Journal of Business Innovation and Accounting Research
Vol 3, No 1
http://educo-insight.com/journal/index.php/jbiar

Impact of International Capital Inflows, Institutional Quality, and Macroeconomic Factors on Labour Productivity in Nigeria

Uzoma Mirian Anyachebelu

Department of Economics, Nwafor Orizu college of education, Nsugbe, Anambra State, Nigeria

Abstract
The study is based on the Solow–Swan neoclassical growth model, which explains economic growth through the interaction of output, capital, labour, and technological progress. It examines how international capital inflows influence labour productivity in Nigeria. The model includes variables such as foreign direct investment, foreign portfolio investment, external debt, official development assistance, remittances, gross fixed capital formation, real GDP, and secondary school enrollment. The analysis employs the Autoregressive Distributed Lag (ARDL) approach to capture both short-run and long-run relationships among variables. For robustness, the Fully Modified Ordinary Least Squares (FMOLS) technique is also applied. The study further conducts pre- and post-estimation diagnostic tests to ensure the reliability and stability of the econometric results. The results revealed a mixed order of integration, where four variables were integrated at first difference I(1) and six variables were stationary at level I(0), satisfying the requirement for applying the ARDL bounds test. Short-run ARDL results show that FDI (-0.0023), ODA (-0.0009), external debt (-0.0118), and GFCF (-0.0780) negatively affect labour productivity, while RGDP (1.0221), secondary school enrolment (0.0010), and FPI (0.0000) have positive effects. The error correction term (-0.5823) confirms adjustment toward long-run equilibrium. Diagnostic tests indicate no autocorrelation, no heteroscedasticity, and model stability. The findings suggest that improving institutional quality and macroeconomic stability is essential for ensuring that international capital inflows effectively enhance labour productivity in Nigeria.
Keyword: Autoregressive Distributed Lag, Labour productivity, international capital inflows, institutional quality, macroeconomic factors.

1. Introduction

Nigeria continues to face the challenge of relatively low labour productivity despite increasing levels of international capital inflows over the past decades. Labour productivity is a key driver of economic growth because it reflects the efficiency with which labour inputs are transformed into goods and services. However, in Nigeria, productivity growth has been constrained by weak institutional structures, macroeconomic instability, inadequate infrastructure, and inefficient allocation of foreign capital. Although international capital inflows are expected to supplement domestic savings and stimulate investment, their actual contribution to labour productivity remains uncertain (Pal, 2024). This raises concerns about whether foreign capital inflows, institutional quality, and macroeconomic conditions effectively translate into productivity improvements and sustainable economic growth.

International capital inflows including foreign direct investment (FDI), foreign portfolio investment (FPI), remittances, official development assistance (ODA), and external debt which play an important role in financing development in emerging economies such as Nigeria. These inflows provide capital resources that can support investment in infrastructure, technology, and productive sectors of the economy. For instance, FDI is widely recognized as a major channel through which developing countries acquire advanced technology, managerial expertise, and innovation, all of which can enhance labour productivity (Workneh & Kumar, 2026). Similarly, portfolio investment can deepen financial markets and increase liquidity, which may indirectly support productive investments and economic growth (Amihud & Levi, 2023).

However, the productivity impact of international capital inflows is not always positive. In some cases, foreign capital inflows may be directed toward sectors that do not significantly contribute to productivity growth, such as speculative financial activities or consumption-oriented activities. Empirical evidence suggests that the effectiveness of foreign capital inflows largely depends on how efficiently these funds are allocated within the economy (Kanval et al., 2024). In Nigeria, some studies indicate that certain forms of capital inflows have limited productivity effects because they are not adequately channeled into sectors that promote technological advancement and industrial development. This situation may also be linked to gaps in human capital capacity and technical skill development required to absorb foreign technologies. For instance, Okafor (2021) observed that limited mastery of technical and process skills among students reflects broader challenges in developing the skilled workforce needed to support productivity improvements. Similarly, Muogbo et al. (2025) emphasize that effective learning strategies and skill acquisition are essential for building human capital capable of utilizing modern technologies introduced through foreign investments. These gaps in skill development may therefore limit the potential productivity gains from international capital inflows.

Institutional quality is another critical factor that influences the relationship between capital inflows and labour productivity. Strong institutions characterized by effective governance, transparency, rule of law, and regulatory quality which create an enabling environment that encourages productive investment. In contrast, weak institutions can undermine the potential benefits of foreign capital by increasing corruption, misallocation of resources, and policy uncertainty. Recent studies show that institutional quality significantly affects the extent to which foreign investment contributes to economic development in African economies, including Nigeria (Okoh, 2024). When governance systems are effective, foreign capital is more likely to be directed toward productive sectors that generate employment and improve productivity.

Macroeconomic conditions also play a significant role in determining the impact of international capital inflows on labour productivity. Macroeconomic stability reflected in stable inflation, sustainable fiscal policies, and stable exchange rates creates a favourable investment climate that attracts both domestic and foreign investment. When macroeconomic conditions are unstable, investment flows may become volatile and reduce the productivity benefits of foreign capital. Research has shown that macroeconomic stability enhances the effectiveness of foreign investments in promoting productivity and economic growth in developing countries (Chornyi & Chorna, 2026). Furthermore, factors such as capital formation, human capital development, and output growth are important determinants of labour productivity because they improve workers' skills and increase the productive capacity of firms.

The importance of this study lies in its contribution to understanding how international capital inflows translate into productivity improvements in Nigeria. Although several studies have examined foreign capital inflows and economic growth, fewer have focused specifically on labour productivity and the role of institutional quality in shaping these outcomes. Recent research emphasizes that weak institutions and macroeconomic instability often reduce the developmental benefits of foreign investment in developing economies (Chrystella et al, 2025). In Nigeria, empirical evidence on how different capital inflows interact with macroeconomic conditions and governance to influence labour productivity remains limited. This study therefore fills an important gap by jointly analyzing capital inflows, institutional quality, and macroeconomic factors.

2. Literature review

International capital inflows have been widely recognized as an important driver of economic growth and labour productivity in developing economies. Foreign direct investment (FDI) in particular has been identified as a key channel through which technology transfer, capital accumulation, and managerial expertise are transmitted across countries. For instance, Chornyi and Chorna (2026) found that FDI significantly promotes economic growth by improving productive capacity and facilitating technological diffusion across host economies. Similarly, Chrystella et al. (2025) argue that the effectiveness of international capital inflows largely depends on the policy environment and domestic absorptive capacity, emphasizing that foreign investment can stimulate productivity when supported by appropriate economic policies and institutional frameworks. Empirical evidence from developing countries also highlights the productivity-enhancing role of FDI through technological spillovers. Workneh and Kumar (2026) demonstrate that foreign investment in Ethiopia's manufacturing sector improved labour productivity by introducing advanced production techniques and enhancing workforce efficiency. These findings suggest that international capital inflows can strengthen productivity when they are directed toward sectors capable of absorbing new technologies and skills.

However, the benefits of foreign capital inflows are strongly influenced by institutional quality and governance structures. Mbuba (2021a) notes that effective institutional frameworks are essential for maintaining economic stability and ensuring equitable allocation of national resources. Similarly, Mbuba (2021b) emphasizes that governance structures and public sector regulations play a critical role in determining how economic opportunities and resources are distributed within a country. Weak institutions may limit the positive impact of capital inflows by encouraging inefficiency and corruption. In a related discussion, Mbuba (2018b) highlights the importance of ethical conduct in public administration for promoting transparency and accountability in governance.

Institutional quality also affects the regulatory environment and policy implementation. For instance, Mbuba (2018a) explains that regulatory institutions play an important role in monitoring and guiding economic activities, ensuring that sectors operate within established standards. Likewise, Okosa et al. (2025) stress that ethical practices and avoidance of conflicts of interest within institutions are necessary for sustaining investor confidence and promoting economic efficiency. Legal frameworks also shape economic outcomes, as noted by Udensi and Okosa (2025), who argue that institutional doctrines influence how laws and policies are interpreted and implemented.

Beyond institutional factors, macroeconomic and socio-economic conditions also affect labour productivity. Human capital development is widely acknowledged as a key determinant of productivity growth. For example, Obikezie et al. (2023) and Ezeanyagu et al. (2023) demonstrate that effective educational strategies and motivational factors significantly improve student achievement and skill development, which are essential components of future labour productivity. Similarly, Enem et al. (2025) show that technological innovation in education enhances students' interest and competence in technical fields, thereby strengthening human capital formation. Infrastructure and housing development also influence economic productivity. Ikeotuonye and Efobi (2022) highlight the importance of investment in housing and real estate development for supporting economic activities and employment generation. In addition, Anyakora et al. (2025) emphasize that sustainable infrastructure management can improve economic efficiency and environmental outcomes.

Organizational and social factors also shape economic productivity. Mbuba (2016) argues that effective conflict management within organizations promotes business growth and operational efficiency. Likewise, Ike et al. (2021) demonstrate that effective government policies can address structural challenges such as housing and infrastructure deficits that may hinder economic productivity. The literature indicates that while international capital inflows can enhance labour productivity through investment and technological transfer, their effectiveness depends on strong institutional frameworks, sound governance practices, human capital development, and supportive macroeconomic conditions

.

2. Material and Method

The study adopts the Solow-Swan Neoclassical growth model, which links output per labour with capital accumulation using variables such as output (Y), capital (K), labour (L), and knowledge (A). The model suggests that increases in labour or capital lead to diminishing returns, while technological progress drives long-term growth. The study also employs the ARDL model, following Hailat and Baniata (2018), to examine the relationship between labour productivity and international capital inflows, allowing different lag lengths and capturing both short-run dynamics and long-run equilibrium adjustments.

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. For a robustness check, the study employed the FMOLS to validate the estimations in research questions one to five. 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) (1)

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 is gross fixed capital formation, and SERR is secondary school enrolment.

The mathematical form of Equation 2 is given as:

$$\begin{aligned} LP_t = \alpha_0 &+ \varphi_j LP_{t-i} + \varphi_j FDI_{t-i} + \varphi_j FPI_{t-i} + \varphi_j EDS_{t-i} + \varphi_j ODA_{t-i} + \varphi_j GFCF_{t-i} \\ &+ \varphi_j PRER_{t-i} + \varphi_j RGDP_{t-i} + \varphi_j SERR_{t-i} \qquad (2) \end{aligned}$$

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

$$\begin{aligned} logLP_t = \alpha_0 &+ \sum_{j=1}^{p} \beta_1 logLP_{t-j} + \sum_{j=0}^{q} \beta_2\, FDI_{t-j} + \sum_{j=0}^{q} \beta_3\, FPI_{t-j} + \sum_{j=0}^{q} \beta_4\, logEDS_{t-j} \\ &+ \sum_{j=0}^{q} \beta_5\, logODA_{t-j} + \sum_{j=0}^{q} \beta_6\, logGFCF_{t-j} + \sum_{j=0}^{q} \beta_7\, PRER_{t-j} \\ &+ \sum_{j=0}^{q} \beta_8\, logRGDP_{t-j} + \sum_{j=0}^{q} \beta_9\, SERR_{t-j} + \mu_t \qquad (3) \end{aligned}$$

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;

$$\begin{aligned} \Delta \log LP_t = \alpha_0 &+ \varphi_j logLP_{t-i} + \varphi_j FDI_{t-i} + \varphi_j FPI_{t-i} + \varphi_j logEDS_{t-i} + \varphi_j logODA_{t-i} \\ &+ \varphi_j logGFCF_{t-i} + \varphi_j PRER_{t-i} + \varphi_j logRGDP_{t-i} + \varphi_j SERR_{t-i} \\ &+ \sum_{j=1}^{p} \beta_1 \Delta \log LP_{t-j} + \sum_{j=0}^{q} \beta_2\, \Delta FDI_{t-j} + \sum_{j=0}^{q} \beta_3\, \Delta FPI_{t-j} + \sum_{j=0}^{q} \beta_4\, \Delta logEDS_{t-j} \\ &+ \sum_{j=0}^{q} \beta_5\, \Delta logODA_{t-j} + \sum_{j=0}^{q} \beta_6\, \Delta logGFCF_{t-j} + \sum_{j=0}^{q} \beta_7\, \Delta PRER_{t-j} \\ &+ \sum_{j=0}^{q} \beta_8\, \Delta logRGDP_{t-j} + \sum_{j=0}^{q} \beta_9\, \Delta SERR_{t-j} + \mu_t \qquad (4) \end{aligned}$$

The hypothesis for the bounds test, which shows that the 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).

$$\Delta logLP_t = \alpha_0 + \sum_{j=1}^{p} \beta_1 \Delta logLP_{t-j} + \sum_{j=0}^{q} \beta_2 \Delta FDI_{t-j} + \sum_{j=0}^{q} \beta_3 \Delta FPI_{t-j} + \sum_{j=0}^{q} \beta_4 \Delta logEDS_{t-j} + \sum_{j=0}^{q} \beta_5 \Delta logODA_{t-j} + \sum_{j=0}^{q} \beta_6 \Delta logGFCF_{t-j} + \sum_{j=0}^{q} \beta_7 \Delta PRER_{t-j} + \sum_{j=0}^{q} \beta_8 \Delta logRGDP_{t-j} + \sum_{j=0}^{q} \beta_9 \Delta SERR_{t-j} + \gamma ECT_{t-i} + \mu_t \quad (5)$$

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.

The model examines the relationship between international capital inflows and labour productivity by defining several key variables that capture economic performance, financial inflows, human capital, and institutional conditions. Labour productivity measures the efficiency of labour in producing goods and services and is calculated as the ratio of output to labour input. It is a crucial indicator because foreign capital inflows can influence productivity by changing the capital–labour ratio, introducing advanced technologies, and enhancing human capital development. When productivity increases, it indicates that the workforce is producing more output with the same or fewer resources.

Foreign Direct Investment (FDI) represents long-term foreign investment in domestic enterprises, typically involving ownership of at least ten percent of voting shares. FDI is important because it brings not only financial capital but also technological knowledge, managerial expertise, and improved production techniques that can significantly raise worker productivity. Foreign Portfolio Investment (FPI), which involves foreign investments in financial assets such as stocks and bonds, also contributes to capital availability and financial market development, potentially influencing productivity through improved access to funds and increased economic activity.

Personal remittances consist of funds sent by migrants to households in their home country. These inflows are an important source of private foreign capital that households often use for consumption, education, healthcare, and small business investments. Such expenditures can improve workers' skills, support entrepreneurial activities, and enhance overall economic efficiency. External debt, which includes public and private long-term borrowing, IMF credit, and short-term obligations to foreign creditors, reflects a country's foreign financing commitments. Borrowed funds can support productivity-enhancing investments such as infrastructure development, but high debt servicing obligations may also limit resources available for productive economic activities.

Official Development Assistance (ODA) represents financial support provided by governments and international organizations to promote development. ODA can contribute to capital formation through investments in physical infrastructure and social services such as education and health. However, its effectiveness depends on how it is allocated, as funds directed toward recurrent government expenditures may not significantly stimulate productivity growth. Real Gross Domestic Product (RGDP) is included to control for the overall size and performance of the economy while adjusting for inflation, allowing a clearer comparison of productivity changes over time. Gross Fixed Capital Formation (GFCF) serves as a proxy for capital formation because it measures investments in physical assets such as machinery, buildings, and infrastructure that expand productive capacity. Human capital development is represented by Secondary School Enrollment, since a more educated workforce tends to be more adaptable and capable of adopting new technologies associated with foreign investment. Institutional Quality Index captures governance conditions—including rule of law, regulatory quality, government effectiveness, and control of corruption—which influence how efficiently international capital inflows translate into productivity gains.

The analysis employs the Autoregressive Distributed Lag (ARDL) model because of its flexibility in estimating both short-run and long-run relationships among variables. The model accommodates variables integrated at different orders and performs well with relatively small sample sizes. By including lagged variables and an error correction mechanism, it captures dynamic interactions and distinguishes between temporary fluctuations and long-term equilibrium relationships. Optimal lag lengths are selected using information criteria to improve model accuracy and reduce potential econometric issues such as autocorrelation or omitted variable bias.

To ensure robustness of the results, the Fully Modified Ordinary Least Squares (FMOLS) estimator is also applied. FMOLS corrects for potential endogeneity and serial correlation in long-run relationships, providing consistent parameter estimates. The combination of ARDL and FMOLS strengthens the reliability of the findings and provides a comprehensive understanding of how foreign direct investment, portfolio inflows, remittances, external debt, and development assistance influence labour productivity under varying economic and institutional conditions.

2.1 Estimation Techniques and Procedures

The models of this study were estimated using the Autoregressive Distributed Lag model.

2.1.1 Evaluation Procedure

In order to ensure the validity, reliability, and robustness of the econometric analysis, this study adopts a comprehensive evaluation procedure that involves both pre-estimation and post-estimation diagnostic tests. The pre-estimation phase assesses the statistical properties of the data, ensuring they meet the underlying assumptions of the chosen model, while the post-estimation phase validates the adequacy and stability of the estimated results. By combining descriptive analysis, unit root and co-integration testing, with diagnostic checks such as autocorrelation, heteroscedasticity, and stability tests, the study establishes a rigorous framework for drawing credible inferences. This systematic evaluation strengthens the accuracy of the findings and provides a sound basis for policy recommendations.

2.1.2 Pre-Estimation Test

In examining the study objectives, the researcher conducted some descriptive pre-estimation tests to justify the use of the data. The pre-estimation properly examined the unit root test, the multicollinearity test, and the co-integration test.

Descriptive Analysis Pre-test: Descriptive statistics provide a summary of the key properties and characteristics of the dataset used in the analysis. These statistics include measures of central tendency (mean, median, and mode) and dispersion (range, variance, and standard deviation). Such measures are vital for both parametric and non-parametric methods, as well as for quantitative and qualitative research. They help in gaining a comprehensive understanding of the dataset.

Unit Root Test: To prevent the problem of false regressions, the time series features of the data used in the estimation equation are evaluated for stationarity using the Augmented Dickey-Fuller (ADF) tests and the Phillips-Perron test. The Augmented Dickey-Fuller (ADF) tests and the Phillips-Perron test, which were used to test for data stationarity at 1%, 5%, and 10% critical values, will be utilized to conduct the unit root test.

Multicollinearity Test: Multicollinearity occurs when predictor variables in a regression model are highly correlated with each other. To detect multicollinearity, we use the correlation matrix to examine the relationships between the independent variables. If any correlation exceeds 0.8, it suggests the presence of multicollinearity, which can undermine the reliability of the regression estimates.

2.1.2 Post-Estimation Test

Under this section, some post-estimation tests were conducted to determine the robustness of the estimated outcome, which includes the heteroskedasticity test, the Breusch-Godfrey Serial Correlation test, and the Dynamic stability Cusum test.

Test for Autocorrelation: This is also known as the Lagrangian Multiplier (LM) test. This is a standard tool that is applied in econometrics time-series analyses to check for autocorrelation in the residuals. This is also called the Breusch–Godfrey Test, named after the founders, Trevor S. Breusch and Leslie G. Godfrey. This is said to be more superior and reliable than Durbin Watson statistics. This is because the Durbin-Watson test is restricted to only non-stochastic regressors and first-order autoregressive models, such as the AR(1) process, but fails when the order is more than one. The Breusch-Godfrey test is more general and has none of these restrictions. However, inasmuch as the proposed methodology has an inbuilt mechanism that solves this problem, the study will go further to mechanically conduct this test. The test makes use of the residuals from the model under study. If a serial correlation exists, it will lead to an incorrect conclusion. Therefore, if the serial correlation is present in the model, the Newey-West Heteroscedasticity and Autocorrelation Corrected (HAC) standard error technique will be applied for the correction.

Test for Heteroscedasticity: This test verifies if the model's error term has constant variance over time. A violation of the constant variance property of the error term is known as heteroscedasticity. The test is conducted using the Breusch-Pagan-Godfrey test tool. Again, if heteroscedasticity is found to be present in the model, it will be corrected using the Newey-West HAC standard error tool.

Stability Test: We must verify the stability of the model, for it will help with forecasting and inferences. In this regard, Cumulative Sum (CUSUM) and Cumulative Sum of Squares (CUSUMSQ) are found to be appropriate as they are widely used in the literature. Therefore, this approach will be used in this study to determine our model stability.

2.2 Nature and Source of Data

The data are annual time series data collected from secondary data sources spanning from 1992 to 2024, i.e., 33 years. The data was sourced from the statistical bulletin (2023), World Bank Indicators (2024), and World Governance Indicators (2024) (Table 1).

Table 1 Variables, Measurements, and Sources

Variables	Measurements	Sources
Labour productivity	GDP per person employed	WDI (2024).
Foreign direct investment	Net inflows	WDI (2024).
Foreign portfolio investment	Net inflows	WDI (2024).
Personal Remittances	Inflows	WDI (2024).
Official development assistance and official aid received	Net inflows	WDI (2024).
External debt flows	Current US$	WDI (2024).
Gross fixed capital formation	Billions of dollars	CBN Statistical Bulletin, 2024
Real GDP	Constant 2015 US$	WDI (2024).
School enrollment, secondary	% gross	WDI (2024).
Composite Institutional Quality Index	The estimate gives the country's score on the aggregate indicator, in units of standard normal distribution, i.e., ranging from approximately -2.5 to 2.5.	WGI (2024).

Source: Researchers' compilation (2025).

The study employs an E-View 10 software package that is appropriate for estimation. The software is advantageous because it is user-friendly and can handle all analyses relevant to this study.

2.3 Unit Root (Stationarity Test)

The unit root test is conducted to check if there is stationarity in the variables. Establishing stationarity is of paramount importance because, without it, data processing may yield biased results. This, in turn, leads to unreliable interpretations and conclusions. Stationarity, in this context, refers to the constancy of statistical characteristics within a time series, including parameters like mean, variance, and autocorrelation, which remain unchanged over time. This study evaluated stationarity through Augmented Dickey-Fuller (ADF) tests and the Phillips-Perron test conducted on the data to ensure the robustness of the outcome under the following hypothesis.

H_o: Variable contains a unit root, hence non-stationary.

H_1: Variable does not contain a unit root, hence stationary.

These tests are performed on the original data series, as well as the first-order differenced series. The decision criterion involves rejecting the null hypothesis if the ADF and Phillips-Perron test statistic values exceed the critical value at a chosen significance level (in absolute terms).

3. Results

The results of the ADF and Phillips-Perron unit root tests is presented in Table 2.

Table 2: Summary of ADF Unit Root Test Results

Variables	Test Stat.	5% Critical Value	Test Stat.	5% Critical Value	Order of Integration
	ADF Unit Root Test		**Phillips-Perron Unit Root Test**		
LP	-2.493021	-1.952066	-2.406681	-1.952066	1(1)
FDI	-4.793848	-3.562882	-4.793848	-3.562882	1(1)
FPI	-4.287124	-3.557759	-4.303949	-3.557759	1(0)
EDS	2.710980	-1.951687	2.408900	-1.951687	1(0)
ODA	-4.169050	-3.562882	-12.64202	-3.562882	1(0)
GFCF	6.758265	-1.951687	5.609836	--1.951687	1(0)
PRER	-5.515214	-3.562882	-6.128025	-3.562882	1(1)
RGDP	2.246054	-1.952066	3.903112	-1.951687	1(0)
SERR	-3.622986	-3.557759	-3.622986	-3.557759	1(0)
INSQIDX	-4.563062	-3.562882	-4.992277	-3.562882	1(1)

Source: Computed from E-Views 10

Following the decision rule, which is to reject the null hypothesis if the ADF statistic value exceeds the critical value at a chosen level of significance (in absolute terms), and accept stationarity when the ADF statistic is greater than the critical value, it can be observed from Table 2 that there is a mix of orders of integration.

3.1 Short-Run Estimation and Interpretation for Model 1 with the ARDL Model

Table 3: The Short Run Estimated Coefficient for Model 1

Variables	Coef.	Std. Error	Prob.
	ARDL		
D(LOGLP(-1))	2.6293*	0.0686	0.0000

D(FDI)	-0.0023*	0.0001	0.0000
D(FPI)	0.0000**	0.0000	0.0540
D(LOGODA)	-0.0009**	0.0003	0.0513
D(LOGEDS)	-0.0118*	0.0013	0.0002
D(PRER)	-0.0006*	0.0001	0.0063
D(LOGGFCF)	-0.0780*	0.0049	0.0000
D(LOGRGDP)	1.0221*	0.0048	0.0000
D(SERR)	0.0010*	0.00006	0.0000
CointEq(-1)*	-0.5823*	0.0261	0.0000

Source: Computed using E-views 10

Note: * denotes significance at 1%, ** denotes significance at 5%

The short-run ARDL results show how changes in the explanatory variables influence labour productivity in the short term. The lagged change in labour productivity has a positive and statistically significant effect on current productivity, with a coefficient of (2.6293), indicating strong persistence in productivity growth. This suggests that previous improvements in productivity tend to reinforce current productivity levels. Foreign Direct Investment (FDI) has a negative and significant short-run effect on labour productivity with a coefficient of (-0.0023), implying that immediate inflows of FDI may initially disrupt productivity, possibly due to adjustment costs, technology adaptation, or structural changes in firms. Similarly, Official Development Assistance (ODA) and external debt (EDS) show negative short-run effects with coefficients of (-0.0009) and (-0.0118) respectively, suggesting that in the short term these inflows may not immediately translate into productivity gains. Personal remittances also have a negative and significant impact (-0.0006), indicating that remittance inflows may initially be used for consumption rather than productive investment.

Foreign Portfolio Investment (FPI) shows a positive but weakly significant effect (0.0000), implying a limited short-term contribution to productivity. Gross Fixed Capital Formation negatively affects productivity in the short run (-0.0780), which may reflect adjustment periods in capital investment. However, Real GDP (1.0221) and secondary school enrollment (0.0010) positively and significantly influence productivity, highlighting the importance of economic growth and human capital development. The error correction term (-0.5823) is negative and significant, indicating that about (58.23%) of short-run disequilibrium is corrected each period, confirming the existence of a stable long-run relationship among the variables.

The short-run coefficient effect of personal remittances received remains positive at 0.0006 with a probability value of less than 1%, meaning that a unit change in personal remittances received increases labour productivity by 0.06% in the short run. Furthermore, 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. Likewise, the short-run impact is similarly large and significant as the coefficient of real GDP is 1.022 with a probability value of 0.01, reflecting that increases in overall economic output lead to immediate gains in 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. The error-correction term in the short-run ARDL mode, that is, CointEq(−1), disclosed a coefficient of –0.5823 with a probability value of 0.01. Its negative sign confirms that when labour productivity deviates from its long-run equilibrium (as defined by the dependent and independent variables), roughly 58.23 percent of that deviation is corrected in the next period. In other words, if labour productivity overshoots or undershoots its equilibrium value, more than half of the gap is closed by the following period, indicating a relatively fast adjustment back toward the long-term relationship.

3.2 Test for Autocorrelation (Breusch-Godfrey).

The Autocorrelation test is used to check if the error terms of different observations are correlated with each other, which is against the assumptions of OLS. Autocorrelation is manifested by OLS estimators, which are not BLUE (Best linear unbiased estimates). In our study, the Breusch-Godfrey Serial Correlation LM Test is used to detect the presence of autocorrelation for the three models (Table 4).

Table 4: Summary of Breusch-Godfrey Serial Correlation LM Test.

	Test Statistic	P-Value
F- Statistic	0.557275	0.4968
Observed R^2	3.790756	0.0515
Durbin-Watson test statistic	2.368152	

Source: Computed using E-view 10

The Breusch–Godfrey Serial Correlation LM test in Table 4 indicates no evidence of serial correlation in the model. The F-statistic (0.557275) with a p-value (0.4968) is insignificant, while the observed R^2 (3.790756) with p-value (0.0515) is marginal. The Durbin–Watson statistic (2.368152) also suggests absence of autocorrelation in the residuals.

3.3 Test for Heteroscedasticity (Breusch-Pagan-Godfrey)

The Heteroscedasticity test is conducted to ascertain if the variance of the error term is constant for all observations. This forms one of the assumptions of the ordinary least squares (OLS), which, if the assumption does not hold, we face the problem of heteroscedasticity. Therefore, to confirm that the variance of the error term is constant, the heteroscedasticity test was adopted. This result is presented in Table 5.

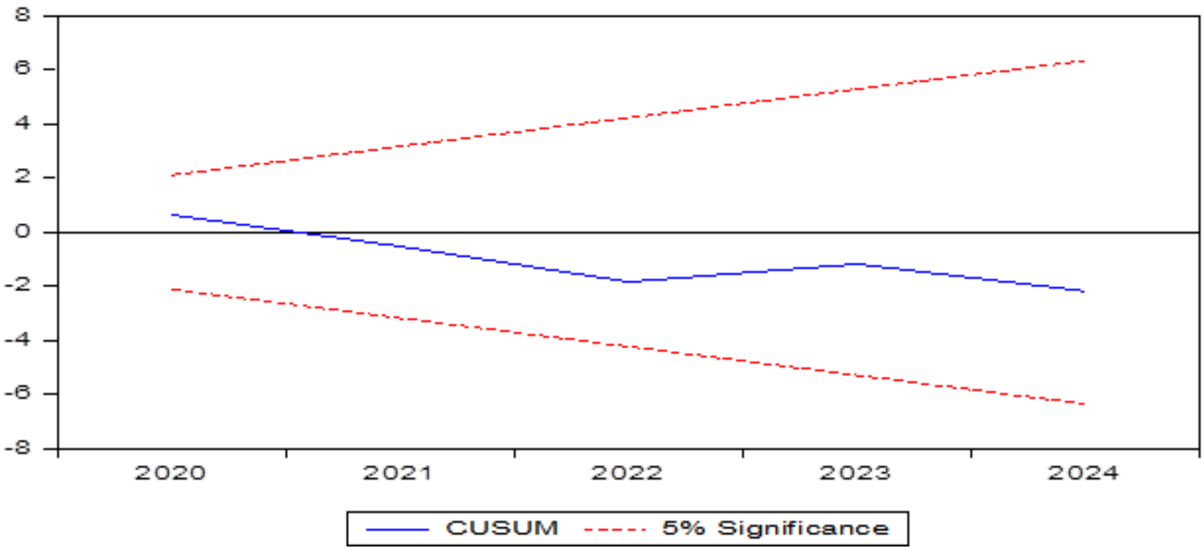
Table 5: Summary of Heteroskedasticity Test

	Test Statistic	P-Value
F- Statistic	0.569471	0.8488
Observed R^2	21.54268	0.6065

The heteroskedasticity test results in Table 5 indicate the absence of heteroskedasticity in the model. The F-statistic (0.569471) with a probability value of (0.8488) and the observed R^2 (21.54268) with a p-value of (0.6065) are statistically insignificant. This implies that the error terms have constant variance, confirming the reliability of the model estimates.

Stability test

The diagnostic test conducted for the models is the CUSUM test to certify the stability of the model. The null hypothesis being tested here is that the $CUSUM_t$ statistic is drawn from a $CUSUM_{(t-k)}$ distribution; thus, the $CUSUM_{(t-k)}$ is a symmetric distribution centered at 0 with its dispersion increasing as t-k does.



Source: Computed using E-view 10

Figure 1: CUSUM Stability Test for the ARDL Model

The CUSUM test in Figure 1 is used to examine the stability of the estimated ARDL model over the sample period. The blue line represents the cumulative sum of recursive residuals, while the red dashed lines indicate the (5%) significance boundaries. The result shows that the CUSUM line remains within the upper and lower critical bounds throughout the period. This indicates that the estimated coefficients of the model are stable and that there is no evidence of structural instability in the model. Therefore, the relationship between labour productivity and the explanatory variables remains consistent over time, confirming that the ARDL model is reliable for policy analysis and inference.

Discussion

The results of the unit root tests reveal a mixed order of integration among the variables, with some variables stationary at level I(0) while others become stationary after first differencing I(1). This outcome supports the application of the ARDL bounds testing approach since the model can accommodate variables integrated at different orders. In a related study, Hailat and Baniata (2018) also employed the ARDL framework when variables exhibited mixed integration orders, emphasizing that such a condition is appropriate for estimating both short-run and long-run relationships among macroeconomic variables. Similarly, Pal (2024) noted that mixed integration properties are common in studies examining capital flows and macroeconomic performance in developing economies, thereby validating the use of ARDL techniques in empirical analysis.

The short-run ARDL results indicate that foreign direct investment (FDI) has a negative and significant effect on labour productivity. In contrast, studies such as Workneh and Kumar (2026) found that FDI positively contributes to productivity through technology spillovers and knowledge transfer in the manufacturing sector. However, this study's finding suggests that the immediate impact of FDI may be negative due to adjustment costs or inefficiencies in the host economy. Similarly, the negative short-run effects of official development assistance (ODA) and external debt imply that foreign financial inflows may not immediately translate into productivity gains. In contrast, Chrystella et al. (2025) argue that the impact of foreign capital depends largely on the policy environment and the absorptive capacity of the receiving economy.

Foreign portfolio investment (FPI), however, shows a positive but weakly significant effect on labour productivity. This finding agreed with Amihud and Levi (2023), who emphasized that increased financial market liquidity and investment flows can enhance firm investment and production activities, thereby supporting productivity improvements. Personal remittances also exhibit a negative short-run effect on labour productivity. In contrast, Kanval et al. (2024) highlighted that remittances can enhance human capital formation and contribute positively to economic performance when invested in education and skill development.

The results further reveal that gross fixed capital formation negatively affects labour productivity in the short run. In contrast, Pal (2024) noted that domestic investment can stimulate productivity when supported by efficient institutional frameworks and productive allocation of resources. On the other hand, real GDP and secondary school enrollment exert positive and significant effects on labour productivity. This finding agreed with Kanval et al. (2024), who emphasized that human capital development plays a critical role in enhancing economic productivity and sustainable development.

The error correction term is negative and significant, confirming the existence of a long-run equilibrium relationship among the variables and indicating that deviations from equilibrium are corrected over time. The diagnostic tests further show that the model is free from serial correlation and heteroskedasticity, while the CUSUM stability test confirms the stability of the estimated parameters. These findings align with the econometric principles discussed by Banerjee et al. (1993), which emphasize the importance of stability and diagnostic testing in validating empirical models.

Conclusion

This study examined the impact of international capital inflows, institutional quality, and macroeconomic factors on labour productivity in Nigeria using the Solow–Swan neoclassical growth framework. The analysis employed the Autoregressive Distributed Lag (ARDL) model to estimate both short-run and long-run relationships among the variables, while the Fully Modified Ordinary Least Squares (FMOLS) technique was used to validate the robustness of the results. The findings revealed that international capital inflows and macroeconomic variables influence labour productivity in Nigeria, although their effects vary in the short run.

The empirical results show that foreign direct investment, official development assistance, external debt, and gross fixed capital formation have negative short-run effects on labour productivity. This suggests that these capital inflows may not immediately translate into productivity gains due to adjustment costs, inefficient allocation of funds, or structural challenges within the Nigerian economy. In contrast, foreign portfolio investment, real gross domestic product, and secondary school enrollment were found to exert positive effects on labour productivity. These findings highlight the importance of economic growth and human capital development in improving workforce efficiency and productivity. The error correction mechanism confirms the existence of a long-run equilibrium relationship among the variables, indicating that deviations from equilibrium are corrected over time. Diagnostic tests further confirm the reliability of the model, showing the absence of autocorrelation and heteroscedasticity, while stability tests indicate that the estimated model is stable and suitable for policy analysis.

References

Amihud, Y., & Levi, S. (2023). The effect of stock liquidity on the firm's investment and production. *The Review of Financial Studies*, *36*(3), 1094-1147.

Anyakora, M. I., Odimegwu, C. N., Ikeotuonye, C. M., Onwubuya-Ezeala, S. O., & Umeora, C. O. (2025). Prospects and challenges of adopting green maintenance approach in commercial property management for eco-friendly environment. *FESCON Conference Proceedings, 5*(1), 244–260.

Banerjee, A., Dolado, J. J., Galbraith, J. W., & Hendry, D. (1993). *Co-integration, error correction, and the econometric analysis of non-stationary data*. Oxford University Press.

Chornyi, R., & Chorna, N. (2026). The role of foreign direct investment in promoting economic growth: Evidence from Poland, Ukraine, and Vietnam (2004–2024). *Research in Globalization*, 100337.

Chrystella, D. F., Ibrahim, S., & Lihua, Y. (2025). Maximizing the impact of foreign direct investment: Trends, determinants, and strategies for sustainable economic and social development. *IOSR Journal of Economics and Finance*, *16*(1), 31-50.

Enem, E. S., Enemuo, C. J., & Okafor, T. U. (2025). Effect of technological gamification on upper basic education students' achievement and interest in computer studies in Awka education zone. *South Eastern Journal of Research and Sustainable Development, 18*(1), 67–83.

Ezeanyagu, N. D., Opara, F. M., & Okafor, T. U. (2023). Motivation and self-esteem as predictors of secondary school students' achievement in biology in Awka educational zone of Anambra State. *UNIZIK Journal of Educational Research and Policy Studies, 16*(2), 219–228.

Hailat, M. A., & Baniata, A. K. (2018). Effects of foreign capital inflow on labor productivity: evidence from Jordan. *Journal of Economic & Management Perspectives*, *12*(4), 28-39.

Ike, C. O., Mbuba, F., & Nwot, F. (2021). Federal government housing policy and building collapse in Anambra State: A study of Awka metropolis. *SSRN Electronic Journal.*

Ikeotuonye, M. C., & Efobi, D. J. (2022). Responding to housing (real estate) needs: The role of real estate developers and practitioners in investment in housing. *Iconic Research and Engineering Journals, 5*(8), 264–271.

Kanval, N., Ihsan, H., Irum, S., & Ambreen, I. (2024). Human capital formation, foreign direct investment inflows, and economic growth: A way forward to achieve sustainable development. *Journal of Management Practices, Humanities and Social Sciences*, *8*(3), 48-61.

Koutsoyiannis, A. (1997). Theory of Econometrics: Introductory to Exposition of Econometric Methods (2nd ed.).

Mbuba, F. (2016). Organizational conflict and business growth: An appraisal. *COOU Journal of Public Administration, 1*(2).

Mbuba, F. (2018a). Nigerian Broadcasting Commission and the regulation of broadcasting media in Nigeria. *Journal of Social Sciences and Public Policy, 10*(3).

Mbuba, F. (2018b). Public servants and code of conduct in Nigeria: A study of Anambra State (2010–2015). *Journal of Social Sciences and Public Policy, 10*(3).

Mbuba, F. (2021b). Federal character principle and the regulation of public employment in Nigeria: A critique. *Journal of Education and Leadership Development, 13*(1).

Mbuba, F. N. (2021a). Federal character principle and Nigerian federalism: An overview. *Journal of Social Sciences and Public Policy, 13*(1), 17–39.

Muogbo, U. F., Okafor, T. U., & Okafor, C. F. (2025). Experiential learning strategy as a predictor of male and female students' interest in computer studies. *IRASS Journal of Arts, Humanities and Social Sciences, 2*(5), 112–116.

Obikezie, M. C., Ezeliorah, B. A., & Okafor, T. U. (2023). Effect of generative learning model on secondary school students' academic achievement in chemistry. *UNIZIK Journal of Educational Research and Policy Studies, 15*(3), 45–55.

Okafor, T. U. (2021). Identification of difficult physics process skills in physics practical activities among senior secondary school students. *Nnadiebube Journal of Social Sciences, 2*(1), 206–217.

Okoh, J. O. (2024). Institutional quality, foreign direct investment and sustainable economic growth in emerging African economies. *International Journal of Developing and Emerging Economies*, *12*(11), 41-66.

Okosa, C. B., Ibe, I. U., & Ojimba, C. C. (2025). Application of ethics to legal practice: The rule against conflict of interests. *Chukwuemeka Odumegwu Ojukwu University Law Journal, 8*(1).

Pal, S. (2024). The international capital flows and domestic savings–domestic investment nexus: A comparative evidence between heterogeneous developing regions. *South Asian Journal of Macroeconomics and Public Finance*, *13*(2), 169-212.

Udensi, B., & Okosa, C. B. (2025). Contemporary issues on repugnancy test doctrine in Nigeria. *Chukwuemeka Odumegwu Ojukwu University Law Journal, 9*(1).

Workneh, W. M., & Kumar, R. (2026). Foreign direct investment in the manufacturing sector of Ethiopia (1996–2021): productivity performance and technology spillover perspectives. *Future Business Journal*, *12*(1), 1-19.