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An Evaluation and Forecast of the Impact of Foreign Direct Investment in Nigeria's Agriculture Sector in A VAR Environment

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Abstract
This study evaluated and forecasted the impact of FDI in the agricultural sector from 1980-2007, specifically its impact on agricultural output and labor in a Vector Auto Regression (VAR) environment. Data used in this study were sourced from Central Bank of Nigeria (CBN) statistical bulletin (2009). Results from the analysis revealed that FDI in the period under review had no significant impact on agricultural output. In addition, results of the forecast estimates showed that the current volume of FDI would not significantly affect agricultural output but will have significant positive impact on labor (employment generation). This study recommended for increase in the volume of FDI and advised government and other stakeholders to seek FDI that will improve existing or introduce new technology in the agricultural sector and enhance domestic capacity or domestic investment, even if the opportunity cost of a reduction in labor may have to be paid.
Keywords: Agriculture; FDI; Nigeria; SAP; VAR.

1. Introduction

Nigeria, a country that spans an area of 924,000 square kilometers, is bordered by the Gulf of Guinea, Cameroon; Benin, Niger, and Chad. Its topography ranges from mangrove swampland along the coast to tropical rain forest and savannah to the north (Lawal and Atte, 2006). Agriculture remains the mainstay of its economy. Okuneye (2002) described agriculture as the main source of food for most of Nigeria's population while Ayinde et al., (2007) opined that it was until oil discovery Nigeria's highest foreign exchange earner. From these views and definitions, the expectation would be that the agriculture sector receives the highest attention from government and private enterprises especially concerning funding.

Conversely, Mogues et al., (2007) publicized that public spending in the sector is "astronomically" low. Less than 2 percent of total federal expenditure was allotted to agriculture during 2001 to 2005; far lower than spending in other key sectors such as education, health, and water contrasting dramatically with the sector's importance in Nigeria's economy and the policy emphasis on diversifying away from oil, an allotment far below the 10 percent goal set by African leaders in the 2003 Maputo agreement.

The involvement of private enterprises also leaves much to cheer; Ogbanje et al., (2010) revealed that in terms of foreign direct investment (FDI), the sector suffers heavy marginalization in spite of its relevance to Nigeria as a major provider of employment, foreign exchange, and economic sustenance. Even Fasinmirin and Braga (2009) called our attention on recourse to modern agriculture; they claim that virtually all facets of human endeavor rely primarily on agricultural products or its by-products.

Provision of funds is a key area to address because it would help return the agriculture in Nigeria to its place of pride and introduce modern practices and system. Ogbanje et al., (2010) defined the lack of capital as the major sustenance of the vicious circle of poverty; this provokes the need for adequate funding since the agricultural sector is important to alleviate poverty.

FDI has been one of the major adoptions to bolster funds into various sectors of an economy. According to Alfaro et al., (2009) there is a widespread belief within policy circles that FDI enhances the productivity of host countries and promotes economic development. Their notion stems from the fact that FDI may not only provide direct capital financing but also creates positive externalities via the adoption of foreign technology and expertise. For instance, Oji-Okoro (2010) in his study, the relationship between FDI and telecommunication growth in Nigeria, expounded that FDI influx boosted the growth of the country's telecommunication sector tremendously.

A host of research has been carried out to investigate the significance of foreign direct investment on the economy of Nigeria; however, most of these researches are concentrated on the sector where the large chunk of these investments goes to--the oil and gas sector. The low level of foreign direct investment in the agricultural sector might be one major reason why not much work has been done to analyze the impact of FDI in Nigeria's agricultural sector. A sectorial analysis of cumulative foreign direct investment in Nigeria from 1980-2007 is described in Figure 1.

The major gap this study points out and intends to address is that, studies that have even attempted to empirically study the impact of FDI in the agricultural sector of Nigeria use the FDI that is obtained in the entire economy

rather than use the FDI that flows specifically to the agricultural sector. The question that then comes to mind is; what is the impact of foreign direct investment that flows specifically into the agricultural sector on the output and productivity of the sector? This study, with the aid of empirical models, intends to bridge this gap by examining the relationship between agriculture FDI, and agricultural product output in Nigeria.

Hence, our objective is, to within a VAR environment, evaluate and forecast the relationship between the levels of productivity in the agricultural sector relative to the amount of foreign direct investment that has been obtained in the sector.

We use FDI as well as other economic variables such as labor force in the agricultural sector to explain productivity in the agricultural sector of Nigeria. In this study, the following hypotheses are to be tested;

- The level of agricultural sector output is positively related to the level of FDI in the agricultural sector.
- The level of labor generation by the agricultural sector is significantly related to FDI in the agricultural sector.
- FDI into the agricultural sector and the agricultural sector output have a complementary long-run relationship
- Foreign investment inflows to the agricultural sector have a complementary long run relationship with the employing power of the agricultural sector.

This study is important because understanding the linkage between FDI flows to the agricultural sector and the levels of productivity in the sector may be key to uncovering channels through which FDI stimulates the growth and development of Nigeria's agricultural sector and consequently, to identify the policy levers that may be engineered to maximize both inflows and gains of FDI into the agricultural sector.

The remaining part proceeds as follows: section two contains review of some relevant literatures, section three describes methodology; section four contains a detail on results of data analysis and discussion while the final section, section concludes the study.

2. Literature Review

Theory and evidence shows that an agricultural economy is strategic to national development, particularly for developing countries (Okorie and Eboh, 1990). A flourishing agricultural economy is a sign of a healthy and wealthy economy.

Agriculture in Nigeria enjoyed a boisterous era between the 60's and the 70's. In the 60's agriculture contributed up to 64 percent to the total GDP but gradually declined in the 70's to 48 percent, further declining in 1980 to 20 percent and 19 percent in 1985, due to the oil glut of the 1980's (Ukeje, 2003). Most literatures support (Ukeje, 2003) assertion that oil or the oil boom period of 1971-1977 is the reason for negligence and failure of the agricultural sector in Nigeria. Nevertheless, the decline in the growth and development of agriculture in Nigeria cannot be placed at the doorsteps of oil alone.

A few other studies have shown that the lack of political will for development of the sector; policy somersaults of successive governments, unavailability of the right policies, and poor implementation of good ones also aggregate as large contributors to the decline. Among them is (Fasminrin and Braga, 2009), they established that the main reason for the slow agricultural development in Nigeria despite the torrent of scientific information to engender improvement is due to poor government involvement at the level of policy formulation and implementation.

The right and stable policies should be in place to improve funding either through public or private sector investment; this will not only help to meet the food needs of the ever-bulging populace but also help alleviate socioeconomic problems that come with such increase. For example unemployment, Ayinde (2008) detected an inverse relationship between agricultural growth and unemployment in Nigeria, he proposed that polices developed to alleviate poverty in Nigeria should focus on increasing agricultural growth. According to Fasinmirin and Braga (2009), the global economic recession and the concomitant increase in food prices, unemployment, dilapidated infrastructures, and poor industrial growth all call for a concerted effort at ensuring a strong and efficient agriculture to meet the demands of an ever-increasing Nigerian population.

One of the most sought after ways to seek funds for improvement of agricultural production especially in developing economies such as Nigeria is to source for FDI. Furtan and Holzman (2004) termed FDI as the most spectacular manifestation of globalization that occurred since 1990 while Ogbanje et al., (2010) specified it as a major component of international capital flows been investment by multinational companies with headquarters in developed countries. This investment ranges from transfer of funds to whole package of physical capital, techniques of production; managerial and marketing expertise, products; advertising, and business practices for the maximization of global profits. Ayanwale (2007) argued that most countries strive to attract FDI because of its acknowledged advantages as a tool of economic development. Africa and Nigeria in particular joined the rest of the world in seeking FDI as evidenced by the formation of the New Partnership for Africa's Development (NEPAD) to primarily, attract foreign investment to Africa.

Ogbanje et al., (2010) using Least squared difference (LSD) method to determine the mean difference between agricultural sector and each of the other economic sectors of Nigeria in relation to FDI from 1970-2007 discovered that there was discrimination against the sector and then advised that foreign countries should increase investment in Nigeria's agricultural sector so as to mitigate capital inadequacy faced by key stakeholders of the sector and increase agricultural GDP. However, Omankhanlen (2011) in his study of the impact of FDI in Nigeria's economy, even though he recognized its importance, found no empirical strong evidence to support the notion that FDI had been pivotal to economic growth in Nigeria that justifies the effort of successive governments in the country at using FDI as a tool for economic growth; he suggested for sound economic policies that would make the country more investor friendly. Whereas, Long (2005) in reviewing and evaluating China's policies on FDI disclosed that china currently encourages FDI for the purpose of transforming traditional agriculture, developing modern agriculture, and promoting the industrialization of agriculture.

Nigeria's agricultural sector policies are reviewed over time and new ones introduced; previous literatures have extensively discussed the different policies that were implemented during the sector's evolution. These policies lie within three main periods that we categorize into: Pre-SAP, SAP, and Post-SAP periods.

The Pre-SAP from 1960-1986 was a period marred by higher local demand than production capacity along with export restrictions on the farmer's goods that resulted in relative price distortions. Some notable policies in that era include; "River Basin Development Authorities (RBDAs)," "Agricultural Credit Guarantee Scheme Fund (ACGSF)," and "Operation Feed the Nation (OFN)" amongst a host of others. Adofu (2010) in their study outlined Structural Adjustment Program (SAP) as a policy that sought to eliminate price distortion and promote market liberalization in a bid to promote healthy growth and development. The New Agricultural Policy (NAP) most notably marks the Post-SAP period, initiated under the framework of National Economic Empowerment and Development Strategy (NEEDS); it attempted to overcome the pitfalls of past policies. These policies and frameworks whilst they lasted reflected the role expected of the sector with respect to relative available resources, yet the sector has been growing retrogressively.

Charting the way forward has also generated numerous contributions from multiple literatures and stakeholders such as Olomola (2007) who emphasized adequate funding for research and extension and other sector-specific strategies such as: promotion of contract farming to enhance market access, improved agricultural financing, and improved market information to shoot up agricultural productivity. Oji-Okoro (2011) examined the effect of the agricultural sector on Nigeria's economy and drew a notion similar to what Olomola (2007) raised; provision of more funds for Nigeria's agricultural universities to enable them carry out more research on all areas of agricultural production. Lawal and Atte (2006) from a different perspective advocated for the introduction of improved technology to achieve increase per-capita productivity in agricultural production while Okuneye (2002) not only called for provision of feeder roads, storage facilities; effective extension service delivery system, credit facilities, and agricultural research among others but also consistent positive policies.

3. Methodology

We obtained the data in this study from Central Bank of Nigeria (CBN) statistical bulletin (2009). In a bid to evaluate the effect of FDI on the other variables, we examined the relationship between three time series variables namely: FDI, agricultural output, and labor from 1980- 2007. Statistical tool employed is an unrestricted Vector Auto Regression (VAR) model and its higher-order dynamics: Impulse Response Function (IRF), and Variance Decomposition (VD). The three equations, (one for each variable), of the VAR model along with lag length of two plus intercept summed to twenty-one coefficients. Ordinary Least Squares (OLS) was employed to estimate the coefficients. The regressors were lagged values of agricultural output, labor, and FDI. The data was transformed into natural logarithm form after which we conducted a unit root test. We also tested for co-integration to determine whether to employ VAR or a Vector Error Correction (VEC) model and then a residual test to confirm suitability of the model. All these were done to ensure that we do not produce spurious regression results when OLS estimates the equations of the VAR. Forecasting was done with IRF and lastly VD, which shows the relative important information of random perturbations that have impact on the variables in the VAR model was employed.

4. Empirical Analysis of Data and Presentation of Results

4.1 Model Specification

Each of the variables in our model serve as the dependent variable in each of the equations while the regressors in all the equations are lagged values of all the variables. An unrestricted VAR with lag length p can be expressed as:

$$Y_t = C + \Phi_1 Y_{t-1} + \ldots + \Phi_p Y_{t-p} + \Psi_t \qquad (1)$$

Where Y_t denotes a vector of variables (agricultural output, labor and FDI), C represents a vector of

corresponding constant terms; $\Phi_1,\ldots,\Phi_p$ are matrices of coefficients and Ψ_t is an unobservable zero-mean independent white noise process. This model is often referred to as a VAR (p) process because the number of is the same "p".

Given three endogenous variables, the basic VAR model can be mathematically expressed with the following estimation equations:

$$Y1_t = \alpha_1 + \sum_{j=1}^{k} \beta_{1j} Y1_{t-j} + \sum_{j=1}^{k} \delta_{1j} Y2_{t-j} + \sum_{j=1}^{k} \varphi_{1j} Y3_{t-j} + \varepsilon_{1t} \quad (2)$$

$$Y2_t = \alpha_2 + \sum_{j=1}^{k} \beta_{1j} Y1_{t-j} + \sum_{j=1}^{k} \delta_{1j} Y2_{t-j} + \sum_{j=1}^{k} \varphi_{1j} Y3_{t-j} + \varepsilon_{2t} \quad (3)$$

$$Y3_t = \alpha_3 + \sum_{j=1}^{k} \beta_{1j} Y1_{t-j} + \sum_{j=1}^{k} \delta_{1j} Y2_{t-j} + \sum_{j=1}^{k} \varphi_{1j} Y3_{t-j} + \varepsilon_{3t} \quad (4)$$

Where the ε's are the stochastic error terms called impulses or innovations or shocks, while Y1, Y2 and Y3 are the variables and K is the maximum lag length.

4.2 Stationarity Test

We did this to ensure that the variables in the model are specified correctly. If the variables are not stationary, OLS cannot estimate the coefficients in the equations correctly. These variables been detected to be stationary implies that they do not change over time and therefore good for economic analysis, assumptions and forecasting.

4.3 Unit Root Test

Augmented Dickey Fuller (ADF) was employed to carry out the unit root test on each variable; the significance of unit root testing was to determine, with the help of differencing, the "integration order" of the variables. Since by rule, only variables that fall under the same integration order can be in the same model. The variables all had an integration order of (I1). Results of unit root tests are presented in Tables 1, 2 and 3. Actually, the Autoregressive (AR) function in e-views does the differencing and not the ADF itself. Schwarz info criterion was used to help automatically select lag length. The Augmented Dickey-Fuller tests equations are mathematically expressed as;

$$\Delta y_t = \Delta y_t + \rho y_{t-1} + \sum_{i=1}^{k} \lambda_i \Delta y_{t-1} + \mu_t \quad (5)$$

$$\Delta y_t = \alpha + \rho y_{t-1} + \sum_{i=1}^{k} \lambda_i \Delta y_{t-1} + \mu_t \quad (6)$$

$$\Delta y_t = \alpha + y_t + \rho y_{t-1} + \sum_{i=1}^{k} \lambda_i \Delta y_{t-1} + \mu_t \quad (7)$$

Where $\Delta Y_t = Y_t - Y_{t-1}$ is the first difference of the series; ρ, α, and λ are parameters to be estimated while μ is a stochastic disturbance term.

4.4 Cointegration Test

Since all the variables have the same order of integration, the next step will be to obtain the number of co-integrating vector(s) and determine if our model is or is not a co-integrated model. To do this, we will employ Johansen-Juselius maximum likelihood method of co-integration. If our model is co-integrated, then VECM, a restricted form of VARs will have to be used but if not, we continue with the unrestricted model. Tables 4 and 5 contain results of the cointegration test. The implication of the variables if found to be co-integrated means that they all share a common stochastic trend and will grow proportionally, in order words, a long run relationship exist amongst them. The JJ maximum likelihood test will be done on the variables in their non-stationary form.

$$\lambda_{trace} = -T \sum_{i=r+1}^{n} \ln\left(1 - \hat{\lambda}_i\right) \quad (8)$$

$$\lambda_{\max} = -T \ln\left(1 - \hat{\lambda}_{r+1}\right) \quad (9)$$

Where λ_{trace} is the trace statistic, λ_{max} is the eigen-max statistc, $\hat{\lambda}_1$ denotes the smallest eigen-values, and T is the sample size. The null hypothesis tested in λ_{trace} is no cointegration. In fact, for bivariate cointegration tests, up to two null hypotheses can be tested. If the null that r = 0 is rejected, at least one cointegrating vector may exist and the second hypothesis that $r \leq 1$ is subsequently tested. Equal number of CEs or equal number of rejections supports for VECM while unequal number of CEs or rejections supports VAR. From results in Table 3 and 4, we

deduce that agricultural output, labor and FDI do not have a stochastic trend justifying our use of a VAR model.

4.5 Model Stability Diagnostic Check

Statistically, there is a strong linkage between model stability, forecasting, and policy analysis. It is imperative to diagnose the residuals of an autoregressive model through its roots to verify the absence of serial correlation and normality of distribution. The autoregressive root of characteristic polynomial is shown in Figure 2.

4.6 VAR Model Estimation

Every VAR environment has an equation for each of the variables; our main interest was the equation where agricultural output is the dependent variable and lags of all the variables as independent variables. The VAR estimates do not present the p-values for testing the corresponding parameters. However, based on each value of the t-statistics, it is easy to conclude whether or not a lagged variable has a significant adjusted effect on the corresponding dependent variable, by using a critical point of $t_0 = 2$ or 1.96. For example, if $|t_0| > 2$, or 1.96, then it can be concluded that the corresponding independent variable has a significant adjusted (partial) effect. Based on the t-statistics values, OLS estimates reveal that only the first lag of output is significant to explain variability in output while the other independent variables are not significant. However, the model had an R^2 of 95.94 percent indicating that it was nicely fitted, a DW value of 2.27 showing that the residuals in the model were not serially or auto correlated and an adjusted R^2 of 94.66 percent meaning that about 5.33 percent of the variability in agricultural output coming from other factors were not observed in this model.

4.7 Residual Test

We carried out a residual test to further certify that the residuals of the model are not auto or serially correlated. The result of the residual test conducted is stated in Table 6.

4.8 Wald Test

Wald test is an econometric property of time series variables used to test joint significance of several independent variable coefficients on the dependent variable. Wald test result is indicated in Table 7.

4.9 Impulse response Function

Figures 3, 4 and 5 give the graphical representation of the impulse response function; the ordinates indicate the fluctuations caused by impacts of the units, while the abscissa shows the duration of fluctuations. The solid line represents the response function curve or forecast estimates while the two dotted lines define the 95 percent confidence interval. IRF helps to determine in what manner or for how long each of these variables affect each other if a shock is applied to the innovations or residual. The shock is applied to the residuals by giving them One Standard Deviation "±2S.E". Ordering of variables is very important when using IRF and therefore "Cholesky dof adjusted" was used to carry out ordering.

4.10 Variance Decomposition

Variance decomposition literarily means breaking the variance of the error of forecast for each variable into several components. It is a structure that helps to analyze contribution rate of the impact of each structural change on the endogenous variable (usually measured by variance). VD curve for the variables is marked out in Figures 6, 7 and 8.

5. Conclusion

The relationship between agriculture FDI and agricultural sector production in Nigeria is a new area of study. We find support for the view that there is a very low level of FDI that flows into the agricultural sector of Nigeria. For each of the hypotheses posed in this study, we establish the following findings; first, 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 labor generation. Second, 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 exits with labor generation. Therefore in respective order, we reject the first null hypothesis while we accept the second null hypothesis and also we reject the third null hypothesis while we accept the fourth null hypothesis.

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 meager these jobs might be) and focuses less on the providing the necessary level of technology required to improve output in the sector.

Thus, we conclude that if Nigeria wants to increase the level of production and holistically develop its agricultural sector, open policies towards FDI are important. Nigeria does have a preponderance of human resources and natural resources, such as water, and land which enhances the ability to produce primary agricultural products. However, the expansion of agriculture production, reduction in reliance of import, and attainment of food security requires capital, energy, technology, and international business connections. It is the

second list that Nigeria is lacking. FDI can serve as a ready supply of such inputs.
We therefore recommend for more FDI to be sought for the agricultural sector of Nigeria with focus on attracting FDI that will improve existing or introduce new technology in the agricultural sector and enhance domestic capacity or domestic investment.

References

Adofu, I., Abula, M. & Audu, S.I (2010). "An Assessment of the Effects of Interest Rate Deregulation in Enhancing Agricultural Productivity in Nigeria". Current Research Journal of Economic Theory 2(2): 82-86, 2010. Maxwell Scientific Organization, 2010. ISSN: 2042-485X.

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. JEL Classification: F23, F36, F43, O40.

Ayanwale, A. B. (2007). "FDI and Economic Growth: Evidence from Nigeria". African Economic Research Consortium, Nairobi April 2007. AERC Research Paper 165. ISBN 9966-778-09-8.

Ayinde, O. E. (2008). Empirical Analysis of Agricultural Growth and Unemployment in Nigeria. African Journal of Agricultural Research Vol. 3 (7), pp. 465-468, July 2008. Available online at: http://www.academicjournals.org/AJAR. ISSN 1991-637X.

Ayinde, O. E., Ayinde K., Memudu, I. J. B., & Ojehomon, V. I. (2007). "Empirical Analysis of Agricultural Growth and Unemployment in Nigeria". African Association of Agricultural Economists Ghana Conference Proceedings (2007). pp. 365-367.

Fasinmirin, J. T., & Braga, F. (2009). "Agriculture for sustainable food, energy and industrial development in the Sub-Saharan Africa: The case of Nigeria". African Journal of Food Science Vol. 3 (13) pp. 429-433 December 2009. Available Online at: http://www.acadjourn.org/ajfs. ISSN 1996-0794.

Furtan, W. H., & Holzman, J. J. (2004). "The Effect of FDI on Agriculture and Food Trade: An Empirical Analysis". Statistics Canada Agriculture Division. Agriculture and Rural Working Paper Series Working Paper No. 68. Catalogue no. 21-601-MIE — No. 068. ISSN: 1707-0368. ISBN: 0-662-37434-7.

Lawal, A. M., & Atte. O. A. (2006). "An Analysis of Agricultural Production in Nigeria". African Journal of General Agriculture, Vol. 2, No. 1, June 30th, 2006. AJGA 2006012/2101.

Long, G. Q. (2005). "China's policies on FDI: review and evaluation". In: Moran, T., Graham, E.M., Blomstrom, M. (Eds.), "Does Foreign Direct Investment Promote Development"? Institute for International Economics, Centre for Global Development, Washington D.C., pp. 315–336.

Manyong, V. M., Ikpi, A., Olayemi, J. K., Yusuf, S. A., Omonona, B. T., Okoruwa, V., & Idachaba, F. S. (2005). "Agriculture in Nigeria: Identifying Opportunities for Increased Commercialization and Investment". International Institute of Tropical Agriculture (IITA), Ibadan, Nigeria. 159p. ISBN: 978-131-249-1.

Mogues, T., Morris, M., Freinkman, L., Adubi, A., Ehuiet, S., Nwoko, C., Taiwo, O., Nege, C., Okonji, P., & Chete, L. (2008). "Agricultural Public Spending in Nigeria" IFPRI Discussion Paper 00789. Development Strategy and Governance Division. International Food Policy Research Institute.

Ogbanje, E. C., Okwu, O. J., & Saror, S. F. (2010). "An Analysis of Foreign Direct Investment in Nigeria: The Fate of Nigeria's Agricultural Sector". Production Agriculture and Technology (PAT) Nassarawa State University, Keffi. Journal. Available Online at: www.patnsukjournal.net/currentissue. PAT December 2010; 6 (2): 15-25. ISSN: 0794-5213.

Oji-Okoro, I. (2010). "Relationship between FDI and Telecommunication Growth in Nigeria" Paper Presented At Proceedings of the 7th International Conference on Innovation & Management. Wuhan University of Technology, Wuhan, P.R. China, 430070. December 4th -5th, 2010 pp. 1886-18892.

Oji-Okoro, I. (2011). "Analysis of the Contribution of Agricultural Sector on the Nigerian Economic Development". World Review of Business Research. Vol. 1. No. 1. March 2011. pp. 191 – 200.

Okorie, A. and E. C. Eboh. (1990). "Fundamentality of Agriculture in National Development." In Ikeme, A. I. (ed.). Challenges of agriculture in national development. Enugu: Optimal Computer Press Ltd.

Okuneye, P. A. (1995). "Nigerian Agriculture on the Run. Refuses to move". University of Agriculture, Abeokuta. Inaugural Lecture Series No. 2 36p.

Okuneye, P. A. (2002). "Rising Cost of Food Prices and Food Insecurity in Nigeria and Its Implication for Poverty Reduction". CBN Economic & Financial Review, VOL. 39 N0. 4.

Olomola, S. A. (2007). Background Paper for the "Competitive Commercial Agriculture in Africa study (CCAA) Nigeria case study" Final report submitted to the Canadian International Development Agency (CIDA) and the World Bank. Department of Agriculture and Rural Development Department. Nigerian Institute of Social and Economic Research (NISER), Ibadan.

Omankhanlen, A. E. (2011). "Foreign Direct Investment and its Effect on the Nigerian Economy" Business Intelligence Journal - July, 2011. Vol.4 No.2. pp. 253-261.

Ukeje, R. O. (2003). Macroeconomics: An Introduction, Port Harcourt. Davidson Publications.
United Nations Conference on Trade and Development. (UNCTAD, 2005). "World Investment Report, Transnational Corporations and Internationalization of R & D. New York: United Nations".

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Table 1. Unit Root Test of agricultural output for stationarity at First Difference

Variable	Statistic	Model (1) ADF None	Model (2) ADF Intercept	Model (3) ADF Trend and Intercept
Log (output)	5 percent sig level	-1.9654	-2.9810	-3.5950
	ADFα	-2.1368	-5.8028	-6.3071
	Probability	0.0340	0.0001	0.0001

Ho: D log (output) has a unit root

Results in Table 1 show that agricultural output is made stationary after first differencing, we choose model (2) because its p-value is more significant than that of model (1) even though they both meet the condition of t-statistics been less than the critical value. Due to results obtained we therefore reject the null hypothesis.

Table 2. Unit Root Test of labor for stationarity at First Difference

Variable	Statistic	Model (1) ADF None	Model (2) ADF Intercept	Model (3) ADF Trend and Intercept
Log (labor)	5 percent sig level	-1.9544	-3.0049	-3.6450
	ADFα	-2.4680	-0.9926	-14.752
	Probability	0.0158	0.7373	0.0000

H_0: D log (labor) has a unit root

Results in Table 2 show that labor is made stationary after first differencing, here we choose model (1) as it meets the conditions required to reject the null hypothesis. Therefore, we the null hypothesis of unit root is rejected.

Table 3. Unit Root Test of FDI for stationarity at First Difference

Variable	Statistic	Model (1) ADF None	Model (2) ADF Intercept	Model (3) ADF Trend and Intercept
Log (FDI)	5 percent sig level	-1.9544	-2.9810	-3.5950
	ADFα	-4.6297	-5.0351	-4.9915
	Probability	0.0001	0.0004	0.0024

H_o: D log (FDI) has a unit root

Results in Table 3 show that FDI is made stationary after first differencing, here we also choose model (1) as it

meets the conditions required to reject the null hypothesis. Therefore, we the null hypothesis of unit root is rejected.

In the three cases, we reject the null hypothesis (H_o). (Mackinnon, 1994) critical value for rejection of hypothesis of unit root applied. ADF_α is the critical value and D means differencing.Source: Author's estimation using Eviews 5.1

Table 4. Unrestricted Cointegration Rank Test (Trace)

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None *	0.768647	51.24535	29.79707	0.0001
At most 1	0.441895	14.65010	15.49471	0.0667
At most 2	0.002792	0.069893	3.841466	0.7915
Trace test indicates 1 cointegrating equation(s) at the 0.05 level denotes rejection of the hypothesis at the 0.05 level **MacKinnon-Haug-Michelis (1999) p-values				

For unrestricted co-integration rank test (Trace): We reject its H_o on "No CE" while we fail to reject the H_o's on "At most I CE" and "At most 2 CEs". The Trace test indicates one co-integrating equation (CE) at 0.05level.

Table 5. Unrestricted Cointegration Rank Test (Maximum Eigenvalue)

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None *	0.768647	36.59525	21.13162	0.0002
At most 1 *	0.441895	14.58020	14.26460	0.0446
At most 2	0.002792	0.069893	3.841466	0.7915
Max-eigenvalue test indicates 2 cointegrating equation(s) at the 0.05 level denotes rejection of the hypothesis at the 0.05 level **MacKinnon-Haug-Michelis (1999) p-values				

For unrestricted co-integration rank test (Maximum Eigenvalue): We reject its H_o on "No CE" and "At most 1 CE" but fail to reject H_o for "At most 2 CEs". The Maximum Eigenvalue test indicates two CEs at 0.05level. Other ways to conclude on this test would be to follow the number of CEs determined or to identify the number of rejections (*) from both tests.

Table 6. Residual Test Results

Lags	LM-Stat	Prob
1	11.64723	0.2339
2	14.11512	0.1183
probs from chi-square with 9 df		

Table 6 shows results of residual test, we fail to reject Ho to further confirm there is no serial correlation of the residuals. Source: Author's estimation from E-views 5.1

Table 7. Wald Test Results

Wald Test:			
System: Untitled			
Test Statistic	Value	df	Probability
Chi-square	0.721276	2	0.6972
Null Hypothesis Summary:			
Normalized Restriction (= 0)		Value	Std. Err.
C(3)		0.013480	0.109125
C(4)		-0.053250	0.092126
Restrictions are linear in coefficients.			

Table 7 shows results of Wald test of joint significance on both lags of FDI. The null hypothesis of this test is that the combination of coefficients is not significant to explain variability in the dependent variable. In this case, we accept the null as the p-value of chi-square is greater than 0.05.

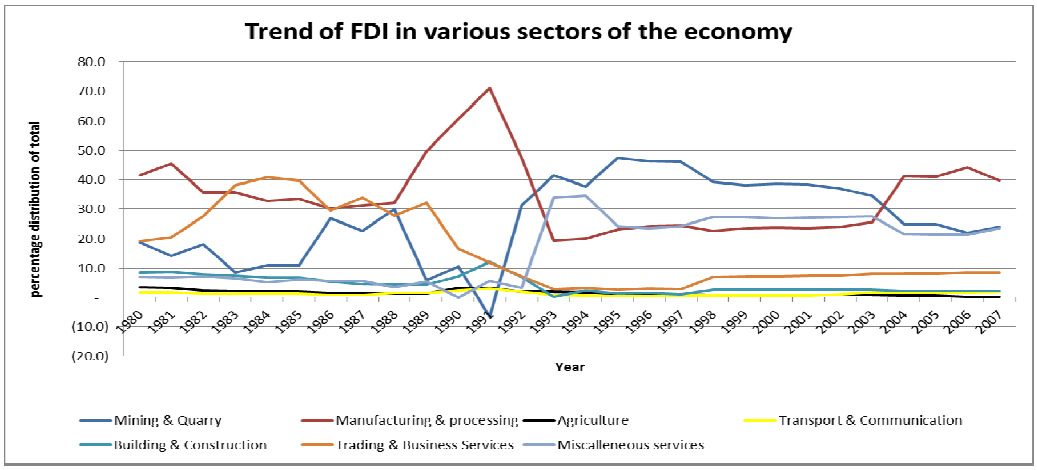

Figure 1. Sectorial Analysis of Cumulative Foreign Direct Investment in Nigeria

Figure 1 describes the volume of FDI in terms of percentage that is obtained in various sectors of the Nigerian economy. Agriculture sector together with transport and communication are the sectors to have received the lowest percentage of FDI from the period of 1980-2007.

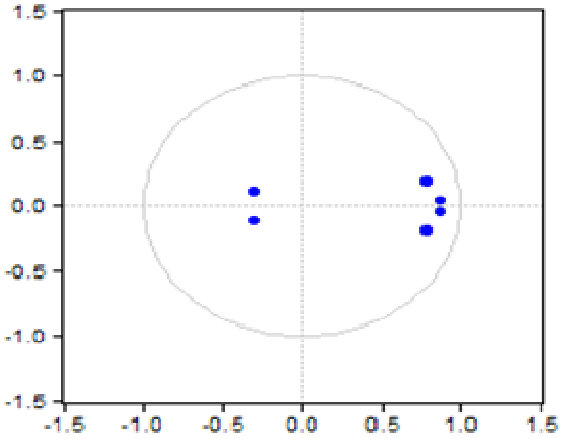

Figure 2 AR roots of characteristic polynomial

Figure 2 shows the graphical representation of the AR roots using a complex coordinate system. It explains that the VAR model does not have a root outside the unit circle implying that our model satisfies the stability condition.

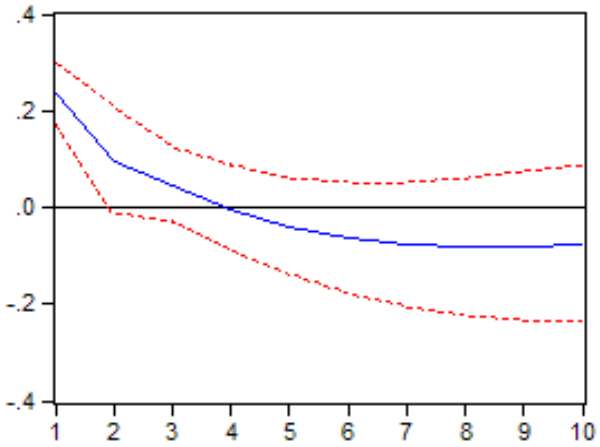

Figure 3 Response of log (FDI) to log (FDI)

Figure 3 explains that given one standard deviation of FDI after positive impact, it responds by trending downwards. In the first phase the response value is 23.50 percent, in the fourth phase; response is zero and afterwards goes negative. This means that if FDI increases over time, due to influence of certain conditions, its contribution would weaken and after a certain period the influence would become counterproductive hindering its own growth. It shows that FDI inflows in the agricultural sector are not smooth and easily affected by other conditions.

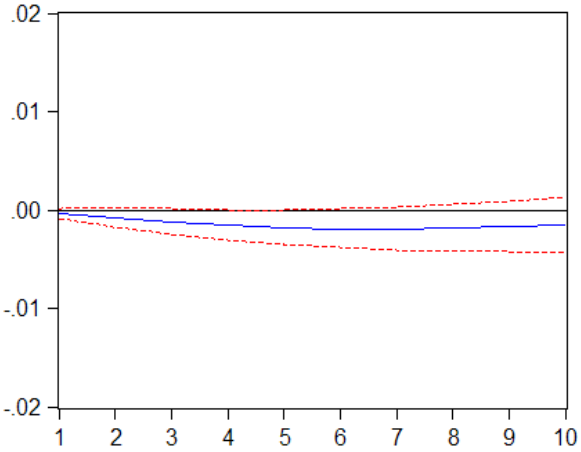

Figure 4 Response of log (LABOR) to log (FDI)

In figure 4, at the beginning, the response value of labor on the shock or impact of FDI is zero, and slides to the minimum value -0.20 percent in the seventh session as its greatest response to the shock. Here the IRF is negative indicating that if the current FDI increases due to impact of certain conditions the agricultural sector will reduce unemployment for the next seven years or lags.

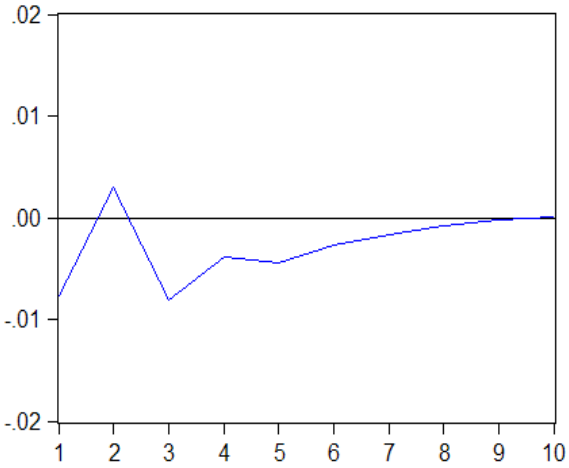

Figure 5 Response of log (OUTPUT) to log (FDI)

Figure 5 shows the response of output to a shock of FDI. Its highest fluctuation is at the second session while the lowest is at the third session where a sharp negative trend is observed before it again heads towards the center. The response value of output is close to zero, that is, if the current FDI increases due to impact of certain conditions, it does not result in any change in output, either current or during the subsequent lag.

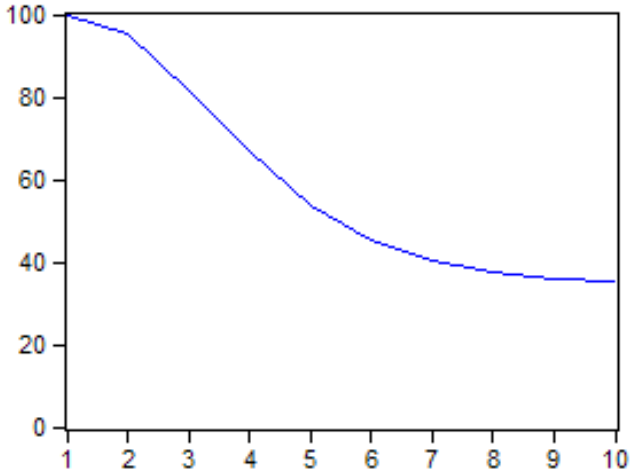

Figure 6 percent log (FDI) variance due to log (FDI)

Figure 6 shows that in the first five periods, the change of FDI is mostly due to its own contribution with volatility of variance between 53 -100 percent. This indicates that pre-FDI investment in the agricultural sector has a decisive impact on the latter part of the changes. Starting from the sixth period, the change of FDI depends on other factors, that is, other factors play a decisive role on the change of FDI. Without considering the contribution of FDI on its own, other factors (including labor, output, etc.) in the tenth period contributes the change in quantity of the food reserves up to 64.92 percent, with output's contribution up to the maximum 53.5 percent, while the labor contribution of FDI is very small.

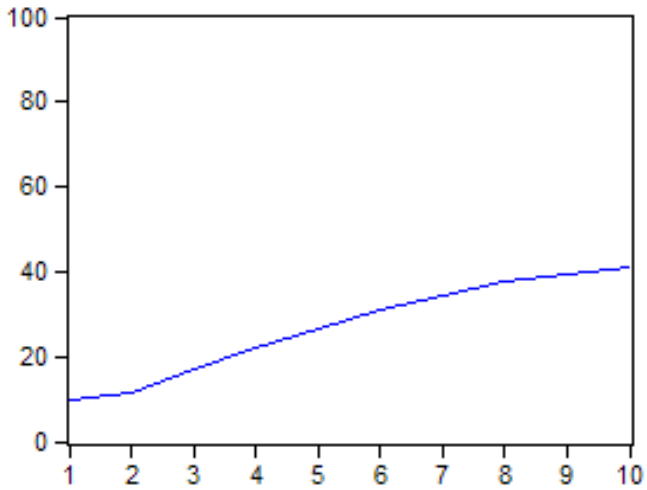

Figure 7 percent log (LABOR) variance due to log (FDI)

Figure 7 explains that FDI's contribution on the variance of the labor shows an increasing trend, up to 9.5 percent in the first period, with increase of lag phases, FDI has a greater impact on the labor movements, and in the tenth period, its contribution is up to the rate of 41.14 percent.

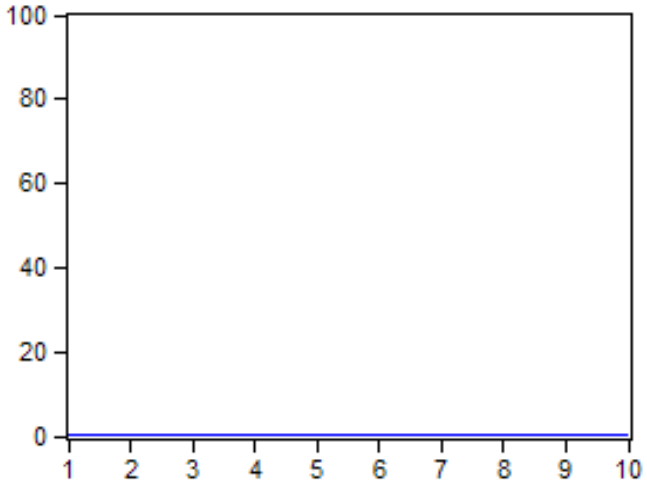

Figure 8 percent log (OUTPUT) variance due to log (FDI)

Figure 8 explains that FDI's contribution on the variance of output is close to zero, indicating that FDI has an weak impact on the output of agricultural sector, fluctuating between 0.26 percent -0.39 percent, virtually negligible. The effect of FDI on output is consistent all through the lag phases.