Journal of Management and Economics Innovation
Volume 1, Nomor 2, 2025, Hal: 83-100
https://doi.org/10.64670/jmei.v1i2.30

Impact of foreign direct investment inflows on labour productivity in Nigeria.

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ABSTRACT

This study focused on the impact of foreign direct investment inflows on labour productivity in Nigeria. It specifies an Autoregressive Distributed Lag (ARDL) model, following the work of Hailat and Baniata (2018), to evaluate the impact of international capital inflows—Foreign Direct Investment (FDI), Foreign Portfolio Investment (FPI), Official Development Assistance (ODA), and External Debt (ED)—on labour productivity in Nigeria. The ARDL bounds test is used to determine the existence of cointegration among variables, while the Error Correction Model (ECM) captures both short-run and long-run dynamics. Finally, the Fully Modified Ordinary Least Squares (FMOLS) method is employed to validate the robustness of the estimates. The Akaike Information Criterion (AIC) guided lag selection for the Autoregressive Distributed Lag (ARDL) model, with maximum lags of (1) and (2) chosen via E-Views 10. Results show that Foreign Direct Investment (FDI) negatively affects labour productivity (−0.0074, p=0.0002), while Foreign Portfolio Investment (FPI) and Official Development Assistance (ODA) are insignificant. External Debt (ED) has a negative significant effect (−0.0164, p<0.05). Personal Remittances (PRER) and Real Gross Domestic Product (RGDP) positively influence productivity (0.0046, p<0.05; 1.0931, p<0.01), while Gross Fixed Capital Formation (GFCF) shows a strong negative link (−0.3862, p<0.01). Secondary School Enrollment Rate (SERR) remains positive (0.002, p<0.05). The study concludes that sustainable labour productivity growth in Nigeria requires policies that strengthen domestic absorptive capacity, improve institutional quality, and channel foreign capital toward skill development and technology-driven sectors

ARTICLE HISTORY

Received : 07 September 2025
Revised : 07 Oktober 2025
Accepted : 30 Oktober 2025

KEYWORDS

Labour Productivity, Foreign Direct Investment, Remittances, Institutional Quality

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Introduction

Foreign direct investment (FDI) is widely recognized as a long-term cross-border investment aimed at acquiring at least 10% of voting power in a foreign enterprise, reflecting a significant and lasting interest, as defined by the IMF and World Bank (IMF, 2019; World Bank, 2021). Unlike portfolio investment, FDI typically transfers not only capital but also managerial expertise, technology, and market access, thereby exerting a stronger influence on host-country productivity (Alvarado, Iñiguez, & Ponce, 2017). Modern scholarship highlights FDI as both a

source of external financing and a driver of structural transformation, particularly in developing countries where it enhances innovation and competitiveness (Adams, 2009; Boateng et al., 2015).

However, the developmental effects of FDI are conditional: while some studies find positive spillovers through technology transfer and employment creation, others report mixed or insignificant effects due to weak absorptive capacity and institutional inefficiencies (Adeleye et al., 2017; Pegkas, 2015). More recent evidence in Africa shows that the benefits of FDI are moderated by governance, infrastructure, and human capital, which determine whether inflows translate into sustainable growth (Abubakar et al., 2021; Asongu & Odhiambo, 2020). In West Africa, empirical findings remain inconclusive, revealing the need for deeper comparative research on how FDI interacts with domestic financial markets and macroeconomic stability.

Recent cross-country and country-specific studies still find both complementary ("crowd-in") and substitution ("crowd-out") effects. On the negative side, evidence from China shows FDI can displace domestic investment when local finance is tight, dampening capital deepening that would otherwise raise labour productivity (Guo, 2024). A broader developing-country lens shows the effect hinges on capital-market depth and the FDI mode: greenfield inflows tend to generate stronger positive intra-industry productivity spillovers than cross-border Mergers and Acquisitions, consistent with crowd-in of domestic investment and inputs (Ahn, Aiyar, & Presbitero, 2024). At the accumulation margin, panel evidence across developing economies suggests FDI can either augment or erode domestic capital formation depending on institutions and absorptive capacity (Emako, 2023).

Fresh, firm-level, and policy reviews emphasize vertical linkages as the prime conduit from Multinational Enterprises (MNEs) to local productivity. A World Bank brief highlights that supplier upgrading, contract depth, and domestic absorptive capacity are decisive for turning MNE–supplier relationships into measurable TFP gains (World Bank, 2020). For Africa, new evidence stresses that while vertical linkages are still relatively scarce, where they do form, technology transfer and performance improvements among connected local firms are material (Hoekman, 2023). Cross-country microdata further indicate positive intra-industry (horizontal) and vertical spillovers from greenfield FDI into domestic firms' labour productivity, consistent with demonstration, competition, and input–output learning effects (Ahn et al., 2024; IMF, 2024). Complementary work also documents that FDI can catalyze product innovation among domestic firms by easing access to foreign know-how and standards (Deng, 2024).

Productivity plays a critical role in economic growth and living standards. Higher productivity leads to cost savings, lower prices, increased demand, and enhanced competitiveness (Nwaru, 2018). It boosts profits for businesses, promoting long-term growth, and results in higher wages, which raise consumption and tax revenues for public goods (Kalu et al., 2025). Additionally, improved productivity enables labor reallocation across industries, addressing new needs (Idigo, 2022). For instance, efficiency improvements in agriculture can meet growing urban demands and enhance export capacities. As such, productivity directly influences national economic dynamics, fostering sustainability and responding to emerging challenges (Idigo, 2024; Okonkwo & Idigo, 2025).

Labour productivity is the quantity of labour input required to produce a unit of output and is the principal gauge of how effectively a nation transforms its workforce effort into valuable

goods and services (Nwaru, 2018; International Labour Organisation [ILO], 2018). In developing economies with abundant labour, measuring output per hour worked or per worker and even in value-added terms, such as GDP per labour hour or physical units like tons per worker, provides critical insights into real income improvements, unemployment trends, job creation, and wage dynamics (Ogunniyi, 2018; ILO, 2018). High productivity reflects enhanced utilization of skills, technology, training, and capital equipment, enabling firms to generate more with the same or fewer inputs. This, in turn, underpins wage growth, competitiveness, profitability, and living standards; contains inflationary pressures by lowering unit labour costs; and creates fiscal space through higher tax revenues without raising rates (World Bank, 2020). Consequently, sustained gains in labour productivity are not only desirable but essential for economic development, social welfare, and poverty reduction in labour-rich nations like Nigeria.

The World Development Indicator (2024) shows that Productivity per worker declined below 8,000 USD from 1992 to around 2001, reflecting economic instability and structural challenges. From 2001 to 2014, a sustained upward trend emerged, culminating in a peak from 8000 USD to 14,000 USD, driven by favourable macroeconomic reforms and oil revenue inflows. From 2014 to date, the GDP per person employed has been slowing down, though from 14,000 USD to 12,000 USD, suggesting diminishing marginal returns to productivity-enhancing investments. Despite the rise in Nigeria's labour force population, the data indicated that labour productivity is not rising at the moment. The above statistics give a dismal impression of the government's attempts to raise the nation's labour productivity.

Empirical evidence emphasizes this moderating role. Dada and Abanikanda (2022) show that governance indicators significantly shape the FDI-growth nexus in Nigeria, with stronger institutions amplifying real-sector effects. Similarly, Adelowokan et al. (2024) demonstrate that political stability and absence of violence support industrial growth, while weak regulatory quality undermines productivity. Regionally, firm-level evidence indicates that foreign presence boosts productivity in West Africa, particularly where institutions protect contracts and reduce corruption (Orji et al., 2022). Furthermore, studies link institutional quality to human capital development: Ouedraogo et al. (2022) find that better institutions enhance education and skills across Africa, while Githaiga and Kilong'i (2023) reveal that institutional quality interacts with foreign capital to shape human-capital outcomes in sub-Saharan Africa. Collectively, these findings suggest Nigeria's policy priority should focus not only on attracting inflows but also on institutional reforms that promote productivity-enhancing spillovers (Adegboye et al., 2020; Adelowokan et al., 2024; Dada & Abanikanda, 2022).

As Nigeria seeks to diversify its economy beyond oil dependence and enhance its competitiveness in global markets, understanding the role of foreign direct investment (FDI) in driving labour productivity has become increasingly critical. Empirical evidence suggests that FDI can introduce advanced technologies, managerial expertise, and organizational practices that elevate workers' efficiency and skill acquisition (Borensztein et al., 1998; Alfaro et al., 2009). Yet, the extent to which these productivity gains materialize in Nigeria with its unique institutional, infrastructural, and human-capital constraints remains subject to debate. This review synthesizes recent studies on the FDI and labour productivity nexus in Nigeria, highlighting methodological approaches, key findings, and contextual factors that shape the effectiveness of foreign investment

in fostering sustainable productivity growth. Despite the extensive literature on international capital inflows such as foreign direct investment, several knowledge gaps remain unresolved in the Nigerian context. First, most studies are cross-country analyses (Kpognon & Bah, 2019; Vu et al., 2022; Yuan et al., 2023) or focus on other economies (Saha, 2022; Wang & Sun, 2024), thereby neglecting Nigeria's unique institutional weaknesses, policy inconsistencies, and structural peculiarities, leaving limited country-specific evidence.

Methods

The endogenous growth model, also known as the new growth theory, is adopted as the theoretical framework for the study. This theory was developed to address the limitations of the neoclassical growth models (e.g., the Solow-Swan model), which treat long-run growth as determined by an exogenous factor, typically technological progress. In contrast, the endogenous growth theory indigenizes the sources of technological change and emphasizes the role of human capital, innovation, learning-by-doing, and investment in knowledge and R&D as core drivers of sustained economic growth (Romer, 1986; Lucas, 1988). The study adopts the new growth theory, specifically, the endogenous growth model. A canonical endogenous growth framework augments the Solow model by making technological progress a function of economic decisions rather than an exogenous constant. The framework is particularly suited for policy evaluation, as it implies that government policy, education, innovation subsidies, and openness to foreign capital can have permanent effects on growth, in this case, labour productivity.

In the simplest "AK" specification, aggregate output (Y) is produced through

$$Y_t = AK_t \qquad \mathbf{3.1}$$

Where K_t is the capital stock (which may include both physical and human capital). As human capital grows over time, it sustains or increases output growth, reinforcing the endogenous nature of long-run growth. A captures constant returns to scale in the capital, so that the net growth rate is

$$\frac{\dot{K}_t}{K_t} = sA - \delta, \qquad \mathbf{3.2}$$

With s the saving rate and δ the depreciation rate (Mankiw et al., 1992). Unlike the Solow model, there is no convergence to a steady state; rather, growth continues indefinitely as long as savings and productivity remain constant.

A richer R&D-based model (Romer, 1990) distinguishes final goods and knowledge sectors:

$$Y_t = K_t^{\alpha}(A_t L_t)^{1-\alpha}, \quad \dot{A}_t = \eta K_{R,t}^{\emptyset} A_t^{\psi}, \qquad \mathbf{3.3}$$

Equivalently, making labour the subject of the equation, we have:

$$L_t = A_t^{-1} Y_t^{\frac{1}{1-\propto}} K_t^{\frac{-\propto}{1-\propto}} \qquad 3.3a$$

Where L_t is labour, K-{R,t} is capital devoted to research, and $\eta, \varphi, \psi > 0$ govern the productivity of R&D and the spillover effects of existing knowledge. Here, growth is sustained because investment in R&D generates non-rival ideas ($\psi < 1$ ensures diminishing congestion), embedding long-run per-capita growth in endogenous choices (Romer, 1990).

The endogenous growth framework represents a fundamental shift in growth theory, emphasizing internal mechanisms such as capital accumulation, innovation, and policy as sources of long-run economic growth. Unlike neoclassical models, it implies that developing countries like Nigeria can influence their growth trajectories by investing in education, R&D, and infrastructure, and attracting foreign capital that facilitates knowledge spillovers and technology transfer. Several scholars have empirically conducted research using the ARDL model around labour productivity (or general output growth) and international capital inflows, such as Ahmad et al. (2025); Asada (2020), Djalab and Said (2023), Hailat and Baniata (2018), and Onwuteaka et al. (2023). However, the model of Hailat and Baniata (2018), who did a study on the effects of foreign capital inflow on labour productivity in Jordan, is adopted because it is closely related to the current study, given that the ARDL model is a single-equation model that is simple to implement and interpret, where different lag lengths can be assigned to variables. As the baseline model, the model of Hailat and Baniata (2018) is stated in a compact econometric form of ARDL:

$$\left(Y/L\right)_t = \beta_0 + \sum_{i=1}^{p} \beta_i \left(Y/L\right)_{t-i} + \sum_{j=0}^{q} \gamma_j X_{t-j} + \varepsilon_t \qquad \mathbf{3.4}$$

Where Y/L represents the real average productivity of labour, and X is a 4x1 vector of variables of international capital inflows. Optimal lags p and q that may differ across variables are determined by minimizing the Bayesian information criterion (BIC). Equation (3.4) has a parameterization in Conditional Error Correction form according to:

$$\Delta\left(Y/L\right)_t = \emptyset_0 + \sum_{i=1}^{p-1} \emptyset_i \, \Delta\left(Y/L\right)_{t-i} + \sum_{j=0}^{q-1} \alpha_j \Delta X_{t-j} \, \delta \left[\left(Y/L\right)_{t-1} - \boldsymbol{\theta X}_{t-1}\right] + \mu_t \qquad \mathbf{3.5}$$

In this equation, $\left[\left(Y/L\right)_{t-1} - \boldsymbol{\theta X}_{t-1}\right]$ Represents one lag residual from the regression of the dependent variable (Y/L) on the set of independent variables X, and $\boldsymbol{\delta}$ measures the speed of adjustment toward equilibrium. Long-run parameters are measured by $\boldsymbol{\theta_i}$, whereas $\boldsymbol{\alpha_i}$ and $\boldsymbol{\emptyset_i}$ Capture the short-run coefficients.

Empirical Model Specification

The model of this research work is specified in a linear form and would range from general to specific modelling, in line with theory. Model specification is a statement of maintained hypothesis (Koutsoyiannis, 1997). This involves expressing the models in a mathematical form that is used to ascertain the economic phenomenon empirically. Moreover, this study introduced control variables. The autoregressive distributed lag (ARDL) Bound technique was applied in estimating the model objectives 1 to 5.. For a robustness check, the study employed the FMOLS

to validate the estimations in research questions one to five. Addressing the objectives of the study, which is to capture the impact of international capital inflows on labour productivity, Equation 3.5 is adopted and modified. In specifying the model for this study, the Autoregressive Distributed Lag (ARDL) modelling framework in its modern cointegration form was pioneered by Pesaran and Shin (1999) and further developed (with bounds-testing) by Pesaran et al. (2001). This is employed to evaluate the impact of international capital inflows on labour productivity in Nigeria. Only the components of international capital inflows already identified in this work are evaluated to determine their impact on labour productivity.

The model for this study is stated mathematically with modifications to accommodate the presence of control variables such as gross fixed capital formation, secondary school enrolment, unemployment, and institutional quality indicators that were omitted in Hailat and Baniata (2018).

The functional form of the study is stated as:

$$LP = f(FDI, FPI, EDS, ODA, GFCF, PRER, RGDP, SERR) \quad 3.6$$

Where ***LP*** is labour productivity (proxy by GDP per person employed), FDI is foreign direct investment, FPI is foreign portfolio investment, EDS is external debt flows, PRER is personal remittances, ODA is official development assistance, RGDP is real gross domestic product, GFCF i gross fixed capital formation, and SERR is secondary school enrolment.

The mathematical form of Equation 3.6 is given as:

$$LP_t = \alpha_0 + \varphi_j LP_{t-i} + \varphi_j FDI_{t-i} + \varphi_j FPI_{t-i} + \varphi_j EDS_{t-i} + \varphi_j ODA_{t-i} + \varphi_j GFCF_{t-i} + \varphi_j PRER_{t-i} + \varphi_j RGDP_{t-i} + \varphi_j SERR_{t-i} \quad \mathbf{3.7}$$

The ARDL model of this study is specified in econometric form as follows:

$$logLP_t = \alpha_0 + \sum_{j=1}^{p} \beta_1 logLP_{t-j} + \sum_{j=0}^{q} \beta_2 FDI_{t-j} + \sum_{j=0}^{q} \beta_3 FPI_{t-j} + \sum_{j=0}^{q} \beta_4 logEDS_{t-j} + \sum_{j=0}^{q} \beta_5 logODA_{t-j} + \sum_{j=0}^{q} \beta_6 logGFCF_{t-j} + \sum_{j=0}^{q} \beta_7 PRER_{t-j} + \sum_{j=0}^{q} \beta_8 logRGDP_{t-j} + \sum_{j=0}^{q} \beta_9 SERR_{t-j} + \mu_t \quad \mathbf{3.8}$$

where; $\mu_t$is the Disturbance term/error term; β's is the Constant term and parameters to be estimated.

To perform the bounds test for cointegration, the conditional ARDL (p, q) model is specified below;

$$\Delta \log LP_t = \alpha_0 + \varphi_j logLP_{t-i} + \varphi_j FDI_{t-i} + \varphi_j FPI_{t-i} + \varphi_j logEDS_{t-i} + \varphi_j logODA_{t-i} + \varphi_j logGFCF_{t-i} + \varphi_j PRER_{t-i} + \varphi_j logRGDP_{t-i} + \varphi_j SERR_{t-i} + \sum_{j=1}^{p} \beta_1 \Delta \log LP_{t-j} + \sum_{j=0}^{q} \beta_2 \, \Delta FDI_{t-j} + \sum_{j=0}^{q} \beta_3 \, \Delta FPI_{t-j} + \sum_{j=0}^{q} \beta_4 \, \Delta logEDS_{t-j} + \sum_{j=0}^{q} \beta_5 \, \Delta logODA_{t-j} + \sum_{j=0}^{q} \beta_6 \, \Delta logGFCF_{t-j} + \sum_{j=0}^{q} \beta_7 \, \Delta PRER_{t-j} + \sum_{j=0}^{q} \beta_8 \, \Delta logRGDP_{t-j} + \sum_{j=0}^{q} \beta_9 \, \Delta SERR_{t-j} + \mu_t \quad \mathbf{3.9}$$

The hypothesis for the bounds test, which shows that coefficients of the long-run equation are all equal to zero against the alternative that they are not equal to zero, is stated below;

$H_0 : \beta_1 - \beta_{10} = 0$

$H_1 : \beta_1 - \beta_{10} \neq 0$

We can specify both the short-run and long-run models, which is the error correction model (ECM), if we can reject the null hypothesis (that is, there is cointegration).

$$\Delta logLP_t = \alpha_0 + \sum_{j=1}^{p} \beta_1 \Delta logLP_{t-j} + \sum_{j=0}^{q} \beta_2 \, \Delta FDI_{t-j} + \sum_{j=0}^{q} \beta_3 \, \Delta FPI_{t-j} + \sum_{j=0}^{q} \beta_4 \, \Delta logEDS_{t-j} + \sum_{j=0}^{q} \beta_5 \, \Delta logODA_{t-j} + \sum_{j=0}^{q} \beta_6 \, \Delta logGFCF_{t-j} + \sum_{j=0}^{q} \beta_7 \, \Delta PRER_{t-j} + \sum_{j=0}^{q} \beta_8 \, \Delta logRGDP_{t-j} + \sum_{j=0}^{q} \beta_9 \, \Delta SERR_{t-j} + \gamma ECT_{t-i} + \mu_t \quad \mathbf{3.10}$$

Generally, the outcome of the bounds test indicates whether there exist long-run dynamics among variables in the model.

This dynamic error correction model (ECM) is derived from the ARDL model through a simple linear transformation (Banerjee et al. 1993). That is, the ECM integrates the short-run dynamics with the long-run equilibrium without losing long-run information.

α_0 = Constant

β's are the parameters

μ_t = error term (which is white noise)

Δ is the first difference operator,

γ is the speed of adjustment parameter with a negative sign, to show that there is a convergence in the long run.

ECT in the models is the error correction term that captures the long-run relationship in the model.

$\beta_1 - \beta_{11}$ which has the expression with a summation sign representing the short-run dynamics of the model,

φ represents a long-run relationship.

Where P is the maximum lag order of the dependent variables, while q is the maximum lag length of explanatory variables, every other item remains as already defined.

. **Justification of the Model**

This model defines and justifies several variables that explain how international capital inflows influence labour productivity. Labour productivity (LP) measures output per unit of labour input, reflecting how effectively workers use time and resources. It captures the efficiency gains that come from foreign investment, technological innovation, and improved human capital. Foreign Direct Investment (FDI) inflows represent long-term investments made by foreign entities seeking management control. They foster technology transfer, capital deepening, and better management practices that enhance productivity. Foreign Portfolio Investment (FPI) inflows, on the other hand, involve the movement of foreign funds into domestic financial markets through stocks and bonds. Though often speculative, FPIs help diversify capital sources and can improve liquidity and economic performance. Personal remittances (PRER) are transfers from individuals abroad to residents at home. They contribute to domestic investment, human capital development, and small business growth, often improving worker productivity and easing financial constraints. External debt captures total foreign borrowing obligations and reflects how such financing can either stimulate productive investment or impose repayment burdens that hinder growth.

Official Development Assistance (ODA) refers to concessional government-to-government financial support. When directed toward infrastructure or social investment, it can complement domestic savings and encourage productive growth, though its impact depends on allocation priorities. Real Gross Domestic Product (RGDP) measures the economy's output adjusted for inflation, serving as a control for real economic growth. Gross Fixed Capital Formation (GFCF) indicates the share of new value invested in physical assets, representing capital formation essential for sustained productivity. Secondary School Enrollment Ratio (SERR) captures human capital development, emphasizing the role of education in enhancing adaptability and efficiency. Lastly, the Institutional Quality Index (INSQIDX) summarizes governance performance, integrating aspects like regulatory quality, political stability, and rule of law, which collectively shape how effectively capital inflows translate into productivity and long-term economic growth.

Results

Table 1 presents a summary of the descriptive statistics, ranging from the measures of central tendency to the measures of dispersion. These include the mean, median, skewness, kurtosis, Jarque-Bera, etc., of each of the variables of interest in this study.

Table 1: Summary of Descriptive Statistics

Variables	Obs.	Mean	Minimum	Maximum	Strd. Dev.	Jarque-Bera	Skewness	Kurtosis
LP	33	10500.12	7126.157	13845.66	2409.470	3.591792	-0.198077	1.433069
FDI	33	3.451553	-1.118923	12.16451	3.480172	3.590514	0.778761	2.569409
FPI	33	-2.04E+09	-1.50E+10	3.69E+09	3.85E+09	26.86659	-1.656215	5.926969
EDS	33	4.69E+10	1.75E+10	1.10E+11	2.65E+10	8.068195	1.208953	3.146657
ODA	33	2.12E+09	1.52E+0	1.14E+10	2.34E+09	68.26729	2.069041	8.703089
GFCF	33	19343.27	3777.750	44414.00	13314.01	3.327258	0.615153	2.048069
PRER	33	3.608563	0.108433	8.333829	2.382982	1.956946	-0.064768	1.814060
RGDP	33	3.41E+11	1.55E+11	5.83E+11	1.49E+11	3.389142	0.059707	1.434570
SERR	33	35.91089	12.00530	55.08155	13.09467	2.070444	-0.256087	1.884896
INSQIDX	33	-7.88E-08	-2.770856	2.280757	1.691649	3.831260	-0.509424	1.677759

Source: Computed using E-Views 10

The descriptive statistics in Table 1 reveal considerable variation in both the key variables of interest and the controls incorporated into the two models. Labour productivity, the dependent variable, has a mean of 10,500 with a standard deviation of 2,409.5, indicating moderate dispersion. The minimum (7,126.2) and maximum (13,845.7) values suggest productivity nearly doubled across the sample period. The Jarque-Bera statistic of 3.5918 ($p = 0.05$) shows no significant deviation from normality, though the negative skewness (-0.1981) and kurtosis (1.4331) indicate a slightly right-leaning distribution with heavier tails. This cautions against strictly relying on methods assuming Gaussian errors without robustness checks.

Among external finance variables, foreign direct investment averages 3.45 with values from -1.12 to 12.16 and a standard deviation of 3.48. Its positive skewness (0.7788) and platykurtic profile (kurtosis 2.5694) suggest fewer extreme outliers, though the Jarque-Bera statistic indicates mild non-normality. Foreign portfolio investment and official development assistance display greater magnitudes and variability: FPI's mean (-2.04×10^9) and standard deviation (3.85×10^9) highlight episodic inflows, with negative skewness (-1.6562) and high kurtosis (5.9270) reflecting frequent extreme lows, likely from sudden capital flight. ODA, with a mean of 2.12×10^9 and standard deviation of 2.34×10^9, shows strong right skew (2.0690) and very high kurtosis (8.7031), confirming occasional large disbursements. Real economy and socio-economic controls also vary considerably. Gross fixed capital formation ranges from 3,777.75 to 44,414 (mean 19,343.27), with positive skewness and high kurtosis, indicating occasional boom or crisis episodes. By contrast, secondary school enrolment and remittance inflows display lower dispersion and near-symmetric distributions, suggesting more stable mid-range values.

The governance indicators, combined through principal component analysis to create an institutional quality index, show near-zero means (−7.88E-08), standard deviations of 1.6916, and Jarque-Bera values of 3.8313. Their relatively stable distributions suggest limited temporal

variation, potentially constraining explanatory power unless interacted with other variables. Overall, the non-normal distributions and wide ranges in key regressors underscore the need for robust estimation strategies such as bootstrapped standard errors or quantile regressions for reliable inference.

Lag Length Selection Criteria

The lag length for the autoregressive distributed lag model was determined using the Akaike Information Criterion. Since the study used E-views 10, which gives a chance for automatic selection of lag lengths, the study selected maximum lag lengths of 1 and 2, which are shown in the appendix sections of the main regression output. The ARDL Lag length selection criteria are presented in the appendix section for models 1 and 2, respectively.

Long Run Estimation and Interpretation for Model 1 with the ARDL Model and the Robustness Check Model (FMOSL)

Table 2: The Long Run Estimated Coefficient for Model 1

Variables	Coef.	Std. Error	Prob.	Variables	Coef.	Std. Error	Prob.
Panel 1	ARDL			Panel 2		FMOLS	
FDI	-0.0074*	0.0008	0.0002	FDI	-0.0071*	0.0021	0.0023
FPI	5.7400	3.4400	0.1560	FPI	0.0000	0.0000	0.3201
LOGEDS	-0.0164**	0.0043	0.0126	LOGEDS	-0.0872*	0.0133	0.0000
LOGODA	-0.0022	0.0028	0.4590	LOGODA	0.0062	0.0081	0.5318
LOGGFCF	-0.3862*	0.0125	0.0000	LOGGFCF	-0.3306*	0.0376	0.0000
PRER	0.0046**	0.0012	0.0128	PRER	-0.0088**	0.0037	0.0272
LOGRGDP	1.0931*	0.0151	0.0000	LOGRGDP	1.1044*	0.0587	0.0000
SERR	0.002**	0.0007	0.0310	SERR	0.0006	0.0013	0.7636
C	-15.5044*	0.2962	0.0000	C	-14.7668*	1.2787	0.0000

Source: Computed using E-views 10

Note: * denotes significance at 1%, ** denotes significance at 5%; and FMOLS denotes Fully Modified Least Squares. See the appendix for the robustness results.

The specific objectives one to four of the study seek to determine the impact of international capital inflows (foreign direct investment net inflows, foreign portfolio investment net inflows, net inflows of official development assistance, and external debt flow) on labour productivity in Nigeria. To achieve the objectives, the study adopted the ARDL estimation technique in model 1.

The first objective of the study seeks to determine the impact of foreign direct investment net inflows on labour productivity in Nigeria. The long-run effect of foreign direct investment net inflows reveals a negative and statistically significant effect on labour productivity, with a coefficient value of -0.0074 and a probability value of 0.0002. The estimated outcome was significant at a 1% level. This implied that a 1 unit increase in FDI net inflows reduces labour productivity by approximately 0.074%, holding other variables constant. In the short run, the

effect of FDI net inflows remains negative and significant at 1%, with a smaller coefficient of -0.0023 and a probability value of 0.001. Here, a one-point increase in FDI net inflows results in a roughly 0.023% drop in labour productivity, holding other variables constant in the short run.

The second objective of the study seeks to determine the impact of foreign portfolio investment net inflows on labour productivity in Nigeria. The estimated result disclosed that foreign portfolio investment net inflows have a statistically insignificant effect on labour productivity in the long run, with a coefficient value of -5.7400 and a probability value of 0.1560, indicating that changes in foreign portfolio investment net inflows do not have a meaningful influence on labour productivity over time. However, in the short run, foreign portfolio investment net inflows show a positive and weakly significant impact with a coefficient value of close to zero and a probability value of 0.05.

The third research objective of the study seeks to determine the impact of net inflows of official development assistance on labour productivity in Nigeria. The result disclosed that, in the long run, there is a negative but statistically insignificant impact of net inflows of official development assistance on labour productivity in Nigeria with a probability level greater than 5%. This implies that foreign aid does not significantly influence productivity outcomes over time. In the short run, the natural log of net inflows of official development assistance also has a negative coefficient value of -0.0009 with a probability value within the range of 0.05, and significant at the 5% level. The implication here is that a unit change in net inflows of official development assistance leads to about a 0.09 point decline in labour productivity.

The fourth research objective of the study seeks to determine the impact of external debt flow on labour productivity in Nigeria. From the estimated model, the findings established that the natural log of external debt flow exerts a significantly negative effect on labour productivity in the long run, with a coefficient value of -0.0164 and a probability value of less than 0.05. The finding is also significant at 5% level. Similarly, the short-run effect of external debt flow is also negative and statistically significant, with a coefficient value of -0.0118 and a probability value of less than 5%, suggesting that increases in debt have immediate adverse impacts on labour productivity. A unit change in external debt flow in Nigeria results in a 1.18-point decline in labour productivity.

The personal remittances received revealed a positive and 5% statistically significant effect on labour productivity in the long run, with a coefficient value of 0.0046 and a probability value less than 0.05. This implied that a one percent change in personal remittances received would result in about a 0.5% increase in labour productivity in the country. The short-run coefficient effect of personal remittances received remains positive at 0.0006 with a probability value less than 0.01, meaning that a unit change in personal remittances received increases labour productivity by 0.06% in the short run.

The natural log of gross fixed capital formation disclosed a negative and 1% significant effect on labour productivity in the long run, with a coefficient of -0.3862 and a probability value

of 0.01. This means that a unit change in the natural log of gross fixed capital formation will decrease labour productivity in Nigeria by roughly 39% which is counterintuitive. The short-run effect of the natural log of gross fixed capital formation remains negative and at a 1% significant level with a coefficient value of -0.0780 and a probability value of 0.01. This disclosed that a unit increase in the natural log of gross fixed capital formation affects labour productivity in Nigeria negatively by 7.8 points.

Real GDP from the estimated model 1 has a very strong positive and significant effect on labour productivity in the long run. It disclosed a coefficient value of 1.0931 with a probability value of 0.01. Here, a change in real GDP will have a 1.09-point positive impact on labour productivity in Nigeria, and it is significant at a 1% level. This indicates that economic expansion is closely tied to productivity improvements, likely through scale economies, better technology, and infrastructure, as well as stronger demand for labour. The short-run impact is similarly large and significant as the coefficient Real GDP is 1.022 with a probability value of 1%, reflecting that increases in overall economic output lead to immediate gains in productivity.

Finally, the long-run coefficient for the secondary school enrollment rate is positive and statistically significant at 5% level with a probability value of less than 0.05. The estimated model reveals a coefficient value of 0.002, suggesting that a unit change in secondary school enrollment rate results in around a 0.2% increase in labour productivity in the country. Thus, suggesting that higher educational attainment at the secondary level positively impacts labour productivity. The short-run coefficient of secondary school enrollment rate is also positive at 0.001 and highly significant at 1%, indicating that improvements in education levels yield immediate productivity benefits. The implication in the short run is that a percent change in the secondary school enrollment rate generated a 0.1% rise in labour productivity in Nigeria.

Comparison of Long-Run Estimates from ARDL (Baseline) Model and FMOLS Model (Robustness Check)

The ARDL baseline and the FMOLS robustness check yield broadly similar signs for most variables but differ notably in significance levels and magnitudes. Starting with FDI net inflows, the ARDL coefficient is −0.0074 with a probability greater than 0.05, indicating an insignificant negative effect on labour productivity, whereas FMOLS reports a negative 0.0071 with a probability value of 0.01, a statistically significant negative impact. Both specifications find foreign portfolio investment essentially zero and insignificant. External debt flows enter negatively in both estimations, but are larger and more precisely estimated under FMOLS. Gross fixed capital formation has a strong negative long-run coefficient in both, suggesting that higher investment in fixed assets is associated with lower labour productivity in this context, though the magnitude is somewhat weakened under FMOLS. Personal remittances change sign between the two: ARDL reports a 0.0046 coefficient value, a small but positive and significant effect, whereas FMOLS shows a −0.0088 coefficient value, a significant negative coefficient. Real GDP is a large positive driver of labour productivity in both estimation techniques, with nearly identical magnitudes.

Secondary school enrolment is positive and significant in ARDL (0.0020) but becomes statistically insignificant in FMOLS (0.0006). Official development assistance is insignificant in both estimations.

The study employed ARDL and FMOLS estimation techniques to examine the long- and short-run effects of various forms of foreign capital inflows on labour productivity in Nigeria. The findings indicate that while certain forms of external inflows exert significant influences, others have minimal or no effect on productivity. The long-run analysis shows that foreign capital investment net inflows negatively and significantly affect labour productivity in Nigeria. The coefficient of −0.0074 with a p-value of 0.01 implies that increases in foreign capital inflows reduce productivity levels. This negative association may be explained by several structural and institutional challenges within the Nigerian economy. Foreign direct investment (FDI), which constitutes a major part of capital inflows, may crowd out domestic investments or be directed toward capital-intensive sectors such as oil and gas that do not generate substantial employment or skill development opportunities. Moreover, the limited absorptive capacity of the labour market and weak technology transfer mechanisms may prevent FDI from translating into improved productivity. Short-run results also reflect a similar pattern, where increases in FDI correspond with a temporary fall in productivity, possibly due to adjustment frictions, structural inefficiencies, or the dominance of extractive industries with minimal labour content. These findings align with Jibrilla and Dunusinghe (2021) and Aliyu (2015), who observed significant FDI–productivity effects in more diversified economies, but diverge due to Nigeria's current policy and security constraints that reduce FDI's real-sector impact.

Regarding foreign portfolio investment (FPI), the long-run coefficient was insignificant, with a p-value of 0.156, suggesting that FPI does not exert a meaningful long-term impact on labour productivity. This result is intuitive given the speculative nature of portfolio flows, which are typically short-term and rarely linked to physical capital formation or technological advancement. Such investments primarily target financial assets and can be volatile, limiting their ability to generate sustainable productivity improvements. However, the short-run relationship showed a minor positive and significant effect, implying that sudden inflows might temporarily boost liquidity and enhance firms' access to financing. This could stimulate short-term economic activity and confidence in the financial market, although the overall effect remains limited and transient.

The analysis of official development assistance (ODA) revealed a negative and statistically insignificant long-run relationship with labour productivity, with a coefficient of −0.0022 and a p-value of 0.4590. This suggests that aid inflows have not effectively translated into measurable productivity gains in Nigeria. Possible explanations include inefficiency, misallocation, and weak institutional frameworks that hinder the effective utilization of aid. ODA may often be channelled toward consumption or administrative expenditure rather than productive investments in infrastructure or human capital. Although the magnitude of the effect suggests that large

increments in ODA could eventually yield modest productivity improvements, the current structure of aid deployment limits its effectiveness. In the short run, ODA showed a negative and significant impact, which may be linked to aid volatility, bureaucratic delays, and potential Dutch disease effects—where large aid inflows cause currency appreciation, reducing export competitiveness and labour productivity. These findings contrast those of Gomina et al. (2024), who documented positive productivity outcomes from targeted aid projects such as irrigation schemes, highlighting the importance of sectoral allocation and management efficiency in determining aid effectiveness.

External debt flow also demonstrated a significant negative effect on labour productivity, with a coefficient of −0.0164 and a p-value of 0.01. This result reflects the detrimental impact of rising external debt burdens on productivity growth. The debt overhang theory explains that when future taxes are expected to rise to service debt, private investment declines due to anticipated lower returns, discouraging productive activities. Additionally, poor debt utilization, corruption, and resource diversion toward debt servicing rather than productive sectors exacerbate this problem. High external debt levels can also induce macroeconomic instability, exchange rate volatility, and reduced investor confidence, all of which constrain labour productivity. The findings correspond with Barreto (2024) and Anibal-Barreto (2024), who found similar negative or insignificant relationships between debt and productivity in developing economies, emphasizing the importance of effective debt management and investment in growth-enhancing sectors.

Interestingly, personal remittances emerged as a distinct component of international inflows with a positive and significant influence on labour productivity in Nigeria. Remittances provide household income support, enabling better access to education, healthcare, and tools that improve labour efficiency. They can also ease liquidity constraints and finance small-scale enterprises, indirectly fostering higher productivity. In the short run, remittances play a stabilizing role by cushioning economic shocks, supporting consumption, and enhancing work incentives. However, their modest magnitude suggests that their productivity-enhancing effect depends largely on the channel of utilization—whether directed toward consumption or investment. While some inflows, particularly FDI and external debt, demonstrate significant negative effects, others such as portfolio investment and official aid remain largely ineffective in promoting long-term productivity.

In contrast, remittances show consistent positive contributions, albeit at a modest scale. The findings suggest that the productivity impact of capital inflows depends heavily on their composition, sectoral allocation, and the domestic economy's absorptive capacity. Nigeria's weak institutional frameworks, limited technological readiness, and reliance on capital-intensive industries may explain why the expected productivity gains from foreign inflows remain elusive. Strengthening governance, promoting skill development, and ensuring that external resources are channelled into productive and labour-intensive sectors could enhance the positive effects of

international capital inflows on labour productivity in the long run. (Jibrilla & Dunusinghe, 2021; Aliyu, 2015; Gomina et al., 2024; Barreto, 2024; Anibal-Barreto, 2024).

Conclusion

The study concludes that international capital inflows exert mixed and often contrasting effects on labour productivity in Nigeria. While foreign direct investment and external debt significantly reduce productivity in both the short and long run, foreign portfolio investment and official development assistance show no meaningful influence, suggesting that such inflows have yet to be effectively channelled into productive, labour-enhancing sectors. Conversely, personal remittances display a generally positive association with productivity under the ARDL model, highlighting their potential to support household investment, education, and small-scale enterprises, though the FMOLS result tempers this optimism. Real GDP and secondary school enrolment emerge as strong, consistent drivers of productivity, confirming that economic growth and human capital accumulation remain central to improving labour efficiency. The negative coefficient of gross fixed capital formation, however, implies structural inefficiencies or misallocation of resources within Nigeria's investment framework. The study underscores the need for policies that attract quality, productivity-oriented foreign investment, enhance institutional quality, and promote education-driven human capital development. Strengthening governance and ensuring transparency in the management of foreign inflows will also be crucial for translating external capital into sustainable productivity and long-term economic growth.

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