricultural sector was not statistically significant and it was negative. This may be because its effect on agricultural productivity becomes masked by other factors or because the funds meant for agricultural production are channelled into other non-agricultural uses (Akande and Biam, 2013; Izuchukwu *et al*., 2014).

Conclusion and Recommendations

The study was conducted to determine the contribution of FDI and other selected variables to agricultural productivity between 1990 -2016 in Nigeria. The study revealed that there has been decline in FDI inflow into the agriculture sector since 2014. This has grave implication for the economy because a decline in FDI may result in continuous small scale production as well as unemployment in some instances. Also, the hypothesized variables for estimating the factors affecting agricultural productivity

using the ADF test were all stationary at first difference. Furthermore, the result of the Multiple Regression Model revealed that the factors influencing agricultural productivity in Nigeria are GDP, exchange rate, inflation rates, government regime and per capita agricultural land (ha).

The study therefore concluded that agricultural productivity in Nigeria will be boosted by increase in factors such as per capita arable land (ha) and GDP as well as lower exchange rate of the dollar for a naira and inflation rates but not by FDI into the agriculture sector. The study therefore recommends that balanced exchange rate should be controlled for to encourage FDI inflow into the country and funds disbursed should be properly monitored and a system put in place to ensure proper implementation of the purpose for which the funds was disbursed by the Ministry of Agriculture. Similarly, existing technologies and infrastructures should be improved upon or new technologies introduced to enhance domestic production to promote FDI inflow.

References

Aitken B. J. and Harrison A. E. (1999). Do Domestic Firms Benefit from Direct Foreign Investment? Evidence from Venezuela. *America Economics Review*, 89(3):605-618.

Ajuwon, O.S. and Ogwumike, F.O. (2013). Uncertainty and Foreign Direct Investment: A Case of Agriculture in Nigeria. *Mediterranean Journal of Social Sciences,* 4(1): 155-165

Akande, O. R. and Biam, C. K. (2013). Causal relations between foreign direct investment in agriculture and agricultural output in Nigeria. *African Journal of Agricultural Research*, 8(17):1693-1699

Akpan, S. B., Udoh, E. J. and Umoren, A. A. (2017). Empirical linkage between foreign direct investment inflow and agricultural sub-sectoral productivity in Nigeria. *Nigeria Journal of Agricultural, Food and Environment,* 13(1):50-59

Alfaro, L., Chanda, A., Sebnam, K. & Sayek, S. (2009). Does Foreign Direct Investment Promote Growth? Exploring the Role of Financial Markets on Linkages. *Journal of International Economics,* 64:605-818.

Bennett, R. (2005). Theory and evidence: the determinants of Foreign direct investment in Sub-Saharan Africa. Bachelor's Thesis, Leonard N.. Stern School of Business, New York University, New York.

Boyd J. H. and Smith B. D. (1992). Intermediation and Equilibrium Allocation of Investments Capital: Implications for Economic Development. *Journal of Monetary Economics*. 30:409-432.

Dabour, N. M. (2000). The role of FDI in development and growth in OIC members' countries. *Journal of Economic Cooperation*, 21(3):27-55

Danmola, R.A., Olateju, A.O. and Aminu, A.W. (2017). The impact of foreign direct investment on the Nigeria Manufacturing sector: A time series analysis. *European Scientific Journal,* 13(31):521-556

Duada, R. O. (2007): "The Impact of FDI on Nigeria's Economic Growth: Trade Policy Matters." *Journal of Business and Policy Research*, 3(2):11-26.

Dunning, J. H. and Sarianna,M. L. (2008). Multinational Enterprises and the Global Economy. Edward Elgar Publishing.

Ekpo, A.H and Umoh, O.J. (2003). An overview of the Nigerian economic growth and development. Available at: http://www.onlinenigeria.com/economics. Accessed on: 30/07/2017.

FAO, (2014). The Water-energy-food Nexus: a New Approach in Support of Food Security and Sustainable Agriculture. FAO, Rome.

Girma, S., Greenaway, D. and Wakelin, K. (2001). Who Benefits from Foreign Direct Investment in the United Kingdom? *Scottish Journal of Political Economics*, 48:119-133

Izuchukwu, O., Huiping, H., Abubakar, A., and Olufemi, E. A. (2014). Foreign direct investment, Trade and Its Effects on Agricultural Development in Nigeria: Evidence from Time Series Analysis. *International Journal of Management Science and Business Administration*; 1(1):28-40.

Jansen, K. (1995). The macroeconomic effects of direct foreign investment: The case of Thailand. *World Development*, 23:193-210.

Keho, Y. (2015). Foreign Direct Investment and Exports Nexus: Cointegration and Causality Evidence from Cote d'Ivoire. *Journal of Economics and Sustainable Development,* 6(9):2222-2270.

Kurtishi-Kastratl, S. (2013). The Effects of Foreign Direct Investments for Host Country's Economy. *European Journal of Interdisciplinary Studies*, 5(1): 26-38.

Liu, X., Wang, C. and Wei, Y. (2001). Causal links between FDI and Trade in China. *China Economic Review*, 12(2/3): 190-202.

Lucas, R. J (1988). On the mechanics of economic development. *Journal of Monetary Economics.* 22(3):3-42.

Moses, J. D., Okpachu, S. and Ojonugwa, U. (2013). Foreign direct investment and performance of agricultural sector in Nigeria (1970-2010). *Journal of Resourcefulness and Distinction*, 6(1):1-12

Msuya, E. (2007). The Impact of Foreign Direct Investment on Agricultural Productivity and Poverty Reduction in Tanzania. MPRA Paper No. 3671. Pp1-15

Nchuchume, F. F., & Adejuwon, K. D. (2012). The challenge of agriculture and rural development in Africa: The case study of Nigeria. *International Journal of Academic Research in Progressive Education and Development*, 1(3):45-61.

Nwagboso, C. I. (2012). Security Challenges and Economy of the Nigerian State (2007 – 2011), *American International Journal of Contemporary Research*, 2(6):244-258.

Obayelu, A.E., Olarewaju, T.O. and Oyelami, N.L. (2014) Effect of Rural Infrastructure on Profitability and Productivity of Cassava-based Farms in Odogbolu Local Government Area Ogun State, Nigeria. *Journal of Agricultural Sciences*, 59(2):187-200

Offiong, A. I. and Atsu, I. A. (2014). Determinates of foreign direct investment in Nigeria (1980 – 2011). *International Review of Management and Business Research*, 3(3):1538-1550

Oloyede, B. B. (2014). Impact of Foreign Direct Investment on Agricultural Sector Development in Nigeria, (1981-2012). *Kuwait Chapter of Arabian Journal of Business and Management Review*, 3(12):14-24.

Organisation for Economic and Cooperative Development - OECD. (2008). *OECD Benchmark Definition of Foreign Direct Investment: Fourth Edition.*

Romer, P. M. (1986). Increasing Returns and Long Run Growth. *Journal of Political Economics*. 4:102-103.

Slimane, M.B., Huchet-Bourdon, M. and Zitouna, H.(2015). The role of sectoral FDI in promoting agricultural production and improving food security. *Economie Internationale*, pp1-32.

UNCTAD (2002). Trade and Development Report 2002, Geneva, United Nations. pp1- 198

UNCTAD (2009). World Investment Report, Transnational Corporations, Agricultural Production and Development. Geneva, Switzerland, pp1-314

UNCTAD. (2017). *World Investment Report, 2017: Investment and the Digital Economy.* Geneva: United Nations Conference on Trade And Development. Pp1-252

Vernon, R. (1974). The location of economic activity" In. Dunning, J. H. (Ed.), Economic Analysis and the multi-national enterprises. London: Allen and Urwin, pp 89-114

Wiggins, S., Farrington, J., Henley, G., Grist, N., & Anne, L. (2013). *Agricultural Development policy: A comtemporary agenda background paper for GIZ.* Overseas Development Institute, UK. Pp1-142

Yusuff, M. A. Afolayan, O. T. and Adamu, A. M. (2015). Analysis of Foreign Direct Investment on Agricultural Sector and Its Contribution to GDP in Nigeria. *Journal of Emerging Trends in Economics and Management Sciences,* 6(2):94-100

Table 1: Data type, the data sources and the period covered by the study

STUDY DATA	**DATA SOURCES**	**PERIOD**
Food Production Index	World Development Indicators (WDI)	1990-2016
Foreign Direct Investment into Agriculture (US$)	Food and Agriculture Organisation (FAO)	1990-2016
Exchange rate	Central Bank of Nigeria (CBN)	1990-2016
Governance regime (D; Civilian =1, Military= 0	Wikipedia	1990-2016
Inflation Rate	WDI	1990-2016
Per capita arable land (ha)	WDI	1990-2016
Gross Domestic Product (US$)	WDI	1990-2016

Table 2: Descriptive statistics of variables

Series	Mean	Median	Std. Dev.	Skewness	Kurtosis	Jarque-Bera	Probability
Agricprod Index	88.354	89.050	20.415	-0.165	1.940	1.386	0.500
FDI to Agric.	1.38E+08	39750000	2.06E+08	2.240	8.555	57.282	0.000***
Exchange Rate	102.885	120.58	68.321	0.003	1.968	1.198	0.549
Govt. Regime	0.667	1	0.480	-0.707	1.500	4.781	0.092*
Inflation Rate	18.769	12.22	17.753	1.915	5.424	23.109	0.000***
Per Capita Arable Land (ha)	0.256	0.263	0.041	-0.440	1.707	2.753	0.252
GDP	1354165	820586.9	935517.4	0.557	1.683	3.346	0.188

Table 3: Augmented Dickey Fuller stationarity test result

Series	Test at Level	Test at First Difference
Agricultural Production Index	-2.001	-4.367***
Exchange rate	-0.099	-6.475***
Gross Domestic Product	0.497	-5.949***
Per capita Arable land (ha)	0.340	-4.802***
Aid into Agriculture	-2.041	-8.364***
Inflation Rate	-1.939	-4.084***
Government Regime Dummy	-1.401	-3.724***
Interest Rate	-2.727*	-6.376***

Table 4: Factors affecting agricultural productivity in Nigeria

Variables	Coefficient	T-value	P-value
FDI to Agric	-0.006		
	(0.013)	-0.44	0.660
Exchange Rate	0.455***		
	(0.045)	10.04	0.000
Government Regime	-0.591***		
	(0.093)	-6.35	0.000
Inflation Rate	-0.054**		
	(0.023)	-2.36	0.029
Per capita Arable Land (ha)	0.567***		
	(0.178)	3.19	0.005
Gross Domestic Product	0.181***		
	(0.048)	3.75	0.001
	1.418		0.005
Constant	(0.444)	3.19	
Adj R-squared = 0.968			
Prob>F = 0.000			

Standard errors are in parenthesis
****, **, * coefficients are significant at 1%, 5% and 10% respectively*