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Foreign Direct Investment and Manufacturing Sector Performance in Less Developed Economy: Experience from Nigeria and Ghana

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Abstract- ***This study comparatively analyses how foreign direct investment (FDI) affected the output of Nigeria's and Ghana's manufacturing sector from 1991 to 2023 respectively. The study uses manufacturing sector output as the regresand, FDI as the major regressor, and trade openness and exchange rate were utilized as checked variables. The data were sourced from Word Development Indicators. The nature of the series necessitated the use of ARDL techniques for both nations. Outcomes from the short-run ARDL model for both economies reveals that manufacturing sector output responds positively to FDI respectively. We observed that the ECM one period lag coefficient was negative and significant at 0.05 for each nation, indicating that the manufacturing sector output adjusts to changes in explanatory variables within a year. The*** ECM_{t-1} ***corrects 37.5% and 9.5% of the disequilibrium between static and short-run dynamic models of manufacturing sector output of Nigeria and Ghana respectively within a year on average. However, the Granger causality results exhibit unidirectional causal relationship running from FDI to Manufacturing sector output in Nigeria while for Ghana, there exist only one unidirectional causal relationship running from manufacturing sector output to exchange rate. The study found that the manufacturing sector play a pivot role in these less developed countries economic growth and development. Based on these findings, we recommend that the government should implement more practical policy actions that will help the national economy of both nations to attain maximum FDI inflow in an effort to achieve the process of economic development. Importantly, effort should be made to ensure investment-friendly environment in order to achieve the full potential of the FDI inflow which will in turn enhance development through the multiplier effect.***

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

I. INTRODUCTION

The manufacturing sector has long been recognized as a critical engine of sustainable economic development, often serving as a primary proxy for the health and dynamism of a nation's real sector. For emerging economies in West Africa, such as Nigeria and Ghana, the transformation of this sector is pivotal for achieving structural change, job creatiosn, and export diversification. Historically, both nations have pursued Foreign Direct Investment (FDI) as a strategic lever to catalyze this transformation. Foreign direct investment (FDI) promises to deliver not only crucial capital but also advanced technology, managerial expertise, and integration into global value chains key ingredients theoretically capable of boosting manufacturing output. However, the empirical narrative of foreign direct investments (FDI) impact on the real sector in these two neighboring yet structurally distinct economies has been complex and often contradictory, raising critical questions about the nature of this relationship and its policy implications.

The central problem lies in the apparent disconnect between substantial FDI inflows and the sluggish, sometimes stagnant, performance of the manufacturing sector in both Nigeria and Ghana. Despite Nigeria attracting a cumulative $92.8 billion in FDI between 2013 and 2022 and Ghana attracting approximately $15.1 billion over the same period, the contribution of manufacturing to GDP has remained troublingly low. In Nigeria, it hovered around a mere 10% of GDP in 2022, a figure virtually unchanged from a decade prior, amidst severe challenges like infrastructural deficits and foreign exchange volatility. Ghana's manufacturing sector, while more

vibrant in certain sub-sectors like food processing, has similarly failed to consistently exceed 11% of GDP, struggling with high utility costs and competition from imports. This paradox suggests that the promised spillover effects technology transfer and enhanced productivity are not automatic. Instead, FDI appears to be concentrated in resource extraction and, increasingly, services, largely bypassing the capital-intensive, job-creating manufacturing activities that define a robust real sector. The problem is further compounded by a deindustrialization trend, where existing manufacturing capacity shrinks in the face of cheaper imports and an unfavorable business climate, raising doubts about whether current FDI is complementing or inadvertently crippling domestic industrial capabilities.

Against this backdrop, this analysis seeks to move beyond simplistic assumptions to critically examine the nuanced linkages between FDI and manufacturing sector output as the core of real sector performance. It aims to dissect the sectoral composition of FDI in each country to understand where capital is truly flowing and why manufacturing often loses out. The inquiry will evaluate how country-specific structural and policy environments from Nigeria's oil dependency and foreign exchange management to Ghana's power reliability and regional trade integration mediate the effectiveness of FDI in stimulating tangible manufacturing growth. Ultimately, the objective is to derive comparative insights that can inform targeted, evidence-based policy frameworks. The goal is not merely to attract more FDI, but to strategically channel it into manufacturing subsectors with high linkage potential, foster deeper backward integration with local enterprises, and create the domestic conditions necessary to convert foreign investment into genuine, sustained industrial expansion and real sector transformation in both nations.

II. LITERATURE REVIEW

2.1 Theoretical Literature

(a) Product Life-Cycle theory

This theory was developed by Vernon (1966). According to this theory, a firm's product goes through four main stages which include; the introduction stage, growth stage, maturity, and the decline stage, and firms engage in FDI at one of these stages, commonly at the maturity stage. Vernon argues that, as the firm's product reaches the maturity stage, its demand increases significantly. As a result, new firms emerge to produce and compete on similar product by offering different incentives to buyers such as lower prices. Therefore, for the firm to compete successfully with the new entrants or rivals there is the need to engage in FDI through the expansion of its production processes to other markets. The product life-cycle theory according to Kaliappan, (2015) explains how FDI is motivated by cost reduction and market seeking.

(b) Eclectic Theory

Most of the theoretical works developed over time by different authors seem to be integrated in the Dunning (1993) eclectic theory commonly called the OLI paradigm. This theory explains the process of spillovers from multinationals to host country firms through industrial organization. According to Jutta (2002), this has become the standard theoretical framework for studies on foreign subsidiaries of multinational corporations. Dunning's eclectic paradigm has been for long an effective framework for empirical investigation of determinants of foreign direct investment, though it has some weaknesses. The basic assumption of the theory is that it tries to explain FDI and the returns on it by bringing together a set of three factors, which are: the ownership advantages of firm's 'O', that is the monopolistic advantage; locational advantage factors 'L' "which concentrates on where to produce" (the specific advantages to be derived from the macroeconomic environment as well as from country endowments. These specific endowments include national resources, markets, labour, government policies etc. necessary for foreign involvement), and by the internalization factor 'I' that addresses the question of why firms engage in FDI rather than license foreign firms to use their proprietary assets (Dunning, 1993); hence it is often called an OLI theory. By this, we understand that the eclectic theory hinges on a tripod set of conditions for FDI to take place; hence the issue of international value-added activities. It averts that the extent, geography and industrial composition of foreign production embarked on by Multi-National Corporations Yaya, Oladipo, Oyefabi & Okoli (2022),

2.2. Empirical Literature

Many researchers have studied the impact of foreign direct investment on manufacturing sector development across the world. Some of these studies that are relevant to this study are discussed.

(a) Empirical Studies from Nigeria

Nnadozie (2021) investigated the effect of foreign direct investment on industrialization in Nigeria between 1981 and 2015. The study utilizes error correction model to investigate the impact and it was found that foreign direct investment does not have a significant effect on industrialization in Nigeria both in the short and long-run.

Duramany-Lakkoh (2021) also examined the impact of foreign direct investment on manufacturing sector in Sierra Leone from 1970 to 2018, using VAR approach. The study reveals that foreign direct investment has positive and significant effect on manufacturing sector in Sierra Leone. Azolibe (2020) employed fully modified ordinary least square method to examine the impact of foreign direct investment on manufacturing sector growth in Middle East and North Africa Region from the period of 1975 to 2017. The results indicate that both inward and outward FDI influence the growth of manufacturing sector positively.

Agbarakwe (2019) studied the impact of foreign direct investment on manufacturing sector output in Nigeria between 1980 and 2018, using VECM model. The study found that FDI has a positive but poor effect and contribution on the manufacturing sector output growth in Nigeria.

Idoko and Taiga (2018) examined the effect of Foreign Direct Investment (FDI) on manufacturing sector output growth in Nigeria for the period of 1981 to 2016. The study was guided by two research questions and objectives. The Vector Auto Regression (VAR) technique and Johansen Cointegration test were employed for testing the hypotheses of the study. The VAR analysis empirical results from the impulse response function and variance decomposition test shows that FDI had a positive but minimal effect on the manufacturing sector output in Nigeria. The results of the Co-integration test showed a long-run relationship exists between FDI and manufacturing sector output growth in Nigeria.

Muhammad (2018) studied the impact of foreign direct investment on manufacturing output in Nigeria between 1981 and 2016. The study employed ARDL approach and it was found that in the short run, FDI, exchange rate and interest rate have negative impact on manufacturing output while trade openness has positive impact. Also, in the long run, FDI and exchange rate have negative impact while the impact of trade openness and interest rate on manufacturing output in Nigeria was positive.

(b) Empirical Studies from Ghana

Thiam (2006) conducted a study on FDI and its effects on economic growth and they found a positive impact of FDI on host countries. Studies among others, noted that FDI brings much needed physical capital, new technology, managerial and marketing talents and expertise, international best practices of doing business as well as increased competition. These resources may have the potential to be diffused into indigenous firms thereby creating more innovation and productivity growth

Abo (2010) examined the effect of FDI on productivity of firms in Ghana by using a panel of 200 firms within the Ghanaian manufacturing industry spanning from 1991 to 2002. The results indicate that firms with high proportion of foreign capital are more productive than those with low or no foreign capital. This he attributed to the fact that, firms with more foreign capital injection are in a better position to employ advanced forms of technology, employ managers with better international exposure and skills in modern management techniques, adopt good corporate governance and management practices, and may have better access to credit from the international financial markets. The study however, did not find any significant effect of spillovers from FDI on the productivity of domestic firms. Spillovers from FDI may not be high enough to warrant any significant effect on the productivity of domestic firms. It is also likely that the absorptive capacity of domestic firms in Ghana is not strong enough to generate positive spillovers from FDI.

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Abor, Adjasi and Hayford (2008), examined the export-decision and export performance within the Ghanaian manufacturing sector on a panel of plants from 1991 to 2002. They used a probit model, which revealed that FDI has a positive effect on firms' decision to export. The random effect results also revealed a positive relationship between FDI and export performance. Growth in export activities in host countries has also been said to be an important contribution of FDI [Aitken, G.H. Hanson, and A.E. Harrison.]. While the literature on the effects of foreign presence on productivity and wages in developing countries is growing, the evidence is decidedly mixed and varies greatly among countries and industries. This may be particularly true for countries in Africa, specifically sub-Saharan Africa (SSA), which tend to be quite different from countries in Asia or Latin America in many respects.
Bitzer and Gorge (2009) conducted a research on FDI, Competition and Industry Performance. The research investigates the productivity effects of inward and outward FDI using industry and country level data for 10 manufacturing sectors in seventeen (17) OECD countries over the period 1973 to 2001. According to the researchers, the longtime window allows them to construct country level FDI stocks which they used in the empirical estimation.

Griffith, Redding & Van (2004) investigated the effect of market structure and technology diffusion on productivity using industry and country level data for eleven manufacturing sectors in seventeen OECD countries from 1970 to 1995, with US as the benchmark. Their study focused on FDI as the main channel of technology diffusion. They used technology diffusion (proxy - US patent applications and royalty fees) and market structure (proxy - Price Cost Margin) as their key variables whiles controlling the country specific variables such as Human capital, R&D intensity, Government spending, Sunk cost, Openness, Geographic distance. Their study is similar to this study, in that, they used FDI, a channel of technology diffusion as the determinant of productivity growth but different in the sense that market structure was used as a determinant of technological advancement and thus productivity. This study focused solely on FDI and technological spillover as the main determinant of local manufacturing firm's productivity growth.

III. 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.

3.1. Model Specification

The Eclectic Theory propounded by John Dunning (1993) formed the basis of this study's analytical approach. Empirically, this study used the econometric procedure in estimating the relationship between foreign direct investments inflow and manufacturing sector output in Nigeria and Ghana. The Auto-Regressive Distributed Lag (ARDL) technique were employed to obtain the numerical estimates of the coefficients. The ARDL method is chosen because the result of the unit root test produced mixed order integration [i.e I(0) and I(1)] and it possesses unique advantages over others. The model specification of the variables in the work of Muhammad, Sule and Abubakar (2018) is given as:

$$MO = FDI + INT + EXR + TRO \quad (1)$$

Where: MO = Manufacturing Output, FDI = Foreign Direct Investment, INT = Interest Rate, EXR = Exchange Rate, TRO = Trade Openness. The model used for this study which is a modification of the work of Muhammad, Sule and Abubakar (2018) is thus specified as:

Model 1: Nigeria
Equation 1 below is the (Cobb-Douglas) functional form of the model:

$$MSO_t = \alpha_0 FDI_{1t}^{\alpha_1} TON_{2t}^{\alpha_2} EXR_{3t}^{\alpha_3} \varepsilon_t \quad (1a)$$

The logarithmic form of the multiplicative model above can be expressed as:

$$LogMSO_t = Log\alpha_0 + \alpha_1 LogFDI_{1t} + \alpha_2 LogTON_{2t} + \alpha_3 LogEXR_{3t} + Log\varepsilon_t \quad (1b)$$

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

$$\Delta\ln(MSO_t) = \alpha_0 + \alpha_{1i}\Delta\ln(MSO_{t-1}) + \alpha_{2i}\Delta\ln(FDI_{t-1}) + \alpha_{3i}\Delta\ln(TON_{t-1}) + \alpha_{4i}\Delta\ln(EXR_{t-1}) + \sum_{t=1}^{p}\beta_{1i}\Delta 1n(MSO_{t-1}) + \sum_{t=1}^{q}\beta_{2i}\Delta 1n(FDI_{t-1}) + \sum_{t=1}^{q}\beta_{3i}\Delta 1n(TON_{t-1}) + \sum_{t=1}^{q}\beta_{4i}\Delta 1n(EXR_{t-1}) + \varepsilon_{1i} \quad (1c)$$

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:

$$\Delta\ln(MSO_t) = \beta_0 + \sum_{t=1}^{p}\beta_{1i}\Delta 1n(MSO_{t-1}) \sum_{t=1}^{q}\beta_{2i}\Delta 1n(FDI_{t-1}) + \sum_{t=1}^{q}\beta_{3i}\Delta 1n(TON_{t-1}) + \sum_{t=1}^{q}\beta_{4i}\Delta 1n(EXR_{t-1}) + \theta ECT_{t-1} + \varepsilon_{11i} \quad (1d)$$

Model 2: Ghana

Equation 3.2a below is the (Cobb-Douglas) functional form of the model:

$$MSO_t = \rho_0 FDI_{1t}^{\rho_1} TON_{2t}^{\rho_2} EXR_{3t}^{\rho_3} \varepsilon_t \quad (2a)$$

The logarithmic form of the multiplicative model above can be expressed as:

$$LogMSO_t = Log\rho_0 + \rho_1 LogFDI_{1t} + \rho_2 LogTON_{2t} + \rho_3 LogEXR_{3t} + Log\varepsilon_t \quad (2b)$$

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

$$\Delta\ln(MSO_t) = \rho_0 + \rho_{1i}\Delta\ln(MSO_{t-1}) + \rho_{2i}\Delta\ln(FDI_{t-1}) + \rho_{3i}\Delta\ln(TON_{t-1}) + \rho_{4i}\Delta\ln(EXR_{t-1}) + \sum_{t=1}^{p}\beta_{1i}\Delta 1n(MSO_{t-1}) + \sum_{t=1}^{q}\beta_{2i}\Delta 1n(FDI_{t-1}) + \sum_{t=1}^{q}\beta_{3i}\Delta 1n(TON_{t-1}) + \sum_{t=1}^{q}\beta_{4i}\Delta 1n(EXR_{t-1}) + \varepsilon_{1i} + \quad (2c)$$

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:

$$\Delta\ln(MSO_t) = \beta_0 + \sum_{t=1}^{p}\beta_{1i}\Delta 1n(MSO_{t-1}) \sum_{t=1}^{q}\beta_{2i}\Delta 1n(FDI_{t-1}) + \sum_{t=1}^{q}\beta_{3i}\Delta 1n(TON_{t-1}) + \sum_{t=1}^{q}\beta_{4i}\Delta 1n(EXR_{t-1}) + \theta ECT_{t-1} + \varepsilon_{11i}$$

Where; MSO =Manufacturing Sector Output; FDI = Foreign Direct Investment inflow; TON = Trade Openness and EXR = Exchange Rate; α_0 and ρ_0= regression constant; α_1 and ρ_1= parameter of foreign direct investment (FDI) inflow; α_2 and ρ_2 = parameter of trade openness (TON) and α_3 and ρ_3 = parameter of exchange rate (EXR) for Nigeria and Ghana respectively; μt = stochastic or error term which captures the effect of variables that are not included in the model. Δ = first difference operator; p and q indicate the optimal lag length for the dependent and independent variable respectively, t = time lag, β_0 = constant term; β1 – β4 = short-run dynamic coefficients of the model; ε1i – ε4i = 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.

A Priori Expectation

Table 1: A priori Expectation of Manufacturing Sector Output in Nigeria and Ghana

Variables	Description	Parameters	Expected Sign	Mathematical Denotation
		Nigeria		
FDI	FDI inflow	α_1	Positive	$\alpha_1 > 0$
TON	Trade Openness	α_2	Positive	$\alpha_2 > 0$
EXR	Exchange Rate	α_3	Negative	$\alpha_3 < 0$
		Ghana		
FDI	FDI Inflow	ρ_1	Positive	$\rho_1 > 0$
TON	Trade Openness	ρ_2	Positive	$\rho_2 > 0$
EXR	Exchange Rate	ρ_3	Negative	$\rho_3 < 0$

Source: Authors' Ideas, 2026.

IV. RESULTS AND DISCUSSION

Table 2: Descriptive Statistics Test Result

NIGERIA	LOG(MSO)	LOG(FDI)	LOG(TON)	LOG(EXR)
Mean	8.347988	6.381909	1.216981	4.668237
Median	8.186298	7.402537	1.075873	4.883938

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Maximum	8.818032	8.793541	2.590267	6.469545
Minimum	7.971940	1.934416	0.597837	2.293544
Std. Dev.	0.326116	2.038468	0.430457	1.087814
Observations	33	33	33	33
GHANA	LOG(MSO)	LOG(FDI)	LOG(TON)	LOG(EXR)
Mean	7.413801	6.648398	0.147661	4.540908
Median	7.596116	7.184869	0.086648	4.536415
Maximum	11.45618	8.263547	1.720369	5.165258
Minimum	3.113862	4.076350	1.187538	4.222347
Std. Dev.	2.575190	1.427952	0.802457	0.214985
Observations	33	33	33	33

Source: Researcher's Computation, 2026

From Table 2, the manufacturing sector output in Nigeria has a mean value of 8.347988 with a minimum value of 7.971940 and maximum value of 8.818032. The standard deviation of manufacturing sector output in Nigeria which indicates the amount of variation or spread of the variable around its mean is 0.326116. This indicates that the Nigeria manufacturing sector output strongly clustered around the mean value since its standard deviation (0.326116) is relatively lower compared to the mean (9.126719). The mean of foreign direct investment inflow is 6.381909 with variation between 1.934416 and 8.793541. Trade openness and exchange rate both have mean figure of 1.216981 and 4.668237 respectively. Trade openness has a minimum of 0.597837and a maximum of 2.590267 while exchange rate has a minimum of 2.293544 and highest of 6.469545. Ghana, on the other hand, exhibits higher mean manufacturing sector output value of around 7.413801, with notable variations ranging from a minimum of 3.113862 to maximum of 11.45618. The average of foreign direct investment inflow in Ghana is 6.648398 with spread between 4.076350 and 8.263547. Furthermore, trade openness and exchange rate both have mean figure of 0.147661 and 4.540908 respectively. Trade openness has a minimum value of 1.187538 and a maximum of 1.720369 while exchange rate has a minimum of 4.222347 and highest value of 5.165258.

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

	Levels		First Difference			
Variables	ADF Test Statistics	5% Critical Value	ADF Test Statistics	5% Critical Value	Stationarity	Order of Integration
			Nigeria			
LOG(NMSO)	-0.029386	-2.957110	-3.950897*	-2.960411	1st Difference	I(1)
LOG(NFDI)	-2.432929	-2.957110	-5.121815*	-2.960411	1st Difference	I(1)
LOG(NTON)	-3.214923*	-2.957110	-	-	Level	I(0)
LOG(NEXR)	-1.520734	-2.957110	-5.500745*	-2.960411	1st Difference	I(1)
			Ghana			
LOG(GMSO)	-0.599353	-2.957110	-6.205461*	-2.960411	1st Difference	I(1)
LOG(GFDI)	-1.150506	-2.957110	-5.206606*	-2.960411	1st Difference	I(1)
LOG(GTON)	-1.177077	-2.957110	-6.275535*	-2.960411	1st Difference	I(1)
LOG(GEXR)	-3.035206*	-2.957110	-	-	Level	I(0)

Source: Researchers' Computation, 2026.

The unit root test results presented in Table 3 revealed that manufacturing sector output, foreign direct investment and exchange rate were not stable at levels but became stable at first difference and have integrated order of one that is I(1) while trade openness is stationary at levels with integrated order of I(0) for Nigeria. In contrast, manufacturing sector output, foreign direct investment and trade openness were not stable at levels but became stable at first difference and have integrated order of one that is I(1) while exchange rate is stationary at levels with integrated order of I(0) for Ghana. This implies that the variables are mixed series and we therefore proceed with ARDL bound test to affirm the co-integration of the series.

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Table 4: ARDL Bounds Cointegration Test Result

Test Statistic	Value	K
	Nigeria	
F-statistic	10.51*	3
Critical Value Bounds		
Significance	Lower Bound [I(0)]	Upper Bound [I(1)]
5%	2.79	3.67
	Ghana	
F-statistic	14.18*	3
Critical Value Bounds		
Significance	Lower Bound [I(0)]	Upper Bound [I(1)]
5%	2.79	3.67

Source: Researchers' Computation, 2026.

From the above Table 4, the F-statistics of 10.51 and 14.1 for both Nigeria and Ghana respectively is greater than the lower (2.79) and upper (3.67) bound and that there is sufficient statistical evidence to reject the null hypothesis of no co-integration among the series at 5% level of significance. This implies that the series analysed in the model have long-run relationship. Hence the result becomes certain that there exists a long-run relationship among the series investigated in the model.

Table 5: 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 result of the variance inflating factors test for multicollinearity for both Nigeria and Ghana respectively, show that all centered VIF values are below 10 (Table 5), thus the explanatory variables are not collinear to the explained variable. Consequently, the hypothesis of no multicollinearity is accepted (i.e, the OLS assumption of no multicollinearity is not violated).

Table 6: Autoregressive Distributive Lag (ARDL) Error Correction Result

Dependent Variable = LOG(MSO)				
Variable	Coefficient	Std. Error	T-statistic	Prob.*
	Nigeria			
DLOG(NFDI)	0.100477	0.026210	3.833501	0.0021
DLOG(NFDI(-1))	-0.043720	0.023328	-1.874171	0.0836
DLOG(NFDI(-2))	-0.138512	0.027574	-5.023315	0.0002
DLOG(NFDI(-3))	-0.157898	0.028073	-5.624665	0.0001
DLOG(NTON)	0.112461	0.041686	2.697808	0.0183
DLOG(NTON(-1))	-0.043575	0.038003	-1.146603	0.2722
DLOG(NTON(-2))	-0.054425	0.025618	-2.124485	0.0534
DLOG(NEXR)	-0.101300	0.029355	-3.450839	0.0043
DLOG(NEXR(-1))	-0.063357	0.030348	-2.087707	0.0571
DLOG(NEXR(-2))	-0.033207	0.039596	-0.838623	0.4168
DLOG(NEXR(-3))	0.216595	0.041121	5.267297	0.0002
CointEq(-1)*	-0.374969	0.045236	-8.289131	0.0000
Adj. R^2 = 0.746680; Durbin Watson = 2.134385				
	Ghana			
DLOG(GFDI)	0.700531	0.160048	4.376991	0.0004
DLOG(GTON)	0.605425	0.162114	3.734564	0.0009

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DLOG(GEXR)	-0.333838	0.142730	-2.338944	0.0311
CointEq(-1) *	-0.094631	0.010464	-9.043177	0.0000
Adj. R^2 = 0.729763; Durbin Watson = 2.187309				

Source: Researchers' Computation, 2026.

From the computed ARDL result, the coefficient of FDI showed a positive sign for the current period in the short run. It is statistically significant at 5% level of significance for the current period, since it has the probability value of 0.0021, which is less than 0.05. This implies that we do not accept the hypotheses that there is no significant relationship between foreign direct investment inflow and Nigeria's manufacturing sector output and conclude that foreign direct investment inflow influence manufacturing sector output in Nigeria. The implication of this finding is that for the country to fully optimize its gains, the Nigeria government needs to stabilized macroeconomic policies that sustained the Nigeria manufacturing sector. Ghana, on the other hand, revealed that foreign direct investment (FDI) inflow has a positive and significant effect on manufacturing sector output. This is evident by the positive coefficient value (0.700531) of foreign direct investment (FDI) inflow at current period and its p-value (0.0004) 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 manufacturing sector output in the short-run. This signifies that we do not accept the hypotheses that there is no significant relationship between foreign direct investment inflow and Ghana's manufacturing sector output and therefore concluded that foreign direct investment (FDI) inflow at initial level has positive and significant effect on Ghanaian manufacturing sector output in the short-run.

Furthermore, the coefficient of trade openness of the explanatory variables showed a positive sign and conform with economic theory for the current period for Nigeria, but was statistically significant at 0,05 level of significance, since it has the probability value of 0.0183 which is less than 0.05. Consequently, the hypotheses that there is no significant relationship between trade openness and Nigeria's manufacturing sector output is rejected and it can be concluded that manufacturing sector output is a positive function of trade openness in conformity with economic theory. Conversely, the Ghana ARDL estimated result in

Table 6 proved that the trade openness has a positive coefficient value of (0.605425). This implies that trade openness at current period has a positive effect on manufacturing sector output in the short-run. Hence, a unit increase in trade openness will lead to (0.605425) increase in manufacturing sector output. Also, the p-value (0.0009) of the coefficient of trade openness which is less than 0.05 indicates that trade openness has positive effect on manufacturing sector output in the short-run. The implication of this finding is that for trade openness to optimally stimulate the performance of the manufacturing sector, the government has to implement policies that will protect and promote the infant industries.

However, the coefficient of the Nigeria's exchange rate (Table 6) showed negative sign for the current length period, conforming with economic theory in the short-run. However, it is statistically significant at 0.05 level of significance in the short-run, since it has probability value of 0.0043 which is less 0.05. This implies that we do not accept the hypothesis that there is no significant relationship between exchange rate and Nigeria's manufacturing sector output and conclude that manufacturing sector output is a negative function of the exchange rate in conformity with economic theory for the study period. In contrast, Ghana demonstrated a different exchange rate with negative coefficient value of (-0.333838). This implies that exchange rate at current has a negative effect on manufacturing sector output in the short-run. Hence, a unit increase in exchange rate will lead to (0.333838) decrease in manufacturing sector output for Ghana in the short-run. Also, the p-value (0.0311) of the coefficient of exchange rate in Ghana which is less than (0.05) indicates that exchange rate has significant effect on manufacturing sector output in the short-run. Consequently, the implication of the outcomes is that for the exchange rate to optimally stimulate the performance of the manufacturing sector, the authorities has to implement trade policies that will stabilized the naira exchange rate, specifically against the US dollars in

order to reduce cost of importing machineries or technology and attract investment in the manufacturing sector, since Ghana and Nigeria has a larger market that can sustain a robust manufacturing sector.

In furtherance, the coefficient of the ECM in Nigeria is -0.374969 and it is statistically significant. This implies that, there is a long run stable relationship among variables in the model. The coefficient of the ECM indicates the adjustment speed in the occurrence of disequilibrium in the previous and current period is corrected within a year. Comparatively, the estimated coefficient of the ECM for Ghana is well specified, as it has the expected a prior sign (i.e it is negative) with a probability of 0.0000, which is less than 0.05 (Table 6). This revealed that the ECM coefficient is statistically significant at 0.05 level of significance. The existence of a well specified ECM model indicates how economic agents adjusts adjust their anticipated changes in explanatory (economic) variables, and in this case just about 9.5% on the average respectively. This means just about 9.5% of disequilibrium in manufacturing sector output is corrected within a year. This implies that the magnitude of the ECM_{t-1} is 9.5%, meaning that about 9.5% of the disequilibrium between the static equilibrium model and the short run dynamics model of manufacturing sector output is corrected within a year.

Lastly, the adjusted R^2 for Nigeria is 0.746680, this implies that variation in manufacturing sector output is accounted by 75 percent changes in foreign direct investment, trade openness and exchange rate within the period of study. The remaining 25% are explained by other factors not included in the model, but which can affect manufacturing sector output; these factors are captured by the error term in the model. The Durbin-Watson statistic value of 2.134385, which is approximately 2.0, suggest no serial correlation among the successive values of the error term. Comparatively, the overall fit for Ghana is satisfactory given an adjusted R^2 of 0.729763. Thus, 73% variation in Manufacturing sector output is attributed to foreign direct investment, trade openness and exchange rate. The remaining 27% are explained by factors not included in the model, but which can affect manufacturing sector output; these factors are captured by the error term in the model. The Durbin-Watson statistic of 2.187309 for Ghana which is approximately close to 2.0 in manufacturing sector output in Ghana indicates that the model is free from the problem of serial autocorrelation in the short-run.

Table 7: Autoregressive Distributive Lag (ARDL) Long-run Dynamics Results

Dependent Variable = LOG(MSO)				
Variable	Coefficient	Std. Error	T-statistic	Prob.*
			Nigeria	
LOG(NFDI)	0.280673	0.058708	4.780855	0.0004
LOG(NTON)	0.143617	0.048541	2.958687	0.0035
LOG(NEXR)	-0.308022	0.123824	-2.487574	0.0272
C	8.073478	0.404532	19.95760	0.0000
			Ghana	
LOG(GFDI)	0.512706	0.226285	2.265753	0.0397
LOG(GTON)	1.183144	1.718540	0.688459	0.4973
LOG(GEXR)	-5.884842	7.226646	-0.814325	0.4229
C	34.70218	36.14544	0.960071	0.3459

Source: Researchers' Computation, 2026.

From the estimated ARDL result in Table 7, the coefficient of FDI showed a positive sign for the current period in the long run. It is statistically significant at 5% level of significance for the current period, since it has the probability value of 0.0004, which is less than 0.05. This implies that we do not accept the hypotheses that there is no significant relationship between foreign direct investment inflow and Nigeria's manufacturing sector output and conclude that foreign direct investment inflow stimulates manufacturing sector output in Nigeria. The implication of this findings is that for the country to fully utilize its gains, the Nigeria government needs to stabilized macroeconomic policies that sustained the Nigeria manufacturing sector. Ghana, on the other hand, revealed that foreign direct investment (FDI) inflow has a positive and significant effect on manufacturing sector output in the long run. This is evident by the positive coefficient value (0.512706) of foreign direct investment (FDI) inflow at current period and its p-value (0.0397) which is less than (0.05). This means that a unit increase in foreign direct investment (FDI) inflow will lead to (0.512706) increase in manufacturing sector output in the long-run. This

signifies that we do not accept the hypotheses that there is no significant relationship between foreign direct investment inflow and Ghana's manufacturing sector output and therefore concluded that foreign direct investment (FDI) inflow at current level has positive and significant effect on Ghanaian manufacturing sector output in the long-run.

Additionally, the coefficient of trade openness of the explanatory variables showed a positive sign and conform with economic theory for the current period for Nigeria, but was statistically significant at 0,05 level of significance, since it has the probability value of 0.0035 which is less than 0.05. Consequently, the hypotheses that there is no significant relationship between trade openness and Nigeria's manufacturing sector output is rejected and it can be concluded that manufacturing sector output is a positive function of trade openness in conformity with economic theory. Conversely, the Ghana ARDL estimated result in Table 7 proved that the trade openness has a positive coefficient value of 1.183144 and conformed with economic theory in the long run. but was statistically insignificant at 0.05 level of significance, since it has the probability value of 0.4973. Consequently, the hypotheses that there is no significant relationship between trade openness and Ghanaian's manufacturing sector output is accepted and it can be concluded that although manufacturing sector output is a positive function of the trade openness in conformity with economic theory and that trade openness has not optimally enhanced manufacturing sector output in Ghana. The implication of this findings is that for trade openness to optimally stimulate the performance of the manufacturing sector, the government has to implement policies that will protect and promote the infant industries.

Furthermore, the coefficient of the Nigeria's exchange rate (Table 7) showed negative sign for the current length period, conforming with economic theory in the long-run. However, it is statistically significant at 0.05 level of significance in the long-run, since it has probability value of 0.0272 which is less 0.05. This implies that we do not accept the hypothesis that there is no significant relationship between exchange rate and Nigeria's manufacturing sector output and conclude that manufacturing sector output is a negative function of the exchange rate in conformity with economic theory for the study period. In contrast, Ghana demonstrated a different exchange rate with negative coefficient value of -5.884842, which conformed with the economic theory within the study period. This implies that exchange rate at current has a negative effect on manufacturing sector output in the long-run. Hence, a unit increase in exchange rate will lead to (5.884842) decrease in manufacturing sector output for Ghana in the long-run. Also, the p-value (0.4229) of the coefficient of exchange rate in Ghana which is greater than (0.05) indicates that exchange rate has insignificant effect on manufacturing sector output in the long-run. Consequently, the implication of the outcomes is that for the exchange rate to optimally stimulate the performance of the manufacturing sector, the authorities has to implement trade policies that will stabilized the naira exchange rate, specifically against the US dollars in order to reduce cost of importing machineries or technology and attract investment in the manufacturing sector, since Ghana and Nigeria has a larger market that can sustain a robust manufacturing sector.

Table 8: Post-Estimation (Diagnostics) Test Results

Test	F-Statics	Prob-value	Null Hypothesis	Decision
		Nigeria		
Normality Test	0.901807	0.6371	Normally distributed	Do not reject
Serial Correlation Test	1.509248	0.2635	No serial correlation	Do not reject
Heterosced asticity Test	1.091635	0.4413	Homosceda sticity	Do not reject
Ramsey RESET Test	1.447554	0.2521	Correctly specified	Do not reject
		Ghana		
Normality Test	0.788219	0.6911	Normally distributed	Do not reject
Serial Correlation Test	0.036757	0.9640	No serial correlation	Do not reject
Heterosced asticity Test	1.305406	0.2923	Homosceda sticity	Do not reject

Ramsey RESET Test	0.2897 60	0.59 51	Well specified model	Do not reject

Source: Researchers' Computation, 2026.

Determining the distribution of data in a model requires conducting a normality test. Based on Table 8, the null hypotheses that the variables follow a normal distribution cannot be rejected, as the Jarque-Bera probability value at 0.6371 and 0.691 for Nigeria and Ghana is greater than 0.05 respectively. Therefore, the variables do adhere to a normal distribution, ensuring that the OLS assumption of normal distribution of error term values is not violated. In addition, the serial correlation test using the Breusch-Godfrey Serial correlation LM test reveals that the p-value of 0.2635 and 0.9640 for Nigeria and Ghana is greater than 0.05 (Table 8) respectively. The conclusion is that the residual in the short run ARDL model is not serially correlated. This implies that the OLS assumption that the value of Et is not dependent on the value of Et-1 or Et+1 is not violated. Furthermore, the heteroscedasticity test using the Breusch-Pagan-Godfrey LM test revealed the p-value of 0.4413 and 0.2923 for Nigeria and Ghana respectively is greater than 0.05 (Table 8). By implication, the null hypotheses of homoscedasticity or constant variance of the residual is accepted. This implies that the OLS assumption of the homoscedasticity of the error term is not violated. Lastly, the stability test using the Ramsey RESET test showed that the p-value of 0.2521 and 0.5951 for Nigeria and Ghana respectively is greater than 0.05. The implication of this is that the null hypotheses of well specified model is not rejected. Therefore, the estimated model was correctly specified, and the OLS assumption that the model is correctly specified is not violated.

Table 9: Pairwise Granger Causality of Manufacturing Sector Output in Nigeria & Ghana

Null Hypothesis	Obs	F-Statistic	Prob.	Decision	Remark
		Nigeria			
LOG(FDI) does not Granger Cause LOG(MSO)	31	12.5234	0.0002	Reject	Unidirectional
LOG(MSO) does not Granger Cause LOG(FDI)	-	0.13904	0.8708	Accept	
LOG(TON) does not Granger Cause LOG(MSO)	31	4.27293	0.0249	Reject	Unidirectional
LOG(MSO) does not Granger Cause LOG(TON)	-	2.84517	0.0763	Accept	
LOG(EXR) does not Granger Cause LOG(MSO)	31	5.87095	0.0079	Reject	Unidirectional
LOG(MSO) does not Granger Cause LOG(EXR)		0.35066	0.7075	Accept	
		Ghana			
LOG(FDI) does not Granger Cause LOG(MSO)	31	0.31950	0.7293	Accept	
LOG(MSO) does not Granger Cause LOG(FDI)	-	1.45756	0.2512	Accept	No direction
LOG(TON) does not Granger Cause LOG(MSO)	31	0.80911	0.4562	Accept	No direction
LOG(MSO) does not Granger Cause LOG(TON)	-	3.29308	0.0531	Reject	
LOG(EXR) does not Granger Cause LOG(MSO)	31	0.13637	0.8731	Accept	Unidirectional
LOG(MSO) does not Granger Cause LOG(EXR)	-	6.58175	0.0049	Reject	

Source: Researcher's Computation, 2026.

The granger causality test for both models are presented in Table 9 showing the various causal relationship between the variables. The output of the first model specifically shows a strong unidirectional causal link (relationship) between FDI inflow and manufacturing sector output in Nigeria, as its probability value of 0.0002 is less than 0.05 level of significance. This implies that FDI entry is a key

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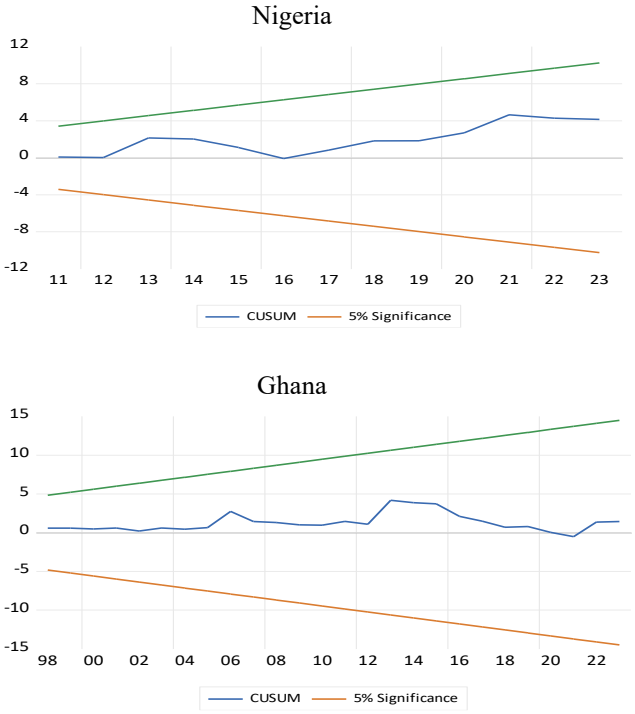
factor (deriver) of economic development in Nigeria. Consequently, the null hypotheses that FDI does not Granger cause manufacturing sector output is rejected and it can therefore be concluded that FED inflow Granger cause manufacturing sector output in Nigeria. Interestingly, trade openness and exchange rate respectively demonstrate a feedback causal relationship with manufacturing sector output. The implication of this is that we do not accept the null hypotheses of trade openness does not Granger cause manufacturing sector output and exchange rate does not Granger cause manufacturing sector output respectively in Nigeria since there probability values of 0.0249 and 0.0079 respectively is less than 0.05 level of significance. This implies that strong unidirectional causal relationship runs from trade openness to manufacturing sector output and as well as exchange rate to manufacturing sector output in Nigeria. For the second model, there exist only one causal relationship running from manufacturing sector output to exchange rate, since it has the p-value of 0.0049, which is less than 0.05. This implies that we do not accept the null hypotheses that manufacturing sector output does not Granger cause exchange rate and therefore concluded that manufacturing sector output exhibit a strong unidirectional causality with exchange rate in Ghana. However, findings shows that there is no evidence of causality relationship between foreign direct investment (FDI) inflow and manufacturing sector output as well as between trade openness and manufacturing sector output in Ghana as their p-value of 0.7293 and 0.4562 respectively is greater than 0.05 level of significance. Thus, foreign direct investment and trade openness does not drive manufacturing sector output, that is the duo are not influencers of each other in Ghana.

Stability CUSUM Test

Finally, the stability test as presented in the figure below for Nigeria and Ghana respectively shows that the models are stable and fit for policy implication as the blue line representing the CUSUM model or plot trend falls within the critical bond at 5 percent level of significance.

V. STABILITY CUSUM TEST RESULT



Source: Researcher's Computation, 2026.

Figure 1: Stability CUSUM TEST

VI. CONCLUSION AND RECOMMENDATIONS

In this research, we examined how foreign direct investment (FDI) affect the performance manufacturing sector output in Nigeria and Ghana. To achieved this, we used multivariate regression model to measure the empirical effect of FDI on the manufacturing sector output in Nigeria and Ghana. The explained variable was manufacturing sector output, while the explanatory variables were FDI inflow, Trade openness and Exchange rate. We analysed cross-country specific annual time series data from 1991 t0 2023, the Unit root test and ARDL model techniques were used to estimate the specified models. The results revealed that ECM is rightly signed (i.e. negative) and is capable of correcting 37.5% and 9.5% disequilibrium in manufacturing sector output of Nigeria and Ghana respectively within a year. The study concluded that:

- Foreign direct investment stimulates the manufacturing sector output performance in Nigeria and Ghana respectively
- Trade openness enhances the performance of manufacturing sector in Nigeria and Ghana respectively
- Exchange rate reduces the manufacturing sector output in Nigeria and Ghana respectively
- Foreign direct investment, trade openness and exchange rate exhibit unidirectional causal relationship with manufacturing sector output in Nigeria and
- Only unidirectional causal relationship runs from manufacturing sector output to exchange rate in Ghana.

Based on the findings, the following recommendations are made:

1. Authorities of both countries should through their regulatory agencies embark on a more practical policy actions that will attract FDI inflow and help the economy to attain optimum FDI inflow in an effort to assist the growth of the manufacturing sector performance.
2. Effort should be made by the government to ensure investment-friendly environment in order to achieve the full potential of the FDI inflow which will in turn enhance development through the multiplier effect.
3. Although we found trade openness and exchange rate to be insignificant to manufacturing sector output in Ghana, this unhealthy insignificant can be reversed if the authority should set up a sound trade policy to stabilize the value of Naira and Cedis respectively against trading partners currencies. By implication, this would stimulate the manufacturing sector output performance, as cost of producing becomes relatively cheaper. This would invariably enhance the growth of Nigerian and Ghanaian economy respectively.

REFERENCES

[1] Abor J, Adjasi C. K & Hayford C (2008). How Does Foreign Direct Investment Affect the Export Decisions of Firms in Ghana? Africa Development Rev. 2008;20(3):446-465.

[2] Agbarakwe, W. C. (2019). FDI and manufacturing output in Nigeria: Empirical evidence from VECM Model. International Journal of Business School Annals, 6(1), 1-12.

[3] Azolibe, C.B. (2020). Does FDI influence manufacturing sector growth in Middle East and North African? International Trade, Policies and Development, 5(1), 71-85.

[4] Bitzer, J., & Gorg, H. (2009). Foreign direct investment, competition and industry performance. The World Economy, 32(2), 221–233. https://doi.org/10.1111/j.1467-9701.2008.01152

[5] Duramany-Lakkoh, E. K., Jalloh, M. S. & Jalloh, A. (2021). FDI and manufacturing sector in Sierra Leone: A vector autoregression analysis approach. Journal of Mathematical Finance, 11, 620-650.

[6] Griffith, R., Redding, S., & Van Reenen, J. (2004). Mapping the two faces of R&D: Productivity growth in a panel of OECD industries. Review of Economics and Statistics, 86(4), 883–895.

[7] Idoko, C.U & Taiga, U.U. (2018). Effect of FDI on manufacturing output in Nigeria (1981- 2016). Advances in Social Sciences Research Journal,5(5), 181-197.

[8] Jutta, G. (2002). The Significance of FDI for Innovation Activities Within Domestic Firms-The Case of Central East European Economies, Discussion Papers Nr,162, Halle Institute for Economic Research.

[9] Muhammad, A.H., Sule, Y.H & Abubakar, M. K. (2018). Impact of FDI on manufacturing sector in Nigeria. European Academic Research, 6(8), 4744-4760.

[10] Nnadozie, O. O., Emediegwu, L. E. & Monye-Emina, A. (2021). Does FDI matter for industrialization in Nigeria? Zambia Social Science Journal, 7(1), 31-51.

[11] Thiam, I (2006). Exogenous shocks and financial stability in the West African Economic and Monetary Union (WAEMU). Journal of African Studies and Development Vol. 4(6), pp. 155-167

[12] Yaya, E. O, Oladipo, A. O, Oyefabi, I. S & Okoli, U. V (2022). Impact of foreign direct investment (FDI) on the Nigerian manufacturing sector: an auto regressive distributed lag (ARDL) approach. Journal of Economic Studies (JES), Vol. 19, Issue No.1, pg. 36-51.