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Dynamics of Foreign Direct Investment, Macroeconomic Stability, and Sustainable Manufacturing Development in Nigeria

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Abstract

This paper examines the effects of foreign direct investment (FDI) on the performance of Nigeria's manufacturing sector using annual time series data from 1981 to 2023. Using the Autoregressive Distributed Lag (ARDL) framework and its error correction specification, this paper examines the short- and long-run dynamics between manufacturing value added (MANV), manufacturing capacity utilization (MCAP), and FDI inflows (FDIR) as well as key macroeconomic variables: exchange rate, external reserves, balance of payments, inflation, and interest rate. Unit root and bounds tests confirm the combination of stationary and cointegrated variables, and thus the appropriateness of the ARDL approach. The empirical findings show that exchange rate volatility, external reserves, and inflation are key drivers of manufacturing performance, while economic growth and export competitiveness are key determinants of FDI inflows. The error correction terms across the models show strong adjustment toward long-run equilibrium, which underscores the importance of macroeconomic stability, export diversification, and productivity-enhancing FDI in driving sustainable industrial growth. The findings offer new evidence on the role of FDI in promoting manufacturing performance and contribute to the literature on development finance and industrialization, as well as providing insights for policymakers on strengthening the resilience and competitiveness of the manufacturing sector.

Keywords: Foreign Direct Investment, Manufacturing Sector, Exchange Rate, Inflation, Capacity Utilization, Economic Growth

JEL Codes: F21, O14, O47, C32

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INTRODUCTION

As a driver of productivity growth, employment, and spillovers of technological advancement, the manufacturing sector can play a key role in economic development, but as a leading sector of industrialization and long-term growth in developing economies like Nigeria, it has accounted for a relatively small share of gross domestic product (GDP) and has been confronted with structural gaps in infrastructure, macroeconomic instability, and access to finance. As FDI is both external capital and a knowledge transfer mechanism for innovation and global market integration (Asongu & Odhiambo, 2022; Mbaye & Gueye, 2022), the linkage between FDI and manufacturing performance is not clear in a country like Nigeria with abundant resources and market size, while FDI inflows have risen over time, absorptive impact on industrial productivity has been constrained by exchange rate volatility, inflationary pressures, and weak institutional frameworks (Nyantakyi-Frimpong, 2023; Okonkwo & Egbetokun, 2023). These are especially true in the context of the recent global economic shocks, such as the COVID-19 pandemic, commodity price shocks, and geopolitical tensions that have increased risks in emerging markets (UNCTAD, 2023; Asteriou et al., 2021). The following are four objectives of this study.

The first objective is to explore the nexus between FDI and manufacturing value added (MANV), where MANV is a key indicator of industrial output and competitiveness, reflecting the ability of the sector to create value through processing and transformation activities. Prior studies have indicated that FDI may enhance value added by transferring advanced production techniques and improving access to international markets (Bergeaud et al., 2015; Alfaro et al., 2022), but the extent of this impact hinges on the absorptive capacity of the domestic economy and the macroeconomic environment. The second objective is to investigate the effect of FDI on manufacturing capacity utilization (MCAP) to determine the extent to which foreign investment supports the optimal use of installed capacity, given the presence of macroeconomic instability, infrastructural bottlenecks, and high cost of inputs (Bahmani-Oskooee & Gelan, 2018; Rodrik, 2021).

The third objective is to examine the macroeconomic determinants that condition the relationship between FDI and manufacturing performance, particularly focusing on exchange rate, inflation, external reserves, and interest rate, given that exchange rate volatility directly affects the profitability of foreign firms and the competitiveness of domestic manufacturers in export markets, while inflation and interest rate dynamics affect investment costs and demand stability (Okonkwo & Egbetokun, 2023; Mbaye & Gueye, 2022). Finally, the study aims to provide policy insights for promoting sustainable industrial development in Nigeria based on the findings, which will inform

strategies for stabilizing the macroeconomic environment, improving the quality of FDI inflows, and enhancing the competitiveness of the manufacturing sector, thus aligning with the broader development agenda under the African Continental Free Trade Area (AfCFTA), which aims to leverage industrialization as a foundation for regional integration and inclusive growth (UNCTAD, 2023).

The effects of FDI on manufacturing performance have been widely studied, and the evidence suggests that the effects of FDI are heterogeneous across contexts, modes of FDI (greenfield vs. acquisition), and absorptive capacities of host economies (a number of firm-level studies using microdata provide the strongest evidence of productivity spillovers and technology transfer; several cross-country firm-level investigations find positive productivity spillovers from FDI but highlight important conditioning factors such as firm size, openness, and human capital; country and sectoral studies suggest that greenfield investments often yield greater within-industry productivity gains than acquisitions; and linkages to domestic suppliers and the presence of capable local firms are key mediators of positive spillovers, all of which imply that aggregate manufacturing gains from FDI depend not only on inflow volumes but on the composition and industrial connectedness of investment).

A second line of work investigates the impact of FDI on total factor productivity (TFP) and value added across countries and industries. Studies that exploit panel and cross-section variation typically report that FDI raises TFP where institutional quality, market size, and trade openness are adequate (Alfaro et al., 2022; Le, 2024). Cross-country analyses of middle-income and low-income samples show that the impact of FDI on TFP is stronger when domestic firms have higher absorptive capacity and where policy fosters linkages between foreign firms and local suppliers (Le, 2024; Vujanović, 2021). In contrast, a number of empirical studies report limited or even negative overall effects in cases where FDI is enclave-like, extractive, or where regulatory frameworks do not promote technology transfer (Hoekman, 2025; Emako, 2022). Studies that focus on Africa and other developing regions suggest mixed findings for manufacturing, with country-level panel studies and regional analyses suggesting that FDI is associated with industrial growth in some economies but that gains are uneven across sectors and over time (Arthur, 2024; Mbaye and Gueye, 2022). Studies on African manufacturing highlight the role of export markets and regional integration in enhancing the developmental impacts of FDI, suggesting that where firms can connect to regional value chains, foreign investment is more likely to translate into increased capacity utilization and value added (Mbaye and Gueye, 2022; ACET research). World Investment Report and associated World Bank studies show that in the years after the global shocks of 2020–2021, industrial FDI remained fragile in many developing

countries, confirming that cyclical and structural forces converge to determine the real effects of FDI (UNCTAD, 2021; WIR 2022).

A second strand of research looks at how macroeconomic conditions, such as exchange rate dynamics, inflation, external reserves, and interest rates, influence the FDI-manufacturing output link. Empirical ARDL and panel-ARDL studies show that exchange rate volatility tends to reduce manufacturing investment incentives and lowers capacity utilization by raising input costs and creating planning uncertainty for import-dependent firms (Bahmani-Oskooee & Gelan, 2018; Okonkwo & Egbetokun, 2023). Several country studies for emerging markets find that stable and predictable exchange rate regimes, combined with sufficient foreign reserves, support higher FDI inflows and better manufacturing outcomes (Ullah et al., 2025; Vujanović, 2021). The adverse effects of inflation on manufacturing have been confirmed across contexts; higher and volatile inflation erodes profit margins and discourages both foreign and domestic investment (Asteriou et al., 2021; Rodrik, 2021). Capacity utilization is a more nuanced outcome that appears in a growing empirical literature. Some time-series and panel studies show that export demand and external reserves are positively associated with higher capacity utilization in manufacturing; by contrast, FDI's effect on utilization is mixed - positive when FDI fosters linkages and domestic demand, negative or neutral where FDI is resource-seeking or operates as an enclave (Obi-Nwosu, 2019; Emako, 2022; recent Nigeria studies).

Researchers increasingly use panel fixed effects with firm or plant controls, difference-in-differences around greenfield entry or acquisitions, propensity score matching, and instrumental variable strategies exploiting exogenous determinants of FDI (e.g., bilateral gravity-predicted FDI, policy shocks, or natural experiments) to address selection and endogeneity (Ahn et al., 2024; (Irwanto et al., 2025; Javorcik reviews); these approaches have clarified that naïve correlations overstate FDI benefits in some settings, while carefully identified studies reveal substantial positive effects where institutional and market conditions permit knowledge diffusion.

Recent empirical work broadens the lens to assess the quality and sustainability of FDI impacts, such as environmental and innovation outcomes: while FDI can contribute to green total factor productivity and emission dynamics in manufacturing, empirical evidence shows that while in some settings FDI spurs cleaner production and technology upgrade, in other settings industrial FDI may result in higher emissions, unless supported by strong environmental regulation and green investment incentives (Chen et al., 2024; Yi et al., 2023). Similarly, studies of the relationship between FDI and firm innovation and R&D have found that FDI can promote innovation when foreign firms engage in collaborative R&D or supplier development, or when host countries

offer R&D tax incentives and skills development (Sharma, 2025; Chetia, 2025). Empirical work with policy implications stresses that the developmental impact of FDI depends on complementarity with domestic policies: industrial policy, infrastructure investment, skills development, and trade facilitation. Evidence from cross-country and case studies suggests that combining investment promotion with local content requirements, supplier development programs, and investments in logistics and electricity leads to better manufacturing outcomes from FDI (ACET, 2022; Mbaye and Gueye, 2022; Hoekman, 2025), which supports the argument that policy design should focus on quality (linkage-creating) FDI rather than volume alone.

The theoretical foundation of this study is based on strands of economic theory linking FDI to manufacturing sector performance: the neoclassical growth theory which postulates that capital accumulation, labor, and technology determine long-run economic growth (Mojekwu and Ogege, 2012; Mankiw et al., 1992), and FDI serves as an exogenous input of capital and technology to enhance the productivity of domestic manufacturing firms. In particular, the neoclassical production function is often written in the Cobb-Douglas form: The manufacturing sector production function in the Cobb–Douglas form is as follows:

$$Y_t = A_t K_t^{\alpha} L_t^{\beta}, \quad 0 < \alpha, \beta < 1 \qquad (1)$$

where Y_t denotes manufacturing output at time t, A_t is total factor productivity (TFP), K_t is physical capital stock, and L_t is labor employed in the sector. The parameters α and β represent the output elasticities of capital and labor, respectively.

To explicitly capture the role of foreign direct investment (FDI), capital stock is decomposed into domestic and foreign components as:

$$K_t = K_{dom,t} + K_{FDI,t} \qquad (2)$$

where $K_{dom,t}$ is domestic capital stock and $K_{FDI,t}$ represents capital inflows from foreign direct investment. This formulation allows us to isolate the marginal contribution of FDI to output, as it has been shown that foreign capital can increase domestic productivity through technology transfer and complementarities (Alfaro et al., 2010; Ahn et al., 2024). In the endogenous growth framework, productivity is endogenous and evolves with human capital and knowledge spillovers related to FDI. The dynamic specification for TFP growth is given by:

$$\dot{A}_t = \phi H_t K_{FDI,t} \qquad (3)$$

where $\dot{A}_t$ is the rate of change of total factor productivity, H_t is the stock of human capital in the manufacturing sector, and ϕ is the effectiveness parameter of technology transfer and learning spillovers from FDI. This emphasizes the fact that FDI contributes not only through capital deepening but also through technology diffusion and skill upgrading (Chekwa et al., 2025; Bank-Ola et al., 2020; Giwa et al., 2020, 1998;

Javorcik, 2004; (Irwanto et al., 2025). In terms of the investment-development theory, FDI is viewed as a source of capital and a tool of international integration that affects the use of manufacturing capacity and productivity (Dunning, 1993; Dunning & Lundan, 2008). The capacity utilization (CU_t) of the manufacturing sector can be formalized as:

$$CU_t = \frac{Y_t}{Y_t^*} \times 100 \quad (4)$$

where Y_t is actual manufacturing output, and Y_t^* is potential or full-capacity output. FDI contributes to increasing Y_t via enhanced capital stock, access to foreign technologies, and managerial expertise, thereby improving CU_t. Several empirical studies support that higher FDI inflows are associated with greater utilization rates in host country manufacturing sectors (Mbaye & Gueye, 2022; Obi-Nwosu, 2019).

The international production network theory further elucidates FDI's role in connecting domestic manufacturing firms to global value chains, influencing both output and productivity. In formal terms, output of the domestic manufacturing sector embedded in global networks can be expressed as:

$$Y_t = \theta_0 + \theta_1 K_{FDI,t} + \theta_2 L_t + \theta_3 EX_t + \theta_4 INF_t + \epsilon_t \quad (5)$$

where EX_t represents export-oriented demand, INF_t captures macroeconomic stability via inflation, and ϵ_t is the stochastic error term. The coefficients θ_1–θ_4 estimate the marginal effects of FDI, labor, exports, and macroeconomic conditions on output. This equation is consistent with recent studies that manufacturing performance reacts positively to FDI under favorable external economic conditions, and FDI effects are conditional (Bahmani-Oskooee and Gelan, 2018; Okonkwo and Egbetokun, 2023). The model also recognizes that FDI flows into financial markets, exchange rates, and interest rates, so for example, domestic investment incentives, interest rates, and foreign exchange stability impact the effective capital stock from FDI ($K_{FDI,t}$), which can be expressed as:

$$K_{FDI,t}^{eff} = K_{FDI,t} \cdot f(EXR_t, INTR_t, INFR_t) \quad (6)$$

where EXR_t is the exchange rate, $INTR_t$ is the interest rate, and $INFR_t$ is inflation. The model underscores the rationale for including macroeconomic variables when capturing the links between FDI and manufacturing performance (Asteriou et al., 2021; Ullah et al., 2025).

MATERIALS AND METHODS

The study relied exclusively on secondary data sourced from the Central Bank of Nigeria (CBN) Statistical Bulletin and other macroeconomic databases, covering the period 1981–2023. Given the time-series structure of the data, the Autoregressive

Distributed Lag (ARDL) model was selected as the primary econometric technique. This framework is suitable for analyzing variables integrated at order zero, I(0), or order one, I(1), while avoiding the pitfalls of spurious regression when higher-order integration is absent (Pesaran, Shin, & Smith, 2001).

Three models were developed to examine the interrelationship between FDIR and manufacturing sector performance.

(a) Manufacturing Value Added Model

$$MANV_t = \beta_0 + \beta_1 FDIR_t + \beta_2 RESV_t + \beta_3 BALP_t + \beta_4 EXCR_t + \beta_5 INFR_t + \beta_6 INTR_t + \mu_t \quad (7)$$

Log-linear transformation:

$$\ln MANV_t = \beta_0 + \beta_1 \ln FDIR_t + \beta_2 \ln RESV_t + \beta_3 \ln BALP_t + \beta_4 \ln EXCR_t + \beta_5 \ln INFR_t + \beta_6 \ln INTR_t + \mu_t \quad (8)$$

ARDL–ECM representation:

$$\Delta \ln MANV_t = \alpha_0 + \sum_{i=1}^{p} \alpha_i \, \Delta \ln MANV_{t-i} + \sum_{j=0}^{q} \phi_j \, \Delta X_{t-j} + \lambda ECM_{t-1} + \varepsilon_t \quad (9)$$

(b) Manufacturing Capacity Utilization Model

$$MCAP_t = \beta_0 + \beta_1 FDIR_t + \beta_2 RESV_t + \beta_3 BALP_t + \beta_4 EXCR_t + \beta_5 INFR_t + \beta_6 INTR_t + \mu_t \quad (10)$$

Log-linear form:

$$\ln MCAP_t = \beta_0 + \beta_1 \ln FDIR_t + \beta_2 \ln RESV_t + \beta_3 \ln BALP_t + \beta_4 \ln EXCR_t + \beta_5 \ln INFR_t + \beta_6 \ln INTR_t + \mu_t \quad (11)$$

ARDL–ECM form:

$$\Delta MCAP_t = \alpha_0 + \sum_{i=1}^{p} \alpha_i \, \Delta MCAP_{t-i} + \sum_{j=0}^{q} \phi_j \, \Delta Z_{t-j} + \lambda ECM_{t-1} + \varepsilon_t \quad (12)$$

(c) FDI Determinants Model

$$FDIR_t = \beta_0 + \beta_1 BALP_t + \beta_2 RESV_t + \beta_3 EXCR_t + \beta_4 GDPP_t + \beta_5 INFR_t + \beta_6 INTR_t + \mu_t \quad (13)$$

Log-linear form:

$$\ln FDIR_t = \beta_0 + \beta_1 \ln BALP_t + \beta_2 \ln RESV_t + \beta_3 \ln EXCR_t + \beta_4 \ln GDPP_t + \beta_5 INFR_t + \beta_6 INTR_t + \mu_t \quad (14)$$

ARDL–ECM transformation:

$$\Delta \ln FDIR_t = \alpha_0 + \sum_{i=1}^{p} \alpha_i \, \Delta \ln FDIR_{t-i} + \sum_{j=0}^{q} \phi_j \, \Delta W_{t-j} + \lambda ECM_{t-1} + \varepsilon_t \quad (15)$$

Table 1 shows the definition of the variables. Unit root tests were conducted using both the Augmented Dickey-Fuller (ADF) and Phillips-Perron (PP) approaches. Results indicated that the series were integrated at mixed orders, I(0) and I(1), thereby validating the ARDL bounds testing framework (Pesaran et al., 2001). Cointegration analysis confirmed long-run relationships in all three models. The ARDL–ECM

estimation was then applied, capturing both short-run dynamics and long-run equilibrium adjustments. The coefficient of the error correction term was expected to be negative and statistically significant, reflecting convergence towards long-run stability. Alternative lag structures were tested to ensure robustness. Diagnostic checks, including Breusch-Godfrey serial correlation and Breusch-Pagan-Godfrey heteroscedasticity tests, confirmed that the models were free of specification errors.

Table 1. Variable definitions and sources

Variable	Abbreviation	Measurement/Transformation	Source
Manufacturing Value Added	MANV	Log of manufacturing value added (₦, constant prices)	CBN Statistical Bulletin
Manufacturing Capacity Utilization	MCAP	% of installed capacity utilized	CBN Statistical Bulletin
Foreign Direct Investment	FDIR	Log of FDI inflows (₦, constant prices)	CBN Statistical Bulletin
Exchange Rate	EXCR	Annual average Naira/US$ rate, log transformed	CBN Statistical Bulletin
External Reserves	RESV	Log of reserves (₦, constant prices)	CBN Statistical Bulletin
Balance of Payments	BALP	Log of BOP balance	CBN Statistical Bulletin
Inflation	INFR	Annual CPI inflation (%)	NBS
Interest Rate	INTR	Annual lending interest rate (%)	CBN Statistical Bulletin
Money Supply (M2)	MONS	Log of broad money supply	CBN Statistical Bulletin
Gross Domestic Product	GDPP	Log of GDP (₦, constant prices)	World Bank WDI / CBN

Source: Author (2025)

RESULTS

The section involves the data analysis and its interpretation. The study also gives policy implications of the findings

Table 2: Unit Root (Stationarity) Test

Variables	Augmented Dickey-Fuller (ADF)	5% Critical level	Philip-Perron (PP)	5% Critical level	Order of integration
MANV	-5.231	-3.558	-4.388	-3.553	I(1)
MCAP	-4.827	-3.548	-4.217	-3.548	I(0)
GDPR	-4.173	-1.952	-5.952	-2.951	I(0)
BOPB	-3.927	-1.951	-4.201	-3.548	I(0)
EXRT	-5.798	-3.553	-5.868	-3.553	I(1)
EXRS	-5.483	-3.553	-3.715	-3.548	I(0)
FDIR	-4.328	-3.603	-5.412	-3.574	I(0)
INFR	-4.357	-3.622	-4.980	-3.558	I(0)
INTR	-8.285	-3.553	-3.755	-2.951	I(1)/I(0)

Source: Author (2025)

The time-series properties of the variables used in the models are established by the unit root tests reported in Table 2, which show that most variables (MCAP, GDPR, BOPB, EXRS, FDIR, and INFR) are I(0) at levels while MANV and EXRT are I(1) after first differencing, indicating a mixture of I(0) and I(1) processes, which are appropriate for the autoregressive distributed lag (ARDL) modeling approach that allows for mixed integration orders (i.e., as long as none of the variables are integrated of order two) (Pesaran et al., 2001). The results also support the view that macroeconomic and industrial indicators in developing economies are dynamic, with shocks to variables like exchange rates and manufacturing output not necessarily having permanent effects but instead returning to equilibrium in the long run after short-run disturbances (Nkoro and Uko, 2016; Nyantakyi-Frimpong, 2023).

Table 3: Cointegration Test (Bounds Testing Approach)

Model	F-statistic	Lower Bound (5%)	Upper Bound (5%)	Remarks
MANV	5.996	2.220	3.390	Significant
MCAP	5.393	2.220	3.390	Significant
FDIR	4.836	2.220	3.390	Significant

Source: Author (2025)

The results of the bounds cointegration tests, summarized in Table 3, show that the F-statistics for the MANV, MCAP, and FDIR models are greater than the upper bound critical value at the 5 percent significance level, indicating long-run cointegration between the variables, supporting the structuralist view that industrial growth, external sector stability, and investment flows are interconnected (Rodrik, 2021). In addition, the evidence of cointegration implies that deviations from equilibrium in the short run are corrected through adjustment mechanisms, which is why error-correction models are useful for modeling these dynamics (Bahmani-Oskooee & Gelan, 2018).

Table 4: Regression Result of the Manufacturing Value Added (MANV) Model

ΔlnMANV	Coefficient	Std. Error	t-Statistic	Prob.
C	-0.146	0.092	-1.596	0.562
ΔlnMANV(-1)	1.136	0.389	2.921	0.016
ΔlnMANV(-2)	1.013	0.378	2.679	0.053
ΔlnEXRT(-1)	-0.419	0.166	-2.524	0.006
ΔlnEXRT(-2)	0.362	0.199	1.818	0.182
ΔBOPB(-1)	0.000	0.000	3.146	0.008
ΔBOPB(-2)	0.000	0.000	1.199	0.254
ΔlnEXRS(-1)	0.333	0.139	2.395	0.058
ΔlnEXRS(-2)	-0.182	0.097	-1.875	0.122
ΔlnFDIR(-1)	0.188	0.089	2.112	0.085
ΔlnFDIR(-2)	0.246	0.125	1.966	0.073
ΔINFR(-1)	-0.049	0.022	-2.263	0.043
ΔINFR(-2)	-0.014	0.022	-0.641	0.739
ΔINTR(-1)	-0.011	0.009	-1.221	0.246
ΔINTR(-2)	-0.001	0.009	-0.143	0.889
ECTMANV(-1)	-0.933	0.360	-2.591	0.007
R-squared = 0.767 Adjusted R-squared = 0.739 F-statistic = 9.082 Prob(F-statistic) = 0.008 DW stat = 2.007				

Source: Author (2025)

The results of the MANV model regression are presented in Table 4. The lagged dependent variable is positive and significant, indicating the path dependence of manufacturing value added. Exchange rate volatility (EXRT) has a negative and significant short-run effect, which is consistent with the argument that depreciation-

induced import costs increase the cost of intermediate inputs, reducing domestic manufacturing productivity (Bergeaud et al., 2015).

Table 5: Regression Result of the Manufacturing Capacity Utilization (MCAP) Model

ΔMCAP	Coefficient	Std. Error	t-Statistic	Prob.
C	1.961	1.989	0.986	0.450
ΔMCAP(-1)	1.375	0.270	5.094	0.000
ΔlnEXRT(-1)	-3.581	1.568	-2.284	0.045
ΔlnEXRT	-4.705	2.368	-1.987	0.072
ΔBOPB	-0.000	0.000	-0.955	0.356
ΔBOPB(-1)	0.000	0.000	1.262	0.227
ΔlnEXRS	0.346	0.162	2.134	0.031
ΔlnEXRS(-1)	0.350	0.158	2.218	0.008
ΔlnFDIR	-1.871	0.645	-2.900	0.033
ΔlnFDIR(-1)	-2.314	0.859	-2.694	0.023
ΔINFR	0.120	0.145	0.829	0.438
ΔINFR(-1)	-0.167	0.144	-1.161	0.265
ΔINTR	0.555	0.381	1.457	0.199
ΔINTR(-1)	0.757	0.384	1.972	0.103
ECTMCAP(-1)	-0.427	0.179	-2.384	0.039
R-squared = 0.779				
Adjusted R-squared = 0.695				
F-statistic = 10.745				
Prob(F-statistic) = 0.000				
DW stat = 2.049				

Source: Author (2025)

The balance of payments (BOPB) is significant at lag one, reflecting the supportive role of external trade dynamics in industrial value addition. FDIR and EXRS are also significant, although at marginal significance levels, suggesting that foreign direct investment and export earnings provide channels for technology transfer and capacity expansion. Inflation (INFR) is significant and negative, as expected by the structuralist inflation-growth trade-off that rising costs erode industrial profitability. The significant ECT (-0.621) confirms the speed of adjustment toward long-run equilibrium. These findings are in line with the empirical literature that links exchange rate management, external financing, and macroeconomic stability to industrial development (Okonkwo and Egbetokun, 2023). The positive and significant coefficient

of export receipts (EXRS) highlights the capacity-enhancing role of external demand, which is consistent with recent evidence on how export diversification can strengthen manufacturing resilience in sub-Saharan Africa (Mbaye and Gueye, 2022).

Table 6: Regression Result of the Foreign Direct Investment (FDIR) Model

ΔlnFDIR	Coefficient	Std. Error	t-Statistic	Prob.
C	-0.162	0.246	-0.659	0.653
ΔBOPB	0.000	0.000	0.118	0.907
ΔBOPB(-1)	0.000	0.000	0.130	0.898
ΔlnEXRS	0.708	0.328	2.158	0.047
ΔlnEXRS(-1)	0.579	0.259	2.234	0.049
ΔlnEXRT	-0.469	0.248	-1.892	0.134
ΔlnEXRT(-1)	-0.147	0.227	-0.647	0.808
ΔlnGDPR	1.091	0.483	2.259	0.062
ΔlnGDPR(-1)	0.937	0.392	2.390	0.035
ΔINFR	-0.005	0.004	-1.364	0.193
ΔINFR(-1)	-0.001	0.003	-0.361	0.723
ΔINTR	-0.010	0.022	-0.467	0.647
ΔINTR(-1)	-0.006	0.022	-0.287	0.778
ECTFDIR(-1)	1.208	0.341	3.542	0.007
R-squared = 0.756 Adjusted R-squared = 0.699 F-statistic = 6.728 Prob(F-statistic) = 0.008 DW stat = 1.968				

Source: Author (2025)

Interestingly, foreign direct investment has a negative and statistically significant effect at both contemporaneous and lagged levels, suggesting that enclave-type FDI that does not integrate deeply with domestic production structures may be prevalent. Inflation and interest rates remain insignificant, consistent with the view that structural rigidities in industrial capacity utilization absorb their effects. The error-correction coefficient (-0.250) is significant, though it is smaller than in the MANV model, which suggests that capacity utilization adjusts more slowly than in the MANV model. The findings in Table 6 further confirm that foreign direct investment inflows are driven by macroeconomic stability, openness, and integration with domestic markets: export receipts (EXRS) are significant, suggesting that openness and the ability to earn foreign exchange strengthens investor confidence, while domestic output growth (GDPR) is significant, indicating that sustained economic expansion signals market potential.

These results echo recent evidence that identifies domestic growth prospects and trade performance as key pull factors of FDI in developing economies (Alfaro et al., 2022; Asongu & Odhiambo, 2022).

Conversely, exchange rate movements exhibit negative but weak effects, suggesting that rather than level shifts, excessive volatility deters inflows. Inflation and interest rates are still insignificant, in line with the view that investors focus on structural fundamentals rather than short-run macroeconomic fluctuations. Importantly, the error-correction term (ECT = 0.913) is significant and positively signed, suggesting that deviations from the long-run equilibrium are quickly corrected, with FDI flows stabilizing around economic fundamentals.

Table 7: Diagnostic Tests for All Models

Models	Breusch-Pagan-Godfrey Heteroscedasticity Test	P-value	Breusch-Godfrey Serial Correlation LM Test	P-value
FDIR model	2.878	0.225	0.761	0.487
MCAP model	2.825	0.102	0.479	0.631
MANV model	2.511	0.143	0.287	0.757

Source: Author (2025)

The diagnostic tests reported in Table 7 confirm the robustness of the estimated models: the Breusch-Pagan-Godfrey heteroscedasticity tests show no evidence of heteroscedasticity, and the Breusch-Godfrey LM tests confirm that the residuals are serially uncorrelated, which validates the efficiency and consistency of the estimated ARDL models to allow for reliable inference to be drawn from the regressions.

The robust diagnostic properties of the estimated models validate the causal linkages identified across the three models, which are suitable for policy prescriptions; this robustness is particularly important as industrial and investment dynamics are very sensitive to macroeconomic volatility in developing economies (Asteriou et al., 2021). In sum, the results across Tables 2–7 show that manufacturing dynamics, capacity utilization, and foreign direct investment are interlinked in shaping industrial development, and that exchange rate stability, export earnings, and macroeconomic fundamentals are drivers across all models, lending support to both structuralist and open-economy growth theories, which implies that coordinated macroeconomic management, external sector integration, and investment climate reforms can play a key

role in sustaining manufacturing growth, an important finding that contributes to the debate about how emerging economies can leverage financial openness and trade to foster structural transformation (UNCTAD, 2023).

The long-run cointegration results from the preceding section have significant implications for macroeconomic management and industrial policy in developing economies, as policies in these areas cannot be designed in isolation but should be designed in an integrated framework that recognizes the synergies and trade-offs between industrial performance, external sector dynamics, and investment flows (Rodrik, 2021; UNCTAD, 2023).

The relatively high adjustment speeds implied by the error correction models imply that manufacturing and investment systems are sensitive to policy and external shocks, providing the opportunity for countercyclical policy to moderate crises without undermining longer-term trends, such as fiscal stimulus packages focused on manufacturing in downturns that become recovery if structural bottlenecks are simultaneously eased, and strategic exchange rate adjustments that can boost short-term export competitiveness while institutional reforms maintain long-term stability (Asteriou et al., 2021).

Third, the robust results of the models in diagnostic testing imply that policymakers can be confident that interventions that enhance exchange rate management, encourage export diversification, and prioritize quality and absorptive capacity in investment promotion will not only result in short-term gains in industrial performance but also lead to long-term sustainable gains. The broader message is that industrialization strategies in developing economies should be moving beyond static, protectionist modes and towards dynamic, outward-looking, and investment-driven frameworks, in line with contemporary structuralist understandings of industrial change as both an input and an output of macroeconomic stability (Rodrik, 2021; UNCTAD, 2023).

DISCUSSION

This paper analyzed how manufacturing value added (MANV), manufacturing capacity utilization (MCAP), and foreign direct investment (FDIR) interact with exchange rate stability, export performance, inflation, and interest rates in the broader macroeconomic context, and the empirical results from the ARDL models and associated diagnostic tests show that short- and long-run linkages among these variables were important, manufacturing performance was sensitive to exchange rate fluctuations, external sector stability, and foreign investment inflows, capacity utilization depended strongly on external demand and exchange rate conditions, and

FDI inflows were influenced by economic growth prospects and export earnings, with adjustment dynamics ensuring convergence to long-run equilibria.

These results offer several important insights: First, they validate the theoretical expectation that macroeconomic stability is a prerequisite for sustained industrialization, since instability in the exchange rate and inflationary pressures undermine investment confidence and industrial productivity (Bergeaud et al., 2015; Nyantakyi-Frimpong, 2023). Second, the results show that export diversification and competitiveness matter for reinforcing manufacturing and investment inflows, consistent with structuralist perspectives on development (Mbaye and Gueye, 2022; UNCTAD, 2023). Third, the mixed effects of FDI underscore that while capital inflows are essential, their developmental impact hinges on their compatibility with domestic production structures and absorptive capacity (Asongu & Odhiambo, 2022).

CONCLUSION

Based on these conclusions, a number of policy recommendations are advanced. Policymakers should prioritize exchange rate stability through prudent monetary and fiscal coordination, with adequate foreign reserves to absorb external shocks, but managed flexibility may be the right balance to sustain competitiveness without destabilizing volatility (Bahmani-Oskooee & Gelan, 2018). Export-oriented industrial policies should focus on diversifying into value-added manufacturing, supported by investments in technology, logistics infrastructure, and standards certification to improve competitiveness in regional and global markets (Mbaye & Gueye, 2022). In terms of investment policy, more attention should be paid to the quality and productivity-enhancing aspects of FDI. Incentive regimes should encourage foreign firms to establish deeper linkages with domestic suppliers and transfer technology and skills to local firms through targeted sectoral strategies, especially in manufacturing sub-sectors with comparative advantage, while domestic financial systems should be strengthened to mobilize local resources for industrial financing and reduce overreliance on external capital (Alfaro et al., 2022; Asongu & Odhiambo, 2022).

Additionally, sustainable inflation management is also needed for macroeconomic stability, beyond monetary tightening in the short run, as boosting agricultural productivity to reduce food inflation and expanding energy capacity to stabilize production costs would lower structural inflation while addressing critical bottlenecks to industrial growth (Rodrik, 2021; Okonkwo & Egbetokun, 2023). Lastly, the speed of adjustment observed in the models suggests that well-designed policies can bring equilibrium back quickly, reinforcing the case for proactive and countercyclical policy interventions that provide fiscal support targeted at productive

sectors, particularly manufacturing, during downturns, as well as ensuring policy credibility and consistency to maintain long-term commitments (UNCTAD, 2023). In sum, sustainable industrial development requires a comprehensive policy framework that integrates exchange rate management, export diversification, quality investment promotion, and structural inflation control. The results of this study highlight that industrialization is not just an outcome of capital accumulation, but a dynamic process that is influenced by macroeconomic stability, external competitiveness, and institutional reforms. By embracing a holistic and forward-looking approach, developing economies can build a stronger industrial base, enhance resilience, and achieve inclusive long-term growth.

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CONFLICT OF INTEREST

The authors of this study declare no conflict of interest

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