

Foreign Direct Investment and Real Sector Performance in Nigeria and Ghana: A Comparative Analysis

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Abstract: This study compares the effect of foreign direct investment on real sector performance in Nigeria and Ghana from 1991 to 2023. The research was based on the Endogenous and Eclectic Paradigm Theory (OLI Model). The research utilized annual time series data obtained from the statistics bulletin of the Central Bank of Nigeria (CBN) and World Bank Development Indicators. The data analysis methods utilized included the Augmented Dickey-Fuller (ADF) statistic, the Autoregressive Distributive Lag (ARDL) technique, and the Error Correction Model. The major finding of the research was that foreign direct investment had a significant and positive effect on agricultural sector output of Nigeria and Ghana in both the short and long run. Likewise, trade openness has a positive and significant impact on agricultural sector output of both nations, in the short and long run too. Contrarily, exchange rate has a significantly negative impact on agricultural sector output in both short and long run only in Ghana. The study concluded that foreign direct investment has a positive and significant influence on the real sector performance (measured by agricultural sector output) of the Nigeria and Ghana economies. The study recommended among others that the authorities of both economies should continue to implement policies that attract and retain foreign direct investment inflow as clear and stable regulation, along with incentives for foreign investor, can contribute to sustain agricultural sector output.

Keywords: Foreign Direct Investment Inflow, Trade Openness, Exchange Rate, Agricultural Sector Output.

INTRODUCTION

No country endowed with all the required economic resources for her desired growth and development. Thus, there is need for one country to depend on resources from others. This calls for the need for foreign direct investment inflow. Foreign Direct Investment (FDI) has emerged as a cornerstone of economic development strategies across the globe, particularly in developing economies. FDI brings not only capital but also access to advanced technology, managerial expertise, and global market networks. For developing countries such as Nigeria and Ghana, FDI is viewed as a crucial enabler of structural transformation, particularly in the real sector, which includes agriculture, manufacturing, services, and other productive activities that form the backbone of the economy. In Sub-Saharan Africa, where investment gaps remain a significant barrier to sustainable development, FDI is often prioritized as a tool for economic diversification, poverty alleviation, and job creation. Nigeria and Ghana, two of the largest economies in West Africa, provide compelling case studies on the interplay between FDI and real sector performance. While both countries share similarities in colonial histories and economic aspirations, their unique socio-economic structures and policy environments offer contrasting insights into the role of FDI in fostering economic growth. Foreign capital is considered as a major source of resources needed to attain economic growth and development. Most developing economies of the

world including Nigeria have come to the realization that domestic resources alone are not enough to finance investment and boost economic growth. There is therefore the need for capital deficient economies to complement local savings with foreign capital inflow which is seen as a catalyst in the economic growth process (Edu, Inaya and Bassey, 2015). According to Aremu (2017) Nigeria as one of the developing countries of the world, has adopted a number of measures aimed at accelerating growth and development in the domestic economy, one of which is the attraction of foreign direct investment (FDI) into the country. Furthermore, the rapid growth of interest in foreign direct investment stands from the perceived opportunities derivable from utilizing this form of foreign capital injection into the economy, to augment domestic savings and further promote economic development in Nigeria (Aremu, 2017). According to World Bank (2020) foreign direct investment is defined as “an investment made to acquire a long-term ownership and controlling interest (at least one-tenth of the equity) in firm operating outside the investors ‘own country”.

Despite the potential benefits of FDI, its impact on real sector performance in Nigeria and Ghana has been inconsistent and suboptimal. In Nigeria, FDI inflows have been predominantly concentrated in the oil and gas sector, with limited spill-over effects into agriculture, manufacturing, and

services. Efforts to channel FDI into the non-oil sectors have often been impeded by challenges such as poor infrastructure, security concerns, and policy unpredictability. As a result, the real sector's contribution to GDP and employment generation remains below its potential. Ghana, on the other hand, has made strides in attracting FDI into its real sectors, particularly mining, manufacturing, and services. However, the long-term sustainability of these gains is uncertain, given structural issues such as over-reliance on primary commodity exports and the limited capacity of local industries to absorb and utilize foreign investment effectively. Comparative studies of the role of FDI in Nigeria and Ghana remain sparse, particularly those that focus on sector-specific outcomes and policy effectiveness. This gap in the literature limits our understanding of the conditions under which FDI can significantly enhance real sector performance in both countries. Addressing this gap is crucial for informing policies that maximize the developmental impact of FDI in Nigeria, Ghana, and similar economies across Sub-Saharan Africa. In view of the above problems faced by the two countries respectively, this study sought to conduct a comparative analysis of the effect of foreign direct investment on real sector performance in Nigeria and Ghana spanning 1991 to 2023. Other specific objectives include to:

- i. examine the effect of foreign direct investment inflow on agricultural sector output in Nigeria;
- ii. determine the effect of trade openness on agricultural sector output in Nigeria;
- iii. assess the effect of exchange rate on agricultural sector output in Nigeria.

REVIEW OF LITERATURE

Theoretical Literature

(a) The Endogenous Growth Theory

This theory was postulated by Paul Romer as a result of the unsatisfied explanation of the Solow's model about technology as an exogenous factor of economic growth. In this view, economists try to endogenize technology in 1980s by developing the endogenous growth theory, which includes a new concept of skills, human capital and knowledge that are responsible for increase in labour productivity. Human capital has increasing rates of returns as against the physical capital, which does not. Hence, there are constant returns to capital, and there is no steady state that will be achieved in the economy. As capital accumulates, growth does not slow down; however, growth rates depend on

the kind of capital the country invested in. Romer (1998) explained that technological alteration is not a manner from heaven as its degree and trends can be directed. If this view holds, technology therefore is an endogenous growth, instead of being regarded as an exogenous factor as postulated by Solow's model. Investments and human capital in the innovation are considered as very important in the process. The growth theory looked at knowledge as a public good (Romer, 1986). The new growth theory differs completely to the law of diminishing returns, because the law of diminishing returns shows a reduction in output growth if inputs increases. This theory is relevant to investment in human and physical capital. It considers knowledge and technology as important drivers to attain increase in national productivity.

(b) The Eclectic Paradigm Theory (OLI Model)

This theory was developed by John Dunning which is called OLI paradigm. O, L and I refer to ownership advantage, location advantage and internalization conditions respectively. Operating in a foreign country has many costs which include failure of knowledge about local market conditions, cultural, legal and many others. Therefore, foreign firms should have some advantages that can offset these costs. Ownership advantage is a firm specific advantage that gives power to firms over their competitors. This includes advantage in technology, in management techniques, easy access to finance, economies of scale and capacity to coordinate activities. Location advantages are country specific advantages. Transnational Companies (TNCs) in order to fully reap the benefit of firm specific advantages, they should consider the location advantage of the host country. This includes accessibility and low cost of natural resource, adequate infrastructure, political and macroeconomic stability. As a consequence, the location advantage of the host country is one essential factor that determines the investment decision of TNCs. Internalization is multinational companies' ability to internalize some activities to protect their exclusive right on tangible and intangible assets, and defend their competitive advantage from rival firms. According to Eclectic Theory of Foreign Direct Investment therefore, all these three conditions must be met before transnational companies open a subsidiary in a foreign country (Soderstein, 1992).

Empirical Literature Review

Silva & Ijeoma (2022) The study examined the relationship between foreign direct investment and

real sector performance in Nigeria adopting time series data ranging from 1981 to 2018. Foreign direct investment was captured by foreign direct investment exchange rate, remittance and trade openness while real sector performance was measured by manufacturing gross domestic product. Data involved in this study were secondary. ARDL regression technique was used to carry out the analysis. The co-integration results of the two models indicates that there is the existence of long-run relationship between foreign direct investment and real sector within the period of study.

Omoke & Opuala-Charles (2021) examined the relationship between trade openness and economic growth in Nigeria by incorporating the role of institutional quality. The study covered the period from 1984 to 2017 and employed three indicators of trade openness including total trade, import trade, and export trade. Cointegration among the variables is examined using the ARDL bounds testing approach. The results provided evidence of a long-run relationship among the variables. The estimates suggested that export trade has a significant positive impact on economic growth while the impact of import trade on economic growth is negative and significant. The results also showed that the negative long-run effects of import trade on economic growth in Nigeria decreases as institutional quality (quality of governance) improves.

Giwa, George, Okodua & Adediran (2020) empirically examined the effect of Foreign Direct Investment (FDI) inflows into Nigeria on real gross domestic product (RGDP) growth and how these external inflows can bring about achieving Goal-17.3 of mobilising additional financial resources for developing countries from multiple sources. The model constructed was estimated using the robust Generalized Method of Moments (GMM) estimation technique which took care of the problem of endogeneity and autocorrelation inherent in ordinary least square. The study found that labour quality has a positive and significant effect on RGDP in line with theory. Equally, it was found that capital intensity displayed a significant negative effect on RGDP in Nigeria.

Atu & Olayemi (2020) used OLS regression to analyse the relationship between FDI and real sector performance from 1981 to 2017. Their findings indicated a lousy correlation between the two. Things like sectoral restrictions or inadequate investment may explain this. However, they

accepted that FDI may have beneficial spillover effects on some industries.

Okeke & Iloh (2020) investigate modern globalization, the social sciences, and the difficulty of scholarly endeavours in developing countries. It defines current globalization as a synonym for the third wave of globalization, which began after World War II and was significantly influenced by American globalism. The definition of social science in the paper is broadly defined as "any study or branch of research that deals with human behaviour in its social and cultural elements." The emerging world regions of Latin America, Africa, Asia, and the Middle East are specially mentioned while discussing social science studies in this work.

A. Nigeria

Aminat & Oluwoye (2024) investigated the impact of FDI inflows on the performance of Nigeria's agricultural sector. The performance was considered on three fronts: agricultural output, exports, and employment. The analytical technique was anchored by the vector autoregressive (VAR) model to capture the relationships between the performance variables and the FDI. The lag order of 2 was selected based on the Akaike Information Criterion. Having analysed the series' descriptive, correlation, and stationarity properties, the VAR estimates revealed that FDI has contributed negatively to agricultural output and employment but positively to agricultural exports in Nigeria. This was interpreted as indicating that the FDI flows majorly to the production of agricultural tradable, i.e., goods that may be exported.

Abdulrahman (2018) examined the relationship between foreign direct investment and Agricultural development in Nigeria Economy. Time series data were used for analysis and the time frame covered the period of 1986-2016. The data used were sourced from CBN statistical bulletin and world development indicators. The findings of the study revealed that foreign direct investment inflow has a significant influence on agricultural sector development in Nigeria. Thus, the foreign direct investment could be used to boost domestic agricultural output.

Owutuamor & Arene (2016) investigated the impact of foreign direct investment and other macroeconomic variables on agricultural growth in Nigeria from 1981 to 2014. Data was analysed using trend analyses, unit root tests, co-integration tests, ordinary least squares (OLS) regression and

Granger causality tests, while the hypothesis was tested with F-test. Results revealed very low foreign direct investment inflow into agriculture, not commensurate with the share of agriculture to GDP. Findings revealed that there was unidirectional causality running from foreign direct investment in agriculture, stock of gross external debts, and variability of consumers' price index to agricultural growth, while agricultural growth was significant in granger causing macroeconomic instability.

Oloyode (2014) examined the impact of foreign direct investment on the agricultural sector development of the Nigerian economy. This work employs secondary time series data which spanned 1981 to 2012, Following ADF test for stationarity and a granger causality test, the study found a relationship among the variables as affirmed by the error parameter. The study found out that foreign direct investment positively impacted on agriculture not only in the short run but also in the long run. This will also engender domestic income diversification which will boost agricultural sector.

B. Other Studies from Ghana

Justice, Nkechi, Ifeoma & David (2024) investigated the effect of Foreign Direct Investment (FDI) on Agricultural Sector in Ghana using data spanning from 1981 to 2022. Agricultural output served as the key indicator of economic growth. FDI, Inflation Rates, and Exchange Rates were examined as independent variables. Ordinary Least Square (OLS) regression analysis was employed, and the model was adapted from previous studies. Descriptive statistics highlighted substantial FDI inflows in both countries, with Nigeria exhibiting a mean FDI of USD 2.47 billion and Ghana's USD 1.13 billion. Analysis revealed the significance of FDI in driving economic growth in both nations, with coefficients of 9.10E08 for Nigeria and 2.85E-07 for Ghana. Additionally, Exchange Rates demonstrated a positive effect on GDP per capita in both countries, emphasizing the importance of currency stability.

Evans, Nuria & Marisa (2023) presented an in-depth analysis of foreign direct investments (FDI) determinants on Agricultura output in Ghana. The analysis revealed that Ghana presents a mostly favourable profile to attract resource-seeking and market-seeking FDI but a mixed situation in the determinants of efficiency-seeking FDI. This study adds to the FDI literature by categorising the drivers under Dunning's motives of FDI and

studying the evolution of these factors in a specific developing African country (Ghana) in order to reveal the country's performance with the determinants. Results show that Ghana's trend is very positive and can become an attractive market for foreign companies. And government and policymakers should continue in the trend of improving their factors to attract and retain foreign investment

Auta, Samuel, John, Micah & Mohammed (2023) examined the impact of foreign direct investment in agricultural productivity on food security in sub-Saharan Africa covering the period 2010-2020. The data were obtained from World Bank World Development Indicators, United Nations Food and Agricultural Organization and United Nations Conference on Trade and Development. The technique used for data analysis is System Generalized Method of Moment. The results of correlation-Bond tests show no autocorrelation. The estimated GMM-SYS results show that foreign direct investment in agriculture is positive and statistically significant in influencing food security variables including food consumption score (with the coefficient of 0.042) and dietary energy consumption (with the coefficient of 0.317). The control variables like crop production, food exports, age dependency and rural population are significant determinants of food consumption score. Also, GDP per capita, crop production, age dependency and rural population are significant factors influencing dietary energy consumption in Sub-Saharan Africa.

METHODOLOGY

An ex post facto research approach was utilised in this study. Furthermore, time series data were utilised. The World Bank Development Indicators was consulted for the data, which covered thirty-three years, from 1991 to 2023.

Model Specification

The endogenous growth model put out by theorist Paul Romer (1990) formed the basis of this study's analytical approach. Empirically, the research utilised a multiple regression model to enhance the accuracy of economic estimations by increasing degrees of freedom and reducing collinearity. Real sector (proxied by agricultural sector output) performance is the dependent variable in the model, while FDI inflow, Trade openness and exchange rate are the independent variables. Based on their empirical examination of the impact of foreign direct investment on Nigeria and Ghana real sector, Silva and Ijeoma (2022) provided the

model for this research. Still, the goals of this particular study informed the adjustments made to

the model. Here, the model in its functional version is given as:

Model 1: Nigeria

$$NASO = f(FDI, TON, EXR) \tag{1}$$

More explicitly, the model is expressed in econometric form as:

$$NASO_t = \delta_0 + \delta_1 FDI_t + \delta_2 TON_t + \delta_3 EXR_t + \mu_t \tag{2}$$

Log linear form of the model is expressed as:

$$LnNASO_t = \delta_0 + \delta_1 LnFDI_t + \delta_2 LnTON_t + \delta_3 LnEXR_t + \mu_t \tag{3}$$

Where; NASO = Nigeria Agricultural Sector Output; FDI = Foreign Direct Investment inflow; TON = Trade Openness and EXR = Exchange Rate; δ_0 = regression constant; δ_1 = parameter of foreign direct investment (FDI) inflow; δ_2 = parameter of trade openness (TON) and δ_3 = parameter of exchange rate (EXR); μ_t = Stochastic or error term which captures the effect of variables that are not included in the model.

Hence, the Nigeria ARDL models employed in this study is specified as follows:

$$\begin{aligned} \Delta \ln(NASO_t) = & \delta_0 + \delta_{1i} \Delta \ln(NASO_{t-1}) + \delta_{2i} \Delta \ln(FDI_{t-1}) + \delta_{3i} \Delta \ln(TON_{t-1}) + \delta_{4i} \Delta \ln(EXR_{t-1}) \\ & + \sum_{t=1}^p \beta_{1i} \Delta 1n(NASO_{t-1}) + \sum_{t=1}^q \beta_{2i} \Delta 1n(FDI_{t-1}) + \sum_{t=1}^q \beta_{3i} \Delta 1n(TON_{t-1}) + \sum_{t=1}^q \beta_{4i} \Delta 1n(EXR_{t-1}) + \varepsilon_{1i} \end{aligned} \tag{4}$$

In furtherance, the short run dynamic parameters are arrived at by the estimation of an error correction model linked with the long-run estimates. The models are stated below:

$$\begin{aligned} \Delta \ln(NASO_t) = & \beta_0 + \sum_{t=1}^p \beta_{1i} \Delta 1n(NASO_{t-1}) + \sum_{t=1}^q \beta_{2i} \Delta 1n(FDI_{t-1}) + \sum_{t=1}^q \beta_{3i} \Delta 1n(TON_{t-1}) + \sum_{t=1}^q \beta_{4i} \Delta 1n(EXR_{t-1}) \\ & + \theta ECT_{t-1} + \varepsilon_{11i} \end{aligned} \tag{5}$$

Model 2: Ghana

Functional form of the model is expressed as:

$$GASO = f(FDI, TON, EXR) \tag{6}$$

In econometric form:

$$GASO_t = \gamma_0 + \gamma_1 FDI_t + \gamma_2 TON_t + \gamma_3 EXR_t + \mu_t \tag{7}$$

Log linear form of the model is expressed as:

$$LnGASO_t = \gamma_0 + \gamma_1 LnFDI_t + \gamma_2 LnTON_t + \gamma_3 LnEXR_t + \mu_t \tag{8}$$

Conversely, the Ghana ARDL models employed in this study is specified as follows:

$$\begin{aligned} \Delta \ln(GASO_t) = & \gamma_0 + \gamma_1 \Delta \ln(GASO_{t-1}) + \gamma_{2i} \Delta \ln(FDI_{t-1}) + \gamma_{03i} \Delta \ln(TON_{t-1}) + \gamma_{4i} \Delta \ln(EXR_{t-1}) \\ & + \sum_{t=1}^p \beta_{1i} \Delta 1n(GASO_{t-1}) + \sum_{t=1}^q \beta_{2i} \Delta 1n(FDI_{t-1}) + \sum_{t=1}^q \beta_{3i} \Delta 1n(TON_{t-1}) + \sum_{t=1}^q \beta_{4i} \Delta 1n(EXR_{t-1}) + \varepsilon_{1i} \end{aligned} \tag{9}$$

In furtherance, the short run dynamic parameters are arrived at by the estimation of an error correction model linked with the long-run estimates. The models are stated below:

$$\begin{aligned} \Delta \ln(GASO_t) = & \beta_0 + \sum_{t=1}^p \beta_{1i} \Delta 1n(GASO_{t-1}) + \sum_{t=1}^q \beta_{2i} \Delta 1n(FDI_{t-1}) + \sum_{t=1}^q \beta_{3i} \Delta 1n(TON_{t-1}) \\ & + \sum_{t=1}^q \beta_{4i} \Delta 1n(EXR_{t-1}) + \theta ECT_{t-1} + \varepsilon_{11i} \end{aligned} \tag{10}$$

Where; NASO = Nigeria Agricultural Sector Output; GASO = Ghana Agricultural Sector Output; FDI = Foreign Direct Investment inflow; Trade Openness and EXR = Exchange Rate; δ_0 and γ_0 = regression constant; δ_1 and γ_1 = parameter of foreign direct investment (FDI) inflow; δ_2 and γ_2 = parameter of trade openness (TON) and δ_3 and γ_3 = parameter of exchange rate (EXR); μ_t = Stochastic or error term which captures the effect of variables that are not included in the model, Δ = first difference operator; p and q indicates the optimum lag length of dependent and independent variable respectively, t = time lag, β_0 = constant variables; $\beta_1 - \beta_4$ = short-run dynamic coefficients of the model; $\varepsilon_{1t} - \varepsilon_{4t}$ = serially uncorrelated stochastic term with zero mean and constant variance. θ = the speed of adjustment which is expected to be negative. ECT = the lagged error correction term derived from the long run cointegrating relationships.

RESULTS AND DISCUSSION

A Priori Expectation

Table 1: Summary of A priori Expectation

Variables	Description	Parameters	Expected Sign	Mathematical Representation
Nigeria				
FDI	FDI inflow	δ_1	Positive	$\delta_1 > 0$
TON	Trade Openness	δ_2	Positive	$\delta_2 > 0$
EXR	Exchange Rate	δ_3	Negative	$\delta_3 < 0$
Ghana				
FDI	FDI inflow	γ_1	Positive	$\gamma_1 > 0$
TON	Trade Openness	γ_2	Positive	$\gamma_2 > 0$
EXR	Exchange Rate	γ_3	Negative	$\gamma_3 < 0$

Source: Researchers' Computation, 2026.

Table 2: Descriptive Statistics Test Result

NIGERIA	LOG(ASO)	LOG(FDI)	LOG(TON)	LOG(EXR)
Mean	9.126719	6.381909	1.216981	4.668237
Median	9.301868	7.402537	1.075873	4.883938
Maximum	9.868197	8.793541	2.590267	6.469545
Minimum	8.186141	1.934416	0.597837	2.293544
Std. Dev.	0.615096	2.038468	0.430457	1.087814
Observations	33	33	33	33
GHANA	LOG(ASO)	LOG(FDI)	LOG(TON)	LOG(EXR)
Mean	8.621147	6.648398	0.147661	4.540908
Median	8.821202	7.184869	0.086648	4.536415
Maximum	9.687579	8.263547	1.720369	5.165258
Minimum	7.471663	4.076350	1.187538	4.222347
Std. Dev.	0.759454	1.427952	0.802457	0.214985
Observations	33	33	33	33

Source: Researcher's Computation, 2026

Table 2 shows that there are thirty-three (33) observations for two of the real sectors performance over a period of thirty-three years from 1991 to 2023 with two explained variables, which are Nigeria agricultural sector output (NASO) and Ghana agricultural sector output (GASO) and three explanatory variables, which are foreign direct investment inflow, Trade openness and Exchange rate. From Table 2, the Nigeria average agricultural sector output from 1991 to 2023 is 9.126719. This shown by the mean value of agricultural sector output for the thirty-

three period of the study. The peak value for agricultural sector output is 9.868197. This occurred in 2023 while the lowest value of agricultural sector output which occurred in 1991 is 8.186141. The peak and lowest value of agricultural sector output are shown by its respective maximum and minimum values. The standard deviation of agricultural sector output which indicates the amount of variation or spread of the variable around its mean is 0.615096. This indicates that the Nigeria agricultural sector output strongly clustered around the mean value since its

standard deviation (0.615096) is relatively lower compared to the mean (9.126719). Ghana, on the other hand, exhibits higher mean agricultural sector output of around 8.621147, with notable variations ranging from a minimum of 7.471663 to a maximum of 9.687579. While the median agricultural sector output value is considerably higher at 8.821202. The standard deviation of agricultural sector output which indicates the amount of variation or spread of the variable around its mean is 0.759454. This indicates that agricultural sector output highly clustered around its mean and as a result, its deviation from the mean is lowly dispersed.

In addition, as show in Table 2, the mean foreign direct investment (FDI) inflow of Nigeria stands at approximately 6.381909, reflecting substantial foreign capital injections into various sectors of the economy. Despite the variability observed, with a maximum recorded foreign direct investment (FDI) inflow of 8.793541 and a minimum of 1.934416, the median value of 7.402537 suggests a relatively stable influx of foreign investments over time. The standard deviation of foreign direct investment inflow which indicates the amount of variation or spread of the variable around its mean is 2.038468. This indicates that foreign direct investment inflow clustered around the mean value since its standard deviation is relatively low compared to the mean. Ghana, on the other hand, exhibits a lower mean foreign direct investment (FDI) inflow of around 6.648398 compared to Nigeria, with notable variations ranging from a minimum of 4.076350 to a maximum of 8.263547. While the median foreign direct investment (FDI) inflow value is considerably higher at 7.184869, it indicates a consistent flow of foreign investments contributing to the country's economic development. The standard deviation of foreign direct investment (FDI) inflow which indicates the amount of variation or spread of the variable around its mean is 1.427952. This indicates that foreign direct investment (FDI) inflow clustered around its mean value and as a result, its deviation from the mean is low. However, the large difference between the minimum and maximum value of foreign direct investment (FDI) inflow means that Ghana welcome more of capital-intensive policy into their economy.

In Nigeria, Table 2 showed that the average Trade openness which is one the proxies of foreign direct investment from 1991 to 2023 is 1.216981. This is shown by the mean value of Trade openness for

the thirty-three-year period of this study. The peak value for trade openness is (2.590267). This also occurred in 2023 while the lowest value of trade openness and this occurred is (0.597837) and this occurred in 1991. The peak and lowest values of Trade openness are shown by its respective maximum and minimum values. The standard deviation of trade openness which indicates the spread of the variable around its mean is 0.430457. This indicates that trade openness highly clustered around its mean values and as a result, its deviation from the mean is strongly low. In contrast, Ghana's mean trade openness from 1991 to 2023 is comparatively lower at (0.147661). The peak value for trade openness is 1.720369. This also occurred in 2023 while the lowest value of trade openness is (1.187538) and this occurred in 1991. The peak and lowest values of trade openness are shown by its respective maximum and minimum values. The standard deviation of trade openness which indicates the spread of the variable around its mean is 0.802457. This indicates that trade openness clustered around its mean value and as a result its deviation from the mean is low.

Furthermore, the mean exchange rate for Nigeria stands at 4.668237 Naira per US dollar with a median of 4.883938 Naira per USD, indicating relatively stable exchange rate trends. However, Nigeria exhibits substantial fluctuations, with the exchange rate ranging from a minimum of 2.293544 Naira per US dollar to a maximum of 6.469545 Naira per US dollar, suggesting periods of both stability and volatility in the currency markets. The standard deviation of exchange rate which indicates the spread of the variable around its mean is 1.087814 Naira per US dollar. This indicates that exchange rate highly clustered around its mean value and as a result its deviation from the mean is low. Conversely, Ghana demonstrates a different exchange rate, with a mean of 4.540908 Cedis per US dollar and a median of 4.536415 Cedis per US dollar. Despite lower mean and median values compared to Nigeria, Ghana's exchange rate exhibits lower variability, ranging from a maximum of 5.165258 Cedis per US dollar to a minimum of 4.222347 Cedis per US dollar. The standard deviation of Ghana exchange rate which indicates the spread of the variable around its mean is 0.214985 Cedis per US dollar. This indicates that Ghana exchange rate clustered around its mean value and as a result, its deviation from the mean is low.

**Trend Analysis
Nigeria**

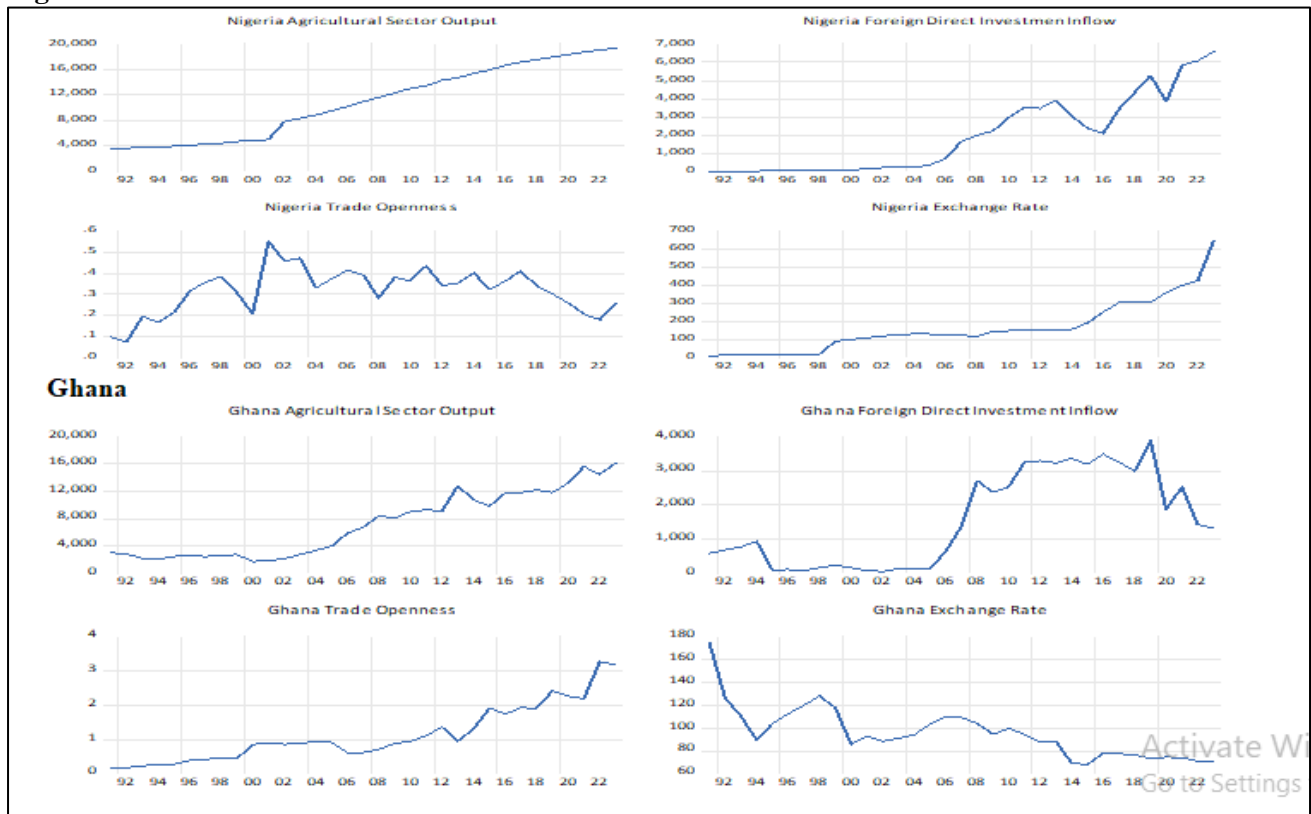


Figure 1: Trend in Agricultural Sector Output (ASO), Foreign Direct Investment (FDI) Inflow, Trade Openness (TON) and Exchange Rate (EXR)

In Nigeria, as it can be seen from Figure 1, there was high degree of inconsistencies in the trend in Trade Openness (TON) in terms of its upward and downward movements throughout the research period (1991-2023) as compared with Agricultural Sector Output (NASO), Foreign Direct Investment (FDI) inflow and Exchange Rate (EXR) which maintained a more consistent upward movement. Conversely, in Ghana, there was high degree of

consistencies in the trend in Ghana agricultural sector output (GASO) and Trade Openness (TON) in terms of its upward movement throughout the research period compared to foreign direct investment and exchange rate whose degree of inconsistencies in the trend in terms of downward movement falls drastically from the initial period of this study.

Table 3: Augmented Dickey-Fuller (ADF) Test Results for Nigeria and Ghana

Variables	Levels		First Difference		Stationarity	Order of Integration
	ADF Statistics	5% Critical Value	ADF Statistics	5% Critical Value		
Nigeria						
LOG(NASO)	-1.029356	-2.957110	-5.039898*	-2.960411	1 st Difference	I(1)
LOG(NFDI)	-2.432929	-2.957110	-5.121815*	-2.960411	1 st Difference	I(1)
LOG(NTON)	-3.214923*	-2.957110	-	-	Level	I(0)
LOG(NEXR)	-1.520734	-2.957110	-5.500745*	-2.960411	1 st Difference	I(1)
Ghana						
LOG(GASO)	-0.067366	-2.957110	-4.894277*	-2.960411	1 st Difference	I(1)

LOG(GFDI)	-1.150506	-2.957110	-5.206606*	-2.960411	1 st Difference	I(1)
LOG(GTON)	-1.177077	-2.957110	-6.275535*	-2.960411	1 st Difference	I(1)
LOG(GEXR)	-3.035206*	-2.957110	-	-	Level	I(0)

Source: Researchers' Computation, 2026.

In Nigeria, the results of the Augmented Dickey Fuller (ADF) unit root test reported in Table 3 showed that Trade Openness (TON) was stationary at level and integrated at order zero [i.e., I(0)]. On the other hand, Agricultural Sector Output, Foreign Direct Investment inflow and Exchange Rate in Nigeria were stationary at first difference and integrated at order one [i.e., I(1)]. Ghana on the other hand, showed that only exchange rate were stationary at levels and integrated at order zero [i.e., I(0)] while Agricultural Sector Output,

Foreign Direct Investment inflow and Trade Openness were stationary at first difference and integrated at order one [i.e., I(1)]. However, a mixed order of integration as evident among the time series from the ADF test results is a precondition for testing for long-run relationship among the variables. Testing for long run relationship among the variables was therefore carried out using ARDL Bounds Cointegration Test and Autoregressive Distributive Lag (ARDL) technique.

Table 4: Variance Inflation Factors (VIF) Multicollinearity test Result

Country's	Variables	Coefficient Variance	Uncentre VIF	Centre VIF
	C	0.026961	48.01502	NA
Nigeria	LOG(FDI)	0.000744	59.29539	5.338169
	LOG(TON)	0.003951	11.68425	1.264156
	LOG(EXR)	0.002536	103.6002	5.182193
	C	3.069646	1945.121	NA
Ghana	LOG(FDI)	0.001069	31.26982	1.338904
	LOG(TON)	0.010645	4.359017	4.211942
	LOG(EXR)	0.144687	1894.600	4.109054

Source: Researchers' Computation, 2026.

The results of multicollinearity test are presented in Table 4. In general, a VIF above 10 indicates high correlation while a VIF below 10 indicates low correlation. Also, variable with centred VIF above 10 shows existence of high multicollinearity among other variables. The result revealed a relatively low-centred VIF for all the variables

both for Nigeria and Ghana respectively. This indicates absence of multicollinearity problem in the explanatory variables. This is so because each explanatory variable has centered VIF value that is consistently smaller than the threshold of 10. This result therefore gives us confidence to proceed with our econometric analysis.

Table 5: ARDL Bounds Cointegration Test Result

Test Statistic	Value	K
	Nigeria	
F-statistic	14.52*	3
Critical Value Bounds		
Significance	Lower Bound [I(0)]	Upper Bound [I(1)]
5%	2.79	3.67
	Ghana	
F-statistic	9.13*	3
Critical Value Bounds		
Significance	Lower Bound [I(0)]	Upper Bound [I(1)]
5%	2.79	3.67

Source: Researchers' Computation, 2026.

The result of Nigeria ARDL Bounds Test presented in table 5 showed that the F-statistic (14.52) is greater than the lower bound (2.79) and

upper bound (3.67) at 5% level of significance. Hence, there is sufficient statistical evidence to reject the null hypothesis of no co-integration at

5% level of significance and conclude that there exists a long run relationship or co-integration between the variables. Specifically, it can therefore be concluded based on the ARDL Bound co-integration test that there is a long run relationship among Nigeria agricultural sector output, foreign direct investment inflow, trade openness and exchange rate. In contrast, the result of Ghana ARDL Bound Test presented in table 4.4 showed that the F-statistic (9.13) is greater than the lower bound (2.79) and upper bound (3.67) at 5% level of significance. Hence, there is sufficient statistical evidence to reject the null hypothesis of no co-integration at 5% level of significance and

conclude that there exists a long run relationship or co-integration between the variables. Specifically, it can therefore be concluded based on the ARDL Bound co-integration test that there is a long run relationship among Ghana agricultural sector output, foreign direct investment inflow, trade openness and exchange rate. In conclusion, the confirmation of long-run dynamics among the variables gives credence for the estimation of the extent of the relationship by proceeding to estimate the ARDL short-run model, ARDL long-run form and ARDL error correction for agricultural sector output model for Nigeria and Ghana.

Table 6: Autoregressive Distributive Lag (ARDL) Long-run Dynamics Results

Dependent Variable = LOG(ASO)				
Variable	Coefficient	Std. Error	t-Statistic	Prob.*
Nigeria				
LOG(NFDI)	0.106594	0.033728	3.160 401	0.0003
LOG(NTON)	0.787355	0.382418	2.058 886	0.0442
LOG(NEXR)	-0.274599	0.119575	- 2.296458	0.0355
C	8.332703	0.946280	8.805 745	0.0000
Ghana				
LOG(GFDI)	0.442874	0.069880	6.337636	0.0001
LOG(GTON)	0.805355	0.283730	2.838456	0.0031
LOG(GEXR)	-0.624580	0.178028	-3.508325	0.0096
C	-23.11142	19.39502	-1.191616	0.2585

Source: Researchers' Computation, 2026.

The long-run estimates of the ARDL model are shown in table 5. The result revealed that foreign direct investment (FDI) inflow have positive and significant effect on agricultural sector output in Nigeria. This is evident by the positive coefficient value (0.106594) of foreign direct investment (FDI) inflow at initial level and its p-value (0.0003) which is less than (0.05). This implies that a unit increase in foreign direct investment (FDI) inflow will lead to (0.106594) increase in agricultural sector output of Nigeria in the long-run. According to Umoh, Jacob & Chuku (2012), the positive coefficient indicates that foreign direct investment (FDI) inflows have positive effect on agricultural sector output of real sector performance by promoting capital formation,

Knowledge transfer and job creation. In line with this study, FDI inflow is a major factor in Nigeria's real sector. This is consistent with other studies that highlights the benefits of FDI inflow for development. (Odozi & Abada, 2019). On the other hand, the long-run estimates of the ARDL model results proved that foreign direct investment (FDI) inflow have a positive and significant effect on agricultural sector output in Ghana. This is evident by the positive coefficient value (0.442874) of foreign direct investment (FDI) inflow and its p-value (0.0001) which is less than 0.05. This implies that a unit increase in foreign direct investment (FDI) inflow will lead to (0.442874) increase in agricultural sector output in the long-run. This is underscores the robustness of

the relationship, suggesting that foreign direct investment (FDI) inflow plays a pivotal role in driving real sector performance in Ghana. This finding aligns with existing literature emphasizing the positive impact of foreign direct investment (FDI) on agricultural sector performance by fostering capital accumulation, technology transfer and employment generation (Kulu, Mensah & Sena 2021; Antwi & Zhao, 2013). Comparatively, we can therefore conclude that foreign direct investment (FDI) inflow has a positive and significant effect on agricultural sector output of Nigeria and Ghana in the long-run

In addition, the long-run estimated ARDL model result revealed that trade openness in Nigeria have a positive coefficient value of (0.787355). This implies that trade openness has a positive effect on agricultural sector output in the long-run. Hence, a unit increase in trade openness will lead to (0.787355) increase in agricultural sector output in the long-run. Also, the p-value (0.0442) of the coefficient of trade openness which is less than 0.05 indicates that trade openness has a significant effect on agricultural sector output. It can therefore be concluded that trade openness has a positive and significant effect on agricultural sector output of real sector performance in Nigeria in the long run. In contrast, the long-run estimates of the ARDL model results revealed that Ghana trade openness has a coefficient value of (0.805355). This implies that the trade openness in Ghana has a positive effect on agricultural sector output in the long run. Hence, a unit increase in trade openness will lead to 0.805355 increase in agricultural sector output in Ghana. Also, the p-value (0.0031) of the coefficient of trade openness which is less than 0.05 indicates that trade openness has a significant effect on agricultural sector output of Ghana in the long-run. It can therefore be concluded that trade openness has a positive and significant effect on agricultural sector output of Ghana in the long-run. Comparatively, we can

therefore conclude that trade openness (TON) has positive and significant effect on agricultural sector output of Nigeria and Ghana respectively in the long-run

Lastly, in Nigeria, the exchange rate has a negative coefficient value of (-0.274599). This implies that exchange rate has a negative effect on agricultural sector output in the long-run. Hence, a unit increase in exchange rate (Naira per dollar) will lead to (0.274599) decrease in agricultural sector output in the long-run. Also, the p-value (0.0355) of the coefficient of exchange rate which is less than (0.05) indicates that exchange rate has a significant effect on agricultural sector output. This suggests that a declining local currency (per US dollar) and variation in the exchange rate are linked to increased agricultural sector output. A depreciated local currency can make exports cheaper and more competitive in international market, thus boosting agricultural output. It can therefore be concluded that exchange rate has a negative and significant effect on agricultural sector output of real sector performance in Nigeria in the long-run. Ghana, on the other hands, proved that the exchange rate has a high negative coefficient value of (-0.624580). This implies that exchange rate has a negative effect on agricultural sector output in the long-run. Hence, a unit increase in exchange rate (Cedis per US dollar) will lead to (0.624580) decrease in agricultural sector output. Also, the p-value (0.0096) of the coefficient of exchange rate which is less than 0.05 indicates that exchange rate has a significant effect on agricultural sector output in Ghana in the long-run. In conclusion, this implies that both economies of Nigeria and Ghana in the long run are investment-driven rather than trade openness and exchange rate. Following the economic intuition, the outcome seems to represent the true characteristics of the developing countries where foreign direct investment inflow is the key driver of economic performance.

Table 7: Autoregressive Distributive Lag (ARDL) Error Correction Result

Dependent Variable = LOG(ASO)				
Variable	Coefficient	Std. Error	t-Statistic	Prob.*
Nigeria				
DLOG(NFDI)	0.045957	0.013349	3.442727	0.0033
DLOG(NTON)	0.041793	0.013959	2.993982	0.0035
DLOG(NTON(-1))	-0.035907	0.022900	-1.568035	0.1364
DLOG(NTON(-2))	-0.071122	0.014485	-4.910217	0.0002
DLOG(NEXR)	0.015965	0.014002	1.140152	0.2710
DLOG(NEXR(-1))	-0.032821	0.016732	-1.961596	0.0674
DLOG(NEXR(-2))	-0.063557	0.022421	-2.834692	0.0120

DLOG(NEXR(-3))	0.178036	0.017898	9.947284	0.0000
CointEq(-1)*	-0.144929	0.015216	-9.524845	0.0000
Adj. R ² = 0.924631; Durbin Watson = 1.763095				
Ghana				
DLOG(GASO(-1))	0.338794	0.124434	2.722676	0.0198
DLOG(GASO(-2))	-0.212357	0.116217	-1.827240	0.0949
DLOG(GFDI)	0.051905	0.018165	2.857402	0.0156
DLOG(GFDI(-1))	-0.068544	0.017244	-3.975070	0.0022
DLOG(GFDI(-2))	0.000981	0.014614	0.067129	0.9477
DLOG(GFDI(-3))	-0.048389	0.012049	-4.016156	0.0020
DLOG(GTON)	0.429526	0.046533	9.230632	0.0000
DLOG(GTON(-1))	-0.201701	0.096010	-2.100842	0.0595
DLOG(GTON(-2))	-0.456506	0.082919	-5.505454	0.0002
DLOG(GEXR)	1.033981	0.123037	8.403797	0.0000
DLOG(GEXR(-1))	-0.619691	0.125499	-4.937813	0.0004
DLOG(GEXR(-2))	-0.627484	0.145980	-4.298421	0.0013
DLOG(GEXR(-3))	-0.227920	0.083356	-2.734315	0.0194
CointEq(-1)*	-0.138668	0.017572	-7.891491	0.0000

Adj. R² = 0.957603; Durbin-Watson stat = 1.857512

Source: Researchers' Computation, 2026.

The short-run estimates of the ARDL model are shown in table 7. The result revealed that foreign direct investment (FDI) inflow have positive and significant effect on agricultural sector output in Nigeria. This is evident by the positive coefficient value (0.045957) of foreign direct investment (FDI) inflow at initial level and its p-value (0.0033) which is less than 0.05. This implies that a unit increase in foreign direct investment (FDI) inflow will lead to 0.045957 increase in agricultural sector output of Nigeria in the short-run. Ghana, on the other hand, revealed that foreign direct investment (FDI) inflow has a positive and significant effect on agricultural sector output. This is evident by the positive coefficient value (0.051905) of foreign direct investment (FDI) inflow at initial level and its p-value (0.0156) which is less than (0.05). This implies that a unit increase in foreign direct investment (FDI) inflow will lead to (0.051905) increase in agricultural sector output in the short-run. It can therefore be concluded that foreign direct investment (FDI) inflow at initial level has positive and significant effect on Nigerian and Ghanaian agricultural sector output in the short-run.

Furthermore, in Nigeria, the short-run ARDL estimated result revealed that trade openness has a positive coefficient value of (0.041793). This implies that trade openness at the current period has a positive effect on agricultural sector output in the short-run. Hence, a unit increase in trade openness will lead to (0.041793) increase in

agricultural sector output. Also, the p-value (0.0035) of the coefficient of trade openness which is less than (0.05) indicates that trade openness has significant effect on agricultural sector output in the short run. In contrast, Ghana ARDL estimated result in table 7 proved that trade openness has a positive coefficient value of (0.429526). This implies that trade openness at current period has a positive effect on agricultural sector output in the short-run. Hence, a unit increase in trade openness will lead to (0.429526) increase in agricultural sector output. Also, the p-value (0.0035) of the coefficient of trade openness which is less than 0.05 indicates that trade openness has positive effect on agricultural sector output in the short-run.

Moreover, in Nigeria, the short-run estimates of the ARDL model are shown in table 7. The result revealed that exchange rate has negative and nonsignificant effect on agricultural sector output in the short-run. This is evident by the negative coefficient value (-0.032821) of exchange rate at lag one and its p-value (0.0674) which is greater than (0.05). This implies that a unit increase in exchange rate will lead to (0.032821) decrease in agricultural sector output in the short-run. Conversely, Ghana demonstrated a different exchange rate with negative coefficient value of (-0.619691). This implies that exchange rate at lag one has a negative effect on agricultural sector output in the short-run. Hence, a unit increase in exchange rate will lead to (0.619691) decrease in agricultural sector output in the short-run. Also, the p-value (0.0004) of the coefficient of exchange

rate in Ghana which is less than (0.05) indicates that exchange rate has significant effect on agricultural sector output in the short-run. Comparatively, it can therefore be concluded in short-run that exchange rate has a negative and significant effect on agricultural sector output in Ghana but nonsignificant effect on agricultural sector output in Nigeria at lag one

In Nigeria, however, the error correction term indicates the speed adjustment to restore equilibrium in the dynamic model. The error correction mechanism coefficient shows how quickly variables converge to equilibrium and it should have a statistically significant coefficient with a negative sign. Thus, the error correction coefficient estimated at CointEq(-1) is fairly significant (0.0000) and negative (-0.144929) as expected. This implies a fairly low speed of adjustment to equilibrium. The fairly significant error correction term further confirms the existence of a stable long-run relationship among all the research variables with their various significant lags. Specifically, the coefficient of CointEq(-1) which is -0.144929 indicates that deviation from the long-term growth rate in agricultural sector output is corrected by 14% in the following year. Conversely, Ghana error correction term indicates the speed adjustment to restore equilibrium in the dynamic model. The error correction mechanism coefficient shows how quickly variables converge to equilibrium and it should have a statistically significant coefficient with a negative sign. Thus, the error correction coefficient estimated at CointEq(-1) is fairly significant (0.0000) and negative (-0.138668) as expected. This implies a very low speed of adjustment to equilibrium. The fairly significant error correction term further confirms the

existence of a stable long-run relationship among all the research variables with their various significant lags. Specifically, this implies that approximately 13% of disequilibria from the previous year's shock converge back to the long run equilibrium in the current year.

In furtherance, the goodness of fit of the agricultural sector output from the result of the short-run estimates of the ARDL model for Nigeria in table 4.6 indicated that about ninety-two (92) percent of the total variation in agricultural sector output of Nigeria is explained by systematic changes in foreign direct investment (FDI inflow, trade openness, and exchange rate) while the 8% is explained by other variables factors outside the model. This implies that foreign direct investment has potentials for improving, enhancing and stimulating the agricultural sector performance in Nigeria in the short-run. Conversely, the goodness of fit of the agricultural sector output from the result of the short-run estimates of the ARDL model in table 7 for Ghana indicated that about ninety-five (96) percent of the total variation in agricultural sector output of Ghana is explained by systematic changes in foreign direct investment (FDI inflow, trade openness, and exchange rate) while the remaining 4% is explained by other variables of factors outside the model. This implies that foreign direct investment has potentials for improving, enhancing and stimulating the real sector performance in Ghana.

Lastly, the Durbin-Watson statistic of 1.763095 and 1.857512 which are closer to 2 in agricultural sector output of Nigeria and Ghana respectively indicates that the model is free from the problem of serial autocorrelation in the short-run.

Table 8: Post-Estimation (Diagnostics) Test Results

Test	F-Statics	Prob-value	Null Hypothesis	Decision
		Nigeria		
Normality Test	0.289514	0.8652	Normally distributed	Do not reject
Serial Correlation Test	5.381223	0.1185	No serial correlation	Do no reject
Heteroscedasticity Test	0.673790	0.7528	Homoscedasticity exist	Do not reject
Ramsey RESET Test	2.938660	0.1071	Well specified model	Do not reject
		Ghana		
Normality Test	1.677742	0.4322	Normally distributed	Do not reject
Autocorrelation Test	0.681057	0.5304	No serial correlation	Do no reject
Heteroscedasticity Test	1.081440	0.4599	Homoscedasticity exist	Do not reject
Ramsey RESET Test	0.058846	0.8132	Well specified model	Do not reject

Source: Researchers' Computation, 2026.

According to Table 8, the Normality Test indicates that the stochastic or disturbance terms follow a

normal distribution for both nations. The diagnostic test mentioned above indicated the lack

of serial correlation and provided evidence of homoscedasticity, indicating the absence of heteroscedasticity for both Nigeria and Ghana economies. Finally, the Regression Specification Error Test (RESET) indicated that the model is not affected by misspecification and that the ARDL

model is stable. All the above test were established for both countries through the probability values which is greater than 0.05. The CUSUM test was performed to determine the stability of the parameters of the ARDL model, in addition to the other tests completed.

STABILITY CUSUM TEST RESULT

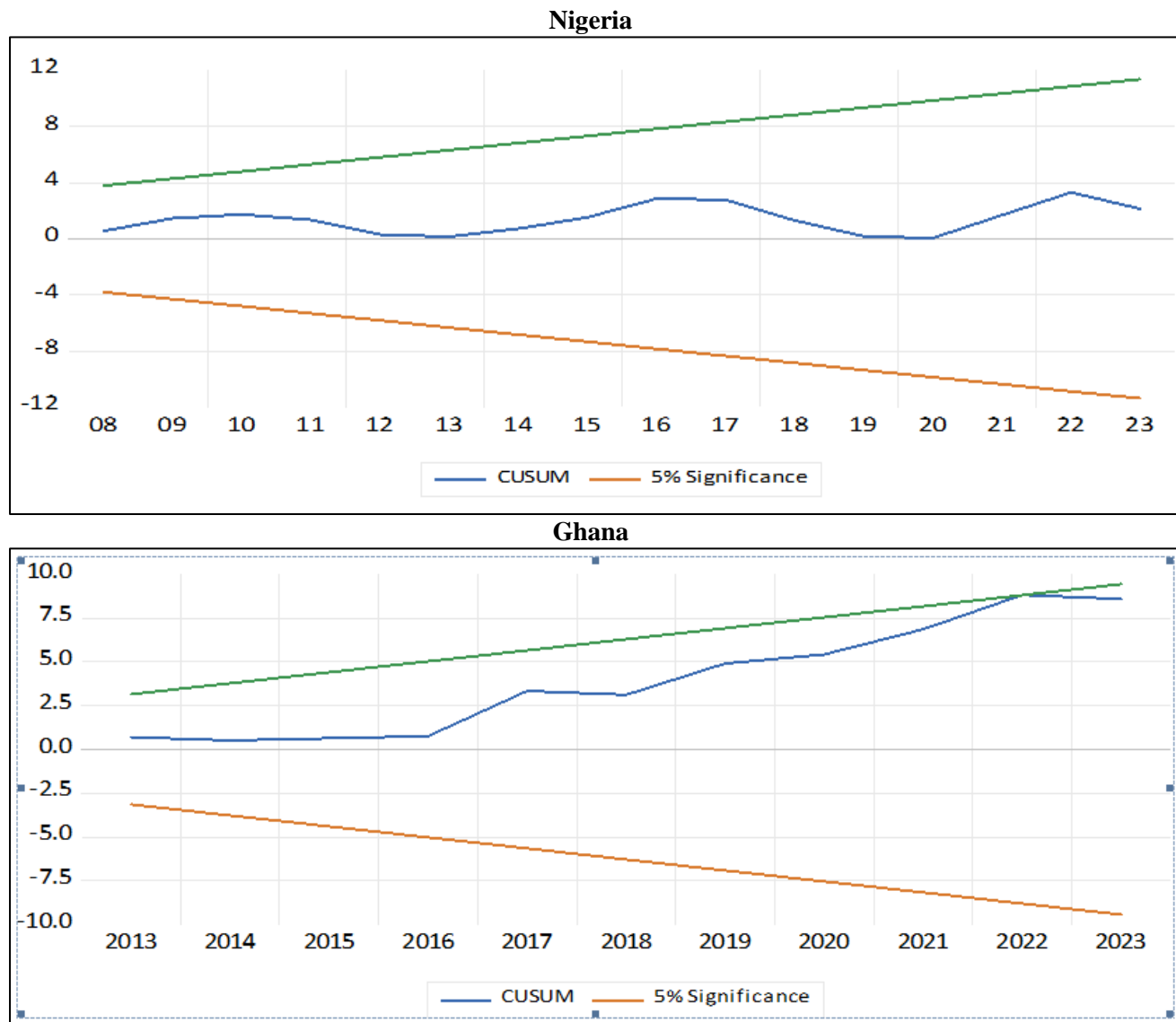


Figure 2: Stability CUSUM TEST
 Source: Researchers’ Computation, 2026.

From what we can see in the Figure 2, the blue line representing the CUSUM model or plot trend is inside the range of the two red lines that indicate the 5 percent crucial bounds. Accordingly, it indicates that there has been no major structural disturbance to the ARDL model of both nations and that it is generally stable.

DISCUSSION OF FINDINGS

The finding of this study showed that foreign direct investment inflow positively and

significantly influences agricultural sector output of real sector performance of Nigeria in both short run and long run. This finding is in agreement with the finding of Gungor and Ringim (2017) who found that there is significant link between foreign direct investment, domestic investment and economic growth in Nigeria and further corroborated by Joshua (2023). Ghana on the other hand, revealed that the results of the foreign direct investment inflow has positively and significantly effect on agricultural sector output of real sector

performance in both short-run and long-run. This discovery is consistent with the conclusions of Ato-mensal (2021) which stated that FDI inflow has significant impact on economic growth in Ghana. Moreover, there is a positive and significant association between trade openness and real sector performance (proxied by agricultural sector output) in Nigeria, both in the short term and the long term. Conversely, Ghanaian trade openness exhibit positive and significant effect on real sector performance both in the short-run and long-run. This discovery is conforms to the finding of Ehigiamusoe and Lean (2018), which stated that trade openness has significant positive impact on economic growth: Evidence from Ghana, Nigeria and South Africa. Lastly, in Nigeria, exchange rate has negative and nonsignificant influence on real sector (proxied by agricultural sector output) performance only in the short run and while negative and significant influence in the long-run. Conversely, exchange rate in Ghana exhibit negative and significant contribution on real sector (agricultural sector output) performance both in the short-run and long-run. This finding is supported by the result of Akpan and Atan (2011) who found that trade openness has significant impact on economic growth in Nigeria and supported by Alagidede and Ibrahim (2017) which stated that exchange rate volatility has negative effect on economic growth in Ghana.

CONCLUSION AND RECOMMENDATIONS

The researchers had carried out a comparative analysis of the effect of foreign direct investment (FDI) on real sector performance (proxies by agricultural sector output) of the two giants' economies of the sub-region, that is, Nigeria and Ghana. Based on the findings of this study, the researchers conclude that the Ghanaian and Nigerian economies are foreign direct investment-induced and also trade-enhanced. In view of the above findings and conclusion, the study recommended that authorities of both economies should continue to implement policies that attract and retain foreign direct investment inflow as clear and stable regulation, along with incentives for foreign investor, can contribute to sustain agricultural sector output. Also, effort should be put in place by the government of both countries to ensure investment-friendly environment in order to harness the full potential of the foreign direct investment inflow. Lastly, authorities should focus on maintaining stability in the currency market. This includes adopting measures to mitigate

extreme fluctuation and ensure a competitive exchange rate for international trade.

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