GLOBAL RESEARCH NETWORK
ONLINE RESEARCH HUB

AMERICAN JOURNAL OF ECONOMICS AND BUSINESS MANAGEMENT

ISSN: 2576-5973
Vol. 7, No.1, January 2024

Assessing the Impact of Foreign Direct Investment (FDI) Flows and their Volatility on Nigeria's Agricultural Sector

Udemadu, Frank Chika PhD
Department of Cooperative Economics and Mgt, Nnamdi Azikiwe University (NAU), Awka, Nigeria

Maduka, Amaka Francisca
Department of Business Administration, Nnamdi Azikiwe University (NAU), Awka, Nigeria

Akwaekwe, Christian Ikechukwu
Department of Cooperative Economics and Mgt, Nnamdi Azikiwe University (NAU), Awka, Nigeria

Abstract: Foreign Direct Investment (FDI) plays a significant role in shaping the economic landscape of both developed and developing countries like Nigeria, particularly in sectors like agriculture, which are vital for sustainable development and food security. This study aims to evaluate the influence of FDI flows and their volatility on Nigeria's agricultural sector. Using econometric techniques, including Vector Error Correction Model Estimates, this research examines the relationship between FDI inflows, their volatility, and key indicators of the agricultural sector's performance in Nigeria from 1999-2022. The study utilizes data from Central Bank of Nigeria and National Bureau Statistics. The findings of this research contribute to the existing literature by providing empirical evidence on the impact of FDI inflows and their volatility on Nigeria's agricultural sector. Understanding these dynamics is crucial for policymakers, as it can inform strategic decisions aimed at attracting stable and productive FDI inflows to bolster agricultural development while mitigating the adverse effects of volatility. The finding supports the Lensink-Morrisey model that FDI has a positive effect on growth, whereas the volatility in FDI flows has a negative effect. Specifically, FDI volatility was found to impact negatively on agricultural growth and it was significant over the study period; while contributing positively to the sector's growth, FDI's coefficient was not significant. This partly supports the Hirschman (1958) hypothesis that the agricultural sector lacks the absorptive capacity to assimilate the technology and managerial spillovers from FDI in most developing economies. The study recommends that policymakers must prioritize strategies that promote stability, inclusivity, and sustainability within the agricultural sector. This includes enhancing regulatory frameworks, strengthening institutional capacity, fostering innovation and technology transfer, and promoting inclusive and sustainable value chains. By addressing these issues, Nigeria can harness the potential of FDI inflows to drive transformative growth, enhance food security, and promote sustainable development in its agricultural sector.

Keywords: Foreign Direct Investment (FDI), Volatility, Infrastructure, Financial Intermediation, Exchange Rate, Agricultural Production

1. Introduction

Foreign Direct Investment (FDI) can have both positive and negative effects on the agricultural sector of a country, depending on various factors such as the nature of investment, policies in place, and the specific context of the country. Foreign Direct Investment (FDI) in agriculture often brings with it advanced technologies and management practices. This can lead to improvements in productivity, efficiency, and quality of agricultural output. For instance, introduction of advanced machinery, irrigation systems, and crop management techniques can enhance agricultural productivity (Yusuf, 2023; Manasseh, Nwakoby, Okanya, Ifediora & Nzidee, 2023; Surafel, 2024). Foreign investors may also invest in infrastructure development such as roads, irrigation systems, and storage facilities, which can benefit the entire agricultural supply chain. Improved infrastructure can reduce post-harvest losses, lower transportation costs, and facilitate access to markets. Foreign Direct Investment (FDI) can provide access to new markets for agricultural products. Foreign investors may establish distribution networks or facilitate exports, thereby increasing market opportunities for local farmers. Foreign Direct Investment (FDI) can create employment opportunities in the agricultural sector through direct investment in farming operations, agribusinesses, and related industries. This can contribute to poverty reduction and rural development. In addition to technology transfer, FDI can also lead to the transfer of knowledge and skills through training programs and technical assistance. Local farmers and workers may benefit from exposure to new agricultural techniques and management practices. One of the concerns associated with Foreign Direct Investment (FDI) in agriculture is the risk of land grabbing, where large tracts of land are acquired by foreign investors at the expense of local communities. This can lead to displacement of smallholder farmers, loss of livelihoods, and social tensions. Heavy reliance on foreign investment in the agricultural sector can make the country vulnerable to external economic shocks and fluctuations in global markets. This dependency may undermine food security and sovereignty. Some forms of Foreign Direct Investment (FDI) in agriculture may have negative environmental impacts, such as deforestation, soil degradation, and water pollution. Lack of proper regulations and enforcement mechanisms can exacerbate these environmental concerns. Nigeria's foreign investment inflows fell by 26.7 percent to US$3.9 billion in 2023 from US$5.3 billion in 2022. The decline was orchestrated by the consecutive drop in foreign investment inflows in the first three quarters of 2023 due to political risks and elevated production costs. Consequently, foreign-owned subsidiaries, including Nestle, Guinness, Airtel Africa, and MTN Nigeria, have lost over N900 billion to currency devaluation. However, the implementation of pro-market reforms – fuel subsidy removal and exchange rate harmonisation - reverted the trend in the fourth quarter of 2023 as capital importation rose to US$1.1 billion. Nonetheless, the overall drop in foreign investment inflows reflects the unfavourable investment climate, which has doused investors' confidence in the Nigerian economy (Ogbanje & Salami, 2022; Uteh, Yisa, Ojo & Ibrahim, 2022).

The effect of Foreign Direct Investment (FDI) volatility on the agricultural sector in Nigeria can be significant and multifaceted: Volatility in FDI inflows can create uncertainty for investors in the agricultural sector. This uncertainty may lead to reduced investment levels as investors become hesitant to commit funds to long-term agricultural projects or ventures. Fluctuations in FDI can disrupt planned investments in technologies, infrastructure, and management practices aimed at improving agricultural productivity and efficiency. This can hinder the sector's ability to modernize and compete effectively in global markets. Sharp fluctuations in FDI inflows can contribute to financial instability in the agricultural sector and the economy as a whole. Sudden declines in FDI may lead to liquidity constraints for agricultural businesses, affecting their ability to access capital for investment and operations. FDI volatility can also exacerbate exchange rate fluctuations, which can affect the competitiveness of agricultural exports and the cost of imported inputs such as machinery, fertilizers, and pesticides. This volatility can undermine the profitability of agricultural operations and reduce farmers' income (Ayodeji

& Liu, 2013; Gbenro, Adebayo, Olatunde & Aderemi, 2023). Volatility in FDI inflows can disrupt agricultural supply chains, particularly if foreign investors play a significant role in the provision of inputs, processing, or marketing services. Disruptions in supply chains can lead to inefficiencies, higher production costs, and lower competitiveness for agricultural products. FDI volatility may result in policy uncertainty as policymakers react to changes in investment patterns. This uncertainty can create challenges for long-term planning and implementation of policies aimed at promoting agricultural development, sustainability, and food security. Inconsistent FDI inflows may affect the transfer of technology, expertise, and best practices to the agricultural sector. Foreign investors may be less willing to invest in technology transfer initiatives or training programs during periods of uncertainty, limiting the sector's ability to benefit from technological advancements. High levels of FDI volatility can increase the risk of capital flight from the agricultural sector and the economy as a whole. Investors may withdraw their investments during periods of uncertainty, leading to capital outflows and further destabilizing the sector. Foreign Direct Investment (FDI) inflows in Nigeria registered a decrease of around 190 million U.S. dollars in 2022, compared to a surplus of 3.31 billion U.S. dollars in the preceding year. In 2011, a peak of 8.84 billion U.S. dollars was achieved. Moreover, in 2018, a considerable drop was registered, as FDI in the country amounted to 780 million U.S. dollars (Ogbanje & Salami, 2022; Uteh, Yisa, Ojo & Ibrahim, 2022).

Agricultural sector development refers to the process of enhancing the productivity, sustainability, and competitiveness of agriculture to promote economic growth, food security, poverty reduction, and rural development. It involves various policies, investments, and interventions aimed at improving agricultural practices, infrastructure, technology, markets, and institutions. Increasing agricultural productivity is fundamental for sector development. This can be achieved through the adoption of improved farming techniques, access to quality inputs (seeds, fertilizers, pesticides), mechanization, irrigation, and better management practices. Research and development play a crucial role in identifying and disseminating innovations that boost productivity sustainably. Sustainable agriculture focuses on balancing economic viability with environmental and social considerations. Developing the agricultural sector involves promoting sustainable practices such as conservation agriculture, agroforestry, integrated pest management, and water-efficient irrigation systems. Sustainable practices help preserve natural resources, mitigate climate change impacts, and ensure long-term food security. Adequate infrastructure is essential for agricultural sector development. This includes rural roads, storage facilities, cold chains, irrigation systems, and market infrastructure. Improving infrastructure facilitates access to markets, reduces post-harvest losses, enhances value chain efficiency, and promotes agricultural trade (Amaghionyeodiwe & Osinubi, 2009; Iheanachor & Ozegbe, 2021). Developing robust market linkages and value chains is crucial for agricultural sector growth. Policies and investments that strengthen market infrastructure, promote agribusiness development, and facilitate access to finance and market information help farmers connect with buyers and receive fair prices for their produce. Value addition through processing and agro-industrialization adds value to agricultural products and creates employment opportunities. Adequate investment and financing are essential for agricultural sector development. This includes public and private investments in agricultural research, infrastructure, technology, and rural finance. Access to affordable credit, insurance, and risk management tools enables farmers to invest in inputs, equipment, and technologies that enhance productivity and resilience. Favourable policy and institutional environments are critical for agricultural sector development. Governments play a key role in formulating policies that support agricultural innovation, market development, land tenure security, and rural infrastructure. Strengthening institutions responsible for agricultural research, extension services, quality control, and market regulation enhances sector performance and governance. Building the capacity of farmers, extension workers, and agricultural organizations is essential for sector development. Extension services provide farmers with technical

advice, training, and information on best practices, market trends, and climate-smart agriculture. Empowering farmers with knowledge and skills enhances their productivity, resilience, and adaptability to changing conditions. Agricultural sector development should prioritize inclusivity and gender equality. Ensuring women's access to land, resources, and agricultural services is critical for enhancing productivity and rural livelihoods. Inclusive approaches that consider the needs of smallholder farmers, youth, indigenous communities, and marginalized groups contribute to equitable and sustainable agricultural development (Sultana & Sadekin, 2023; Ayodeji & Liu, 2013).

2. Statement of the Problem

The Nigerian agricultural sector plays a pivotal role in the nation's economy, serving as a significant source of employment, income generation, and food security. However, despite its importance, the sector faces numerous challenges, including inadequate infrastructure, outdated farming practices, and limited access to modern technologies. One crucial factor that potentially impacts the agricultural sector is Foreign Direct Investment (FDI) and its associated volatility. The problem at hand revolves around understanding the precise nature and extent of the influence exerted by FDI flows and their fluctuations on the Nigerian agricultural sector. Several key questions emerge. What is the direct influence of FDI inflows on the growth and development of the Nigerian agricultural sector? How do these investments affect productivity, employment generation, and value addition within the sector? How does the volatility in FDI flows affect the stability and sustainability of agricultural activities in Nigeria? What are the short-term and long-term repercussions of fluctuating FDI levels on agricultural output, investment decisions, and overall sectoral performance? What specific sub-sectors within the agricultural domain are most affected by variations in FDI inflows? Are there particular crops, livestock, or value chains that demonstrate heightened sensitivity to changes in FDI patterns? do existing government policies and regulations regarding FDI influence the dynamics of the agricultural sector? Are there regulatory frameworks that could be optimized to better leverage FDI for agricultural development while mitigating volatility-induced risks? How does Nigeria's experience with FDI in agriculture compare to that of other countries with similar socio-economic contexts? What lessons can be drawn from international experiences to enhance the effectiveness of FDI utilization in Nigeria's agricultural sector? To what extent does the reliance on FDI for agricultural financing pose sustainability challenges? Are there alternative financing mechanisms or strategies that could reduce dependency on volatile external investments while fostering domestic resource mobilization? Addressing these questions is crucial for policymakers, investors, and stakeholders in the Nigerian agricultural sector to formulate evidence-based strategies aimed at maximizing the positive impacts of FDI while minimizing its potential downsides. Additionally, a comprehensive understanding of the relationship between FDI flows and agricultural performance can guide the formulation of resilient policies capable of fostering sustainable growth and development in Nigeria's vital agricultural sector.

3. Objectives of the Study

To address the aforementioned questions, this study evaluates the influence of FDI flows and its volatility on Nigeria agricultural sector by specifically modeling the effect of foreign direct investment, foreign direct investment volatility, infrastructure, financial intermediation and exchange rate on agricultural production.

4. Theoretical Framework

Lensink and Morrissey (2001) devised a simple endogenous growth model in which they hypothesize that FDI has a positive effect on growth, whereas the volatility in Foreign Direct Investment (FDI) flows has a negative effect. In the model, Foreign Direct Investment (FDI) and its volatility impact on growth through the cost of innovation.

Assumption of the Model

1. The producer has monopoly power over the production and sale of capital goods.
2. Production cost of K(see below) equals one in each period.
3. Rate of return is constant

They kicked-off by assuming that technical progress is represented through the variety of capital goods available. Three kinds of agents are present in the model: producers who rent capital goods, innovators who produce capital goods, and the consumers. The producers are assumed to have a production function of the form:

$$Y_i = AL_i^{1-\alpha} \sum_{J=1}^{N} K_{ij} \quad \text{……1}$$

They assume that 0<a<1, where *A* is the exogenous state of the environment, *Y* is output, *L* is labour input and *Kj* stands for service flows from each capital good *j*. Each final good' producer *i* rent *N* varieties of capital good from specialized firms that produce a type of capital good (the innovators). They further assume that capital goods depreciate fully in each period, thus they behave like non-durable intermediate goods:

$$Y_i = AL_i^{1-\alpha} N K_i^{\alpha} \quad \text{……2}$$

It could be intuit from equation 2 that an increase in N ((technological change in the form of increased variety) increases Y(output).

The demand for capital goods by final good producers is determined by equating the marginal productivity of the capital good to the purchase price P_j:

$$\Delta Y_i / \Delta K_{ij} \ \Delta A\alpha L_i^{1-\alpha} K_{1j}^{\alpha-1} \Delta P_j \quad \text{……3}$$

The demand for capital good *j* by firm *i* is then:

$$K_{ij} = L_i (A\alpha / P_j)^{1/(1-\alpha)} \quad \text{……4}$$

The present value of the returns from inventing (and producing in several periods), *V(t)*, for the capital good *j* equals (where *Kj* is the total quantity produced at each date):

$$V(t) = \int_t^{\infty} (P_j - 1) K_j e^{-r(V-t)} dv \quad \text{……5}$$

The innovator sets P_j by optimizing *V(t)*. Given K_j is independent of time, this comes down to optimizing $(P_j\text{-}1)K_j$, where K_j is the total quantity demanded by different producers *i* ($K_j = \Sigma_i K_{ij}$). The solution of the optimization procedure can be shown to be

$P_j = P = 1/a > 1$ (where $1/a$ is the mark-up). Using this result, the quantity demanded for each variety *K* can be written as:

$$K_i = K = LA^{1/(1-a)} a^{2/(1-a)} \quad \text{……6}$$

Using the value for P_j and equation 6, 5 can be rewritten as:

$$V(t) = LA^{1/(1-a)} \frac{(1-\alpha)}{\alpha} a^{2/(1-a)} \int e^{-r(V-t)} dv \quad \text{……7}$$

Barro and Sala-I-Martin (1995) show that in equilibrium with positive R&D (at cost μ) and increasing N, then $V(t) = \mu$, hence equation 7 can be solved to:

$$r = (1/\mu)\, LA^{1/(1-a)} \left(\frac{1-\alpha}{\alpha}\right) a^{2/(1-a)} \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots 8$$

At this point, they introduced FDI. The costs of production contain two parts. Each period there are fixed maintenance costs, assumed equal to 1. In addition there are fixed set up costs (R&D costs, μ). They assume that the costs of discovering new goods depend on the ratio of goods produced in other countries to those produced domestically. This ratio is a proxy for FDI. A higher ratio of goods produced in other countries would lead to a decline in the costs of innovation. The costs of discovering a new good can be modeled as (using FDI = F): $\mu = f(F)$, where $\Delta\mu/\ \Delta F < 0$.

To account for volatility with respect to F, we assume that F is stochastic, and modeled as $F = \beta(F)+\varepsilon$, where $\beta(F)$ is the mean of FDI and ε is an error term with $\varepsilon \sim N(0, \varepsilon^2)$. The certainty equivalent of the expected value of F equals:

$$E(F) = \beta(F) - 0.5B\delta^2(F)$$

where B is the coefficient of absolute risk aversion (B is positive for risk-averse innovators) and $\delta^2(F)$ refers to the variance in FDI inflows. Taking into account the certainty equivalent value of FDI, and assuming that the rate of return on assets (r) is constant and there is free entry, equation 8 can be written as:

$$r = \left(L / [\, f\{\beta(F) - 0.5B\delta^2(F)\}]\right) * A^{1/(1-a)} \left(\frac{1-\alpha}{\alpha}\right) a^{2/(1-a)} \ldots\ldots\ldots\ldots\ldots\ldots 9$$

Intuitively, equation 9 shows that an increase in FDI leads to an increase in whereas an increase in the variance of FDI leads to a decrease in r, ***given that f(F)<0).***

5. Methodology

The Econometric Model

To empirically assessed the impact of Foreign Direct Investment (FDI) flows and their volatility on Nigeria's agricultural sector, the study adopted the Lensink-Morrisey (2001) FDI-growth nexus model. However, a modification to the model was made by taking into cognizance, in addition to FDI and its volatility as regressors, macroeconomic factors perceived to influence agricultural growth in Nigeria, such as Infrastructure, financial deepening in the sector, and exchange rate. The parameters coefficients were estimated via the vector error correction model. The VECM approach was adopted because of the spuriousness in conventional econometric methodology, such as the OLS.

Before the VECM estimate, preliminary test were carried out in other to validate some properties of time series data. The Augmented Dickey-Fuller (ADF) test was used to determine the time series properties (for the presence of a unit root) of the stochastic variables. A variable is said to contain a unit root if it is non-stationary. The use of data characterized by unit roots may lead to serious error in statistical inference (Abiodun et al: 2010). Moreover, the Johansen procedure was used to test for co-integration in the model; the existence of long-run relationship among the variables. This technique was adopted not because it is vector auto-regressive based but because it performs better in multivariate functions.

The VECM methodology is a variant of VAR approach that regards all variables as endogenous, where each endogenous variable is explained by its lagged values and the lagged values of all other

endogenous variables in the model in a series of simultaneous econometric equations. Thus, given a vector of endogenous variables:

AGPR, FDI, FDIV, INFRAS, FINDE, EXC

The econometric equation is:

$$AGPR_t = \alpha + \theta FDI + \lambda FDIV_t + \gamma INFRAS_t + \text{ɍ}FINDEt + \rho EXC_t + \varepsilon_t \;;\ldots\ldots\ldots\ldots(1)$$

And its VECM structure is thus:

$$AGPRT = \alpha + \sum_{J=1}^{N} \beta AGPRT_{t-j} + \sum_{J=1}^{N} \theta FDI_{t-j} + \sum_{J=1}^{N} \lambda FDIV_{t-j} + \sum_{J=1}^{N} \gamma INFRAS_{t-j} + \sum_{J=1}^{N} \text{ɍ}FINDE_{t-j} + \sum_{J=1}^{N} \rho EXC_{t-j} + u_{1t} \ldots\ldots(2)$$

The next series of equations accompanying equation 2 follow same pattern except that each variable to the right is treated as an endogenous variable in the subsequent econometric equations. However, since we are more interested in the relationship of the first set of the VECM equation, we deemed it expedient to stop.

AGPR represents agricultural production growth rate, FDI and FDIV represent foreign direct investment and its volatility, respectively. INFRAS represents infrastructure, FINDE is the level of financial intermediation, EXC is the exchange rate, ε is the residual or stochastic error term, and ***α, β, θ, λ, γ, ɍ and ρ*** are the slope coefficients of the variables to the right of the VECM equation.

Description and Measurement of Variables

FDI: Foreign direct investment, which is composed of FDI oil and FDI non-oil, means foreign capital movement from a foreign country into a host country strictly for investment purposes. Theoretically, FDI has a positive effect on agricultural growth; an increase in the FDI flow increases the growth rate by complementing domestic capital and as well as technical spillovers emanating from sophisticated management. Foreign direct Investment is proxy by the ratio of FDI to the agricultural production. This variable is proxy by the share of agricultural to total FDI flows.

FDI Volatility: FDI volatility may reflect underlying uncertainty and undulating fluctuations in FDI flows to a host country. It is possible that sudden changes in the volume of FDI inflows can have a destabilizing impact on agricultural production. FDI volatility is measured by the coefficient of variation of FDI, which is computed by:

$$CV = S/\bar{Y} * 100$$

Where S and $\bar{Y}$ represent standard deviation and mean of the series, respectively

Infrastructure: Infrastructure means the capital equipment used to produce publicly and privately available services, including transport facilities, water supplies, electricity, etc. (Black, 2002). It has been affirmed in the literature that infrastructure (private and public) has a positive relationship with agricultural production because it increases the productivity, competiveness, economic efficiency, and provides safety nets for farmers to mitigate adverse effects of price shocks by improving their risk coping capacity; however, this is contingent on the level and quality of the infrastructural base. This variable is proxy by capital expenditure to the agricultural sector as a percentage of total capital expenditure by the government.

Financial Intermediation: This variable mirrors the degree of involvement of the banking sub-sector in the extension of credit and other financial facilities for the promotion of investment activity of the sector. In addition to providing loanable funds to farmers, a well-developed formal financial sector also helps in improving the risk coping capacity of the farmers. The formal financial system offers to

producers financial opportunities for their savings. Producers who are forced to self-financing and self-insuring can have access to remunerated deposits, which is an incentive to save (McKinnon, 1973). Therefore, by encouraging cautionary saving, producers are more impervious to uncertainty and price instability. In the literature, this variable is proxy by the ratio of private credit to the GDP; however, given the study sectorial analysis, this variable is proxy by the ratio of agricultural credit to total bank credit in the economy.

Exchange rate: A country's exchange rate affects its growth rate. It is argued that a country with a relatively weak currency export more than she imports, vice versa, all things being equal, thus, growth. However, its impact on growth has been uncertain, with empirical studies inconclusive findings. So, we expect the a priori sign to be either negative or positive. Exchange rate is being included into the model as a proxy for macro-economic stability.

Stochastic Error Term (ε): The disturbance term, as sometimes called, captures all those determinants of agricultural growth that are not explicitly taken into account in the model. It is random variable that has well defined probabilistic properties.

Estimation Technique and Date Sources

Annual data covering the period 1971-2008 were used for this study. Data reflecting proxies for agricultural supply, financial intermediation, inflation, and infrastructure were ferret out from the Central Bank of Nigeria's (CBN) Statistical Bulletin (various issues) and the Nigerian Ministry of Agriculture and Water Resources. Annual values of FDI volatility were computed from data obtained from CBN's Statistical Bulletin on annually

Nominal FDI flows.

6. Empirical Results

ADF Unit Root Test and the Johansen Test for Cointegration

This study follows a 3-step, systematic time series econometrics approach to evaluate the influence of FDI flows and its volatility on the Nigerian agricultural sector over the period 1999-2022. At the appendix of this work is presented the result of the Augmented Dickey fuller test for stationarity (Table 1); the Johannsen cointegration test (table 2) and the Vector Error Correction estimates (Tables 3a and 3b).

The Augmented Dickey Fuller unit root tests confirm that some variables are non-stationary at level, while all the variables are difference stationary (Table 1). Hence the ADF Unit Root Test results strongly suggest that all the variable are integration of order one or I(1). Since all the variables are found to be in same order of integration we moved ahead to apply the co-integration technique.

Applying Johansen cointegration approach, we find the number of co-integration equations among the variables. Using 5 percent level of significance, the results suggest three co-integrating equations; confirming a significant long term relationship among the variables. Here error correction model (ECM) is useful for short run dynamics with long run relationship, which we applied the VECM approach.

Vector Error Correction Model Estimates

Table 2 presents the results of the VECM estimates. Table 2a shows the co-integrating vector or long run relationship. In the long run, agricultural production growth rate is co-integrated with foreign direct investment, FDI volatility, financial development, and the exchange rate, while none exist between agricultural production rate and infrastructure. The finding asserts that FDI, its volatility, financial intermediation and the exchange rate explain the agricultural sector growth rate. First row of the Table 3b presents the error correction estimates and below this row of the table presents the VAR estimates.

From the table, it could be observed that the coefficients of error correction of agricultural production rate and financial intermediation are significantly negative whereas that of exchange rate is significantly positive. It suggests that in short run if any disturbance in the economy, agricultural production rate and financial intermediation return to the long run equilibrium path whereas resource exchange rate does not come back to its long run equilibrium path. The error estimates for FDI, its volatility and infrastructure are rightly signed but insignificant.

Since our concentration is on the first econometric equation on the VECM series of simultaneous equations, accentuation is paid to the first column of the VAR estimates. From the VAR estimates (Table 3b), FDI volatility affect agricultural production rate; there coefficient are significant. FDI volatility affects agricultural production negatively in the long run; an increase in FDI volatility reduces production rate. This finding support the Lensink-Morrisey model (2001) that increases in the volatility of FDI impedes growth. Turing towards FDI, agricultural production is directly related to FDI both in the short long term; however, its coefficient shows it is not significant. This might be due to the fact the sector is partly incapacitated to absorb significantly positive spillovers from FDI. Other variable in the model are either wrongly signed or are statistically significant. Furthermore, from the diagnostic test, the coefficient of determination (R^2) suggested that about 53 percent of total variation in AGPRO is explained by FDI, FDIV, INFRAS, FINDE and EXC. Also, the first VECM equation (equation 2) is statistically significant because its F-value of 3.004 is significant at 5 percent (see Table 3b at appendix).

7. Conclusion and Recommendations

The influence of foreign direct investment (FDI) inflows on the Nigerian agricultural sector has been significant yet nuanced, with both positive and negative implications. The influx of FDI has undoubtedly brought in much-needed capital, technology, and expertise, which have the potential to modernize and boost productivity within the agricultural industry. This infusion of resources can enhance agricultural infrastructure, facilitate value chain development, and promote market integration, thereby fostering growth and resilience in the sector. However, the volatility associated with FDI inflows poses challenges to the stability and sustainability of Nigeria's agricultural sector. Fluctuations in FDI introduced uncertainty, leading to erratic investment patterns, fluctuating market dynamics, and vulnerability to external shocks. Such volatility may hinder long-term planning, impede sustainable agricultural practices, and exacerbate inequalities within the sector. From the results of the vector error correction model, the finding supports the Lensink-Morrisey model that FDI has a positive effect on growth, whereas the volatility in FDI flows has a negative effect. Specifically, FDI volatility was found to impact negatively on agricultural growth and it was significant over the study period; while contributing positively to the sector's growth, FDI's coefficient was not significant. This partly supports the Hirschman (1958) hypothesis that the agricultural sector lacks the absorptive capacity to assimilate the technology and managerial spillovers from FDI in most developing economies. To mitigate these challenges and maximize the benefits of FDI inflows, policymakers must prioritize strategies that promote stability, inclusivity, and sustainability within the agricultural sector. This includes enhancing regulatory frameworks, strengthening institutional capacity, fostering innovation and technology transfer, and promoting inclusive and sustainable value chains. By addressing these issues, Nigeria can harness the potential of FDI inflows to drive transformative growth, enhance food security, and promote sustainable development in its agricultural sector.

REFERENCES

1. Amaghionyeodiwe, L. A. & Osinubi, T. S. (2009). Foreign direct investment and exchange rate volatility in Nigeria. *International Journal of Applied Econometrics and Quantitative Studies*, 6(2), 84-116.

2. Ayodeji, A. I. & Liu, Y. (2013). An evaluation and forecast of the impact of foreign direct investment in Nigeria's Agriculture Sector in A VAR Environment**.** *Journal of Economics and Sustainable Development*, 4(10),17-28.
3. Gbenro, M. S., Adebayo, A. J., Olatunde, O. A. & Aderemi, T. A. (2023). Foreign Direct Investment and employment in agricultural sector in Nigeria. *Journal of Accounting and Management*, 13(2), 44-53.
4. Hirschman, A. (1958). The strategy of economic development. New Haven, CT: Yale University Press.
5. Iheanachor, N. & Ozegbe, A. E. (2021). The consequences of exchange rate fluctuations on Nigeria's economic performance: An autoregressive distributed lag (ARDL) approach, *International Journal of Management, Economics and Social Sciences (IJMESS*), 10(2-3), 68-87,
6. Lensink, R. & Morrissey, O. (2006). Foreign Direct Investment: Flows, Volatility, and the Impact on Growth. Rev. Int. Econ, (14): 478–493
7. Manasseh, C.O., Nwakoby, I.C., Okanya, O.C., Ifediora, C.U., & Nzidee, W.A., (2023). The impact of foreign direct investment and oil revenue on economic growth in Nigeria. *Studia Universitatis "Vasile Goldis" Arad. Economics Series*, 33(3), 61–85.
8. Ogbanje, E. C. & Salami, A. O. (2022). Impact of foreign direct investment on Nigeria's agricultural sector (1981 to 2019). *International Journal of Environment, Agriculture and Biotechnology*, 7(4), 161-171.
9. Sultana, Z. & Sadekin, Md N. (2023). The impact of FDI on the agriculture sector: A case study from Bangladesh. *Heliyon*, 9. e22983
10. Surafel, G. A. (2024). Assessment of foreign direct investment inflows into Ethiopia in light of peace and security challenges from 2018 to 2022, *Cogent Economics & Finance*, 12(1), 2308670, DOI: 10.1080/23322039.2024.2308670
11. Uteh, A. S., Yisa, E. S., Ojo, M. A. & Ibrahim, F. D. (2022). Drivers of agricultural foreign direct investment and its impact on food production in Nigeria. *Journal of Agripreneurship and Sustainable Development (JASD)*, 5(3), 102-115.
12. Yusuf, A. (2023). A systematic review of investment indicators and economic growth in Nigeria. Humanities and Social Sciences Communications, https://doi.org/10.1057/s41599-023-02009-x