

Do Capital Accumulation, Globalisation, and Institutions Reduce Income Inequality Within the Kuznets Hypothesis in Nigeria?

Kelani, F. A. (PhD), Anagun, A. M.*, Agosu, P. M., and Kosoko, M. A.

* Corresponding author: anagunam@lasued.edu.ng

Department of Economics Education, Lagos State University of Education, Nigeria

Abstract

The demand for sustainable economic development poses challenges for the post-2015 sustainable development agenda. Achieving these objectives can reduce income inequality through capital accumulation, globalisation, and strengthened institutions, rather than just relying on economic growth. Thus, this study investigates how capital accumulation (through human and physical capital), globalisation, and institutions worsen income inequality within the Kuznets framework in Nigeria. The data were sourced from the UNU-WIDER World Income Inequality Database (WIID), the Central Bank of Nigeria (CBN) Public Finance and Real Annual Statistical Bulletin, the KOF Globalisation Index, and the World Development Indicators (WDI). The results employed the ECM-ARDL, Granger causality, and FMOLS frameworks, revealing that the per capita growth rate, the square of the per capita growth rate, education expenditures, gross fixed capital formation, and institutions worsen income inequality in the long-run. However, health expenditures and globalisation have a positive impact on income inequality in the long run, whereas health expenditures and gross fixed capital formation reduce it in the short run. Moreover, the long-run and short-run results are consistent with the FMOLS robustness test. In contrast, the Granger causality test indicates unidirectional causality from gross fixed capital formation, globalisation, and institutions, suggesting that institutional changes have a predictive reverse short-run effect on inequality and public capital investment. Thus, policy recommendations were discussed based on the findings.

Keywords: Capital accumulation. FMOLS. Globalisation. Institutions. Income inequality.

JEL Classification: E02. E24. E25. F15. O16.

1. Introduction

Globally, the reduction of income inequality has become a central macroeconomic objective and a key target of Sustainable Development Goal 10 (SDG 10) of the United Nations (UN), which has led to various fiscal policy reforms. The adverse and heterogeneous effects of income inequality have culminated in significant social unrest and economic threats, prompting research into its eradication (Martin et al., 2021; Okafor et al., 2023). The Nigerian economy has sought to reduce poverty and improve income distribution through various fiscal and monetary policies, including the implementation

of the National Economic Empowerment and Development Strategy (NEEDS) and the National Empowerment Scheme (N-Power). These fiscal policies have hitherto reduced the distribution of income, reaped significant economic benefits from the accumulation of human capital, and strengthened the quality and trust of institutions and globalisation (economic, trade, and financial globalisation). Thus, this establishes the proposition that income inequality can be reduced through reinvestment in capital, quality institutions, and globalisation, thereby mitigating rising rates of poverty and unemployment. Moreover, capital accumulation and globalisation aim to increase economic growth, thereby reducing income inequality. Conversely, an increase in income inequality affects globalisation by reducing economic growth and capital accumulation (Nissanke & Thorbecke, 2010; Osinubi & Olomola, 2020).

Theoretically, Kuznets (1955) and Stiglitz (2002) argued that economic growth, globalisation, and capital accumulation are linked to income inequality. However, their arguments rest on the premise that globalisation reduces income inequality, whereas improvements in economic growth initially aggravate income inequality but tend to decline over the long run. They further suggested that ignoring the reduction of income inequality in any economy can lead to increased crime rates, social unrest, poverty, and unemployment. Although the potential to reduce poverty and unemployment is influenced by capital accumulation, studies have empirically established a link among capital accumulation, economic growth, and globalisation. Separate, fragmented studies have examined the nonlinear effects of economic growth, capital accumulation, globalisation, and institutions on the reduction of income inequality. Research by Lima et al. (2021), Langnel et al. (2021), and Selem-Amachree and Ezekwe (2021) demonstrates that human capital accumulation reduces income inequality, whereas Flores (2021) finds that the capital share affects income share growth. Additionally, Okafor et al. (2023) revealed that the depth of financial development affects income inequality, whereas Osinubi and Olomola (2020) and Ifeakachukwu (2023) argued that globalisation significantly reduces income inequality. Similarly, Adeleye (2024) and Anagun et al. (2024) observed that human capital and institutions can actually worsen income inequality. Furthermore, when testing the Kuznets hypothesis, the structural effects of capital accumulation and institutions on income inequality are often overlooked.

Moreover, Nigeria's income inequality remains a persistent issue despite ongoing economic growth, extensive macroeconomic and institutional reforms, trade liberalisation, and increased public spending on health and education. Nigeria's Gini coefficient has averaged 42.54 over three decades, ranging between 35 and 57, with a pattern of entrenched rather than transitional inequality. Additionally, an increase in the globalisation index to 49.15 indicates minimal advancement in institutional quality, which has consistently averaged a negative value of 0.817. Although public expenditure in social sectors

has risen nominally, actual distributive outcomes have remained largely unchanged. Furthermore, GDP per capita growth remains low, averaging 1.38%, exhibiting notable volatility and a lack of meaningful structural transformation. Despite moderate indicators of globalisation and integration into international markets, Nigeria's weak institutional performance is underscored by persistently negative governance scores. However, Nigeria's data exhibit a contradictory pattern: significant foreign capital inflows, increased social-sector spending, and governance reforms through initiatives such as the National Economic Empowerment and Development Strategy (NEEDS) have not alleviated persistent poverty and income concentration. The expected distributive convergence has not occurred. Empirical findings from developing economies are mixed: some studies indicate progress in reducing inequality, whereas others suggest that skill-biased technological change and institutional disparities continue to exacerbate it. This indicates that substantial structural constraints hinder the realisation of investment and reform benefits.

However, this positions the present study to fill three key research gaps. First, prior studies have examined capital accumulation, globalisation, and institutions in isolation rather than jointly, leaving the combined structural effect of these factors on income inequality in Nigeria untested within a Kuznets framework. Second, studies relying on a single governance indicator overlook institutional complementarities that a composite measure (e.g., via principal component analysis) would capture, particularly within the Kuznets framework in Nigeria. Third, to avoid distributional macroheterogeneous effects, capital accumulation is disaggregated into human and physical components. This suggests that a single component of capital accumulation, which prior studies have investigated, is insufficient to account for the policy inequality-worsening effects. Thus, to address these gaps, the study investigates the marginal joint effects of capital accumulation, globalisation, and institutions on the reduction of income inequality in Nigeria. Specifically achieves the following objectives;

- i. Investigate the short- and long-run effects of capital accumulation, globalisation, and institutions on the reduction of income inequality.
- ii. Assess the dynamic predictive relationships between capital accumulation, globalisation, institutions, and income inequality to appraise practical policy implications.

The findings of this study would be beneficial to policymakers and individuals by demonstrating how a greater share of capital investment and globalisation can mitigate income inequality, thereby reducing social unrest and unemployment through high-quality institutions. Also, the findings would assist in the budgetary allocation process to avoid capital structural inefficiencies. The organisation of

the study continues with the literature review in Section 2, followed by the methodology in Section 3, and the empirical results and discussion of findings in Section 4. Lastly, in Section 5, the study is concluded with recommendations.

2.0 Literature Review

2.1 Conceptual Review

In the context of the study, income inequality is regarded as the uneven distribution of income within an economy, measured by indicators like the Gini coefficient. It reflects relative income disparities rather than absolute poverty and is considered both an effect of and a barrier to economic growth. Capital accumulation consists of physical capital, which includes investments in tangible assets like machinery, and human capital, which involves investments in education and health, affecting labour productivity differently. Globalisation integrates economies into global markets, broken down into economic, trade, and financial dimensions. Institutions structure interactions through rules and governance indicators, with their quality influencing distributive outcomes. This study uses composite measures to assess institutional quality, as the dimensions are interrelated.

2.2 Theoretical Background

This study draws on the Solow-Swan growth model, the Kuznets hypothesis, and institutional theory to explain the relationship between capital accumulation, globalisation, institutions, and income inequality. The Solow-Swan model treats capital accumulation as the engine of per capita growth, while the Kuznets hypothesis predicts that inequality initially rises as labour shifts from agriculture to industry, then declines as capital and labour markets mature. Institutional theory (North, 1990; Acemoglu et al., 2001) extends this by showing that the strength of governance structures determines how growth gains are distributed, while shaping the regulatory environment for globalisation and financial market efficiency. Consistent with Pinto et al. (2025), economic transformation is nonlinear, driven jointly by structural change, institutional frameworks, and investment dynamics. Together, these theories generate the inverted-U relationship this study tests, in which capital accumulation, globalisation, and institutional quality jointly shape the trajectory of income inequality in Nigeria.

2.3. Empirical Review

Existing studies confirm that capital accumulation reduces income inequality, but each considers only a single component in isolation. Lima et al. (2021) find that human capital accumulation strengthens

workers' bargaining power, narrowing the wage gap over the long run. Selem-Amachree and Ezekwe (2021) show that capital expenditure on economic and social services lowers income inequality in Nigeria. Using U.S. data, Flores (2021) finds that a rising labour income share reduces inequality more than a rising capital share does, with effects varying across income quantiles. None of these studies, however, jointly examines human and physical capital accumulation, leaving their distributional effects when disaggregated unexplored, which addresses the first gap of the study.

Also, findings on globalisation are mixed and context-dependent. Hui and Bhaumik (2023) find that globalisation reduces inequality in advanced economies but worsens it in low-income countries. For Nigeria specifically, Osinubi and Olomola (2020) report that globalisation strongly predicts income inequality in the short run, while Lawal and Yusuf (2022) confirm a significant long-run impact. Ullah et al. (2021) and Osode et al. (2020) both argue that globalisation's effect operates through institutions. Specifically, Osode et al. (2020) used instrumental-variable quantile regression to show that globalisation reduces inequality only where institutions are strengthened, while accounting for endogeneity between the two. Ofori et al. (2024) add that institutional quality (economic freedom) moderates globalisation's effect, and that this moderation varies across globalisation's dimensions (trade, financial, and economic). Across these studies, globalisation and institutions are consistently treated as interacting rather than independent forces.

Evidence on institutions is contested. Adeleye (2024) finds that institutions aggravate inequality, while human capital reduces it conditionally. Anagun et al. (2024) similarly find that government effectiveness and public spending on education and health worsen inequality in Nigeria in the long run. In contrast, Okafor et al. (2023) find that financial-sector access, efficiency, and stability outcomes closely tied to institutional quality reduce inequality in Africa, though the depth of financial development raises it. This disagreement stems partly from methodology: nearly all studies rely on a single governance indicator rather than a composite measure capturing institutional complementarities, which is the third gap this study addresses.

Despite the unilateral investigation of the capital-income nexus or the globalisation-income nexus, and likewise, the institutions-income disparity nexus, studies in Nigeria have overlooked the following distinctive gaps in the literature. First, studies have ignored the distributional and heterogeneous effects of capital accumulation when disaggregated into human and physical components. Second is the underexplored joint investigation of capital accumulation, globalisation, and institutions on income inequality in Nigeria, which aims to augment the evidence of the Kuznets hypothesis. Lastly, there is disagreement regarding the complementarities of institutions, which is entirely overlooked in

Nigerian-based studies. The use of a single governance indicator, particularly in principal component analysis for institutions, remains a key driver of long-term economic growth through poverty reduction, inclusive growth, capital accumulation, strengthened globalisation, and stronger institutions.

2.4 Conceptual Framework

Figure 1 identifies the dynamic relationship of how capital investments, globalisation, and institutions affect the short-and long-run elasticities. Institutions, capital investment, and globalisation are interlinked as mutually reinforcing factors that influence income inequality. Institutions determine governance quality and investment allocation, while investment impacts institutional capacity. Capital investment and globalisation coexist, with globalisation facilitating investment inflows and domestic investment enhancing global market integration. The framework disaggregates capital investment into health and education expenditures (human capital) and gross fixed capital formation (physical capital), illustrating diverse effects on inequality. Ultimately, all channels converge into income inequality, with institutions and globalisation impacting it both directly and indirectly through capital investment.

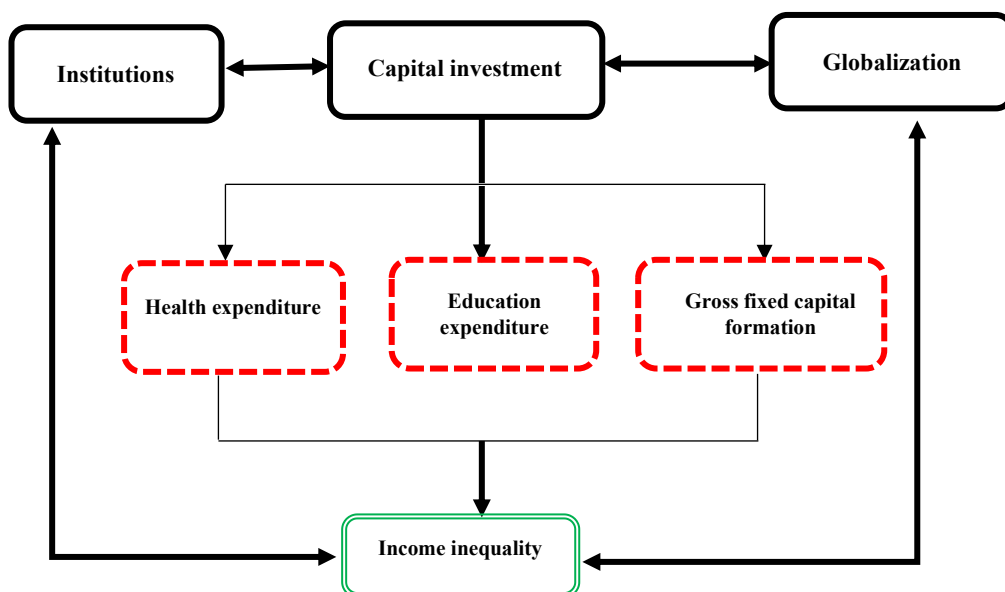


Figure 1: Dynamic framework of the capital investments, institutions, and globalisation nexus.

3.0 Methodology

3.1 Data, Source, and Description

To address the research gap and achieve the stated objectives, reliable annual time-series data from 1991 to 2022 were used to investigate the effects of capital accumulation, globalisation, and

institutions on income inequality in Nigeria. At the time of addressing the research gap, data on the Gini coefficient were available only through 2022, whereas institutions' data were available from 1996. To address data limitations, this study used linear interpolation for 1991-1995, 1997, 1999, and 2001. The data gaps prompted the study period from 1991 to 2022. Income inequality is the dependent variable for this study. At the same time, the recurrent public health and education expenditures, gross capital formation, the Konjunkturforschungsstelle (KOF) globalisation index, institutions, GDP per capita growth rate, and the square of GDP per capita growth rate are the independent variables. The income inequality data were sourced from the UNU-WIDER World Income Inequality Database (WIID), measured by the Gini coefficient, and the selection is justified by Babatunde (2018). Data obtained from the 2024 Central Bank of Nigeria (CBN) Public Finance and Real Annual Statistical Bulletin are the recurrent health and education expenditures and gross capital formation, respectively. The globalisation index is sourced from the 2024 KOF Globalisation Index. This is an all-inclusive index spanning economic, social, and political dimensions.

Globalisation significantly influences income inequality by integrating and reshaping international markets, thereby affecting factor returns, local competition, and the distribution of growth. This further acts as a structural determinant of income inequality, particularly in resource- and import-dependent economies such as Nigeria, where trade and financial integration shape it. The selection of this data is buttressed by Ifeakachukwu (2020). The GDP per capita data were obtained from the 2024 World Development Indicators (WDI). GDP per capita is used to measure per capita output, indicating a country's economic prosperity. The single institutional proxy was computed from the six governance indicators in the 2024 World Governance Indicators (WGI). The computed variables are estimates of government effectiveness, corruption, rule of law, voice and accountability, political stability, and regulatory control.

Studies have largely substituted a single estimate for the variable representing institutions. Acemoglu et al. (2009), Adeleye et al. (2017), Arogundade et al. (2022), and Adeleye et al. (2023) posit that the Principal Component Index (PCI) is a reliable proxy for institutions. This index reflects the operational extent of various governmental branches, including executive, legislative, and judicial (Gold & Anagun, 2026). The selection of this index necessitates strong, significant, and positive correlations with the principal component analysis of the institutions index and the six institutions series. Fig. 1 provides supporting evidence that illustrates the ordered Eigenvalues, Eigenvalue differences, and cumulative proportions in the accompanying figures.

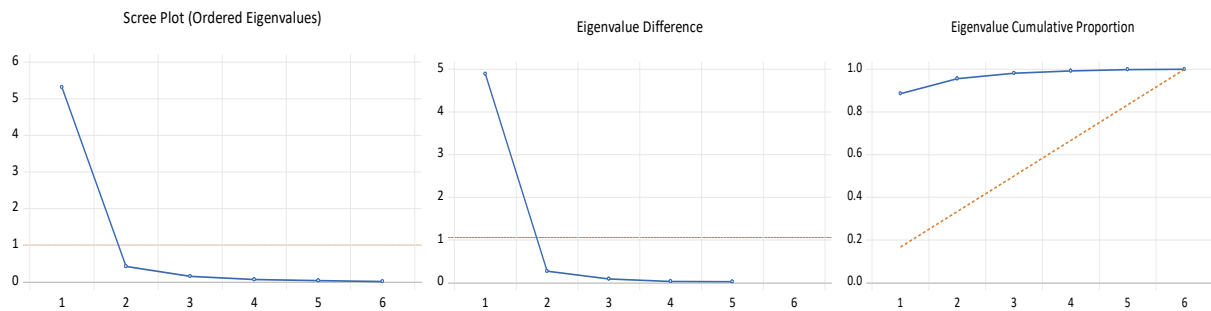


Fig 2. Ordered Eigenvalues (Scree plots) of the institutions index and the six-institutions variables.
Source: Authors' compilations, 2026

The computed institutions index supports the effective reduction of highly correlated variables into smaller, uncorrelated units, as shown in Table 1. This preserves the methodological credibility of the six governance indicators by minimising errors and simultaneity endogeneity, ensuring a robust composite index. Studies such as Pan et al. (2017) and Baruwa (2025) described the computation of principal component indices as a dimensionality-reduction technique for extracting a relatively small number of interpretable components from observed variables that account for most of the variation in the dataset.

Table 1. The Institutions Index and Estimates of the Six Global Governance Indicators

Variables	Institutions index	Government effectiveness	Control of corruption	Rule of law	Voice and accountability	Political stability	Regulatory quality
Institutions index	1.0000 (----						
Government effectiveness	0.968 (0.000)	1.000 (----					
Control of corruption	0.989 (0.000)	0.947 (0.000)	1.000 (----				
Rule of law	0.975 (0.000)	0.907 (0.000)	0.974 (0.000)	1.000 (----			
Voice and accountability	0.844 (0.000)	0.758 (0.000)	0.789 (0.000)	0.847 (0.000)	1.000 (----		
Political stability	0.908 (0.000)	0.935 (0.000)	0.887 (0.000)	0.841 (0.000)	0.615 (0.000)	1.000 (----	
Regulatory quality	0.9567 (0.000)	0.913 (0.000)	0.959 (0.000)	0.928 (0.000)	0.748 (0.000)	0.844 (0.000)	1.000 (----

Where Parentheses () represent the probability of correlation.

Source: Authors' compilations, 2026

Therefore, to support the selection of the principal component, the Eigenvalues of the principal components are expected to exceed 1, indicating a significant proportion of the variance in the six index indicators (Ajide et al., 2022). To further support the justification of the institutions index for the study, Table 2 presents the Eigenvectors, eigenvalues, proportions, and differences in eigenvalues for each

component. The results revealed that the six institutions' indicators have an Eigenvalue of 5.313 with a total variance of 88.5%.

Table 2. Principal Component Analysis of Institutions Index

Principal Component	Eigenvectors (loadings)						Eigen value	Diff.	Cum. val.	Prop.	Cum. Prop.
	First PC	Second PC	Third PC	Fourth PC	Fifth PC	Sixth PC					
Government effectiveness	0.420	-0.209	0.296	0.440	-0.658	-0.255	5.313	4.890	5.313	0.885	0.885
Control of corruption	0.428	-0.055	-0.271	-0.239	-0.290	0.774	0.423	0.271	5.735	0.071	0.956
Rule of law	0.423	0.150	-0.232	-0.658	-0.110	-0.548	0.152	0.087	5.887	0.025	0.981
Voice and accountability	0.364	0.801	0.383	0.152	0.207	0.114	0.065	0.029	5.952	0.011	0.992
Political stability	0.395	-0.531	0.516	-0.182	0.509	0.058	0.036	0.024	5.988	0.006	0.998
Regulatory quality	0.416	-0.080	-0.610	0.510	0.411	-0.138	0.012	---	6.000	0.002	1.000

Source: Authors' compilations, 2026

Where Diff. signifies the difference in the Eigenvalues; Cum. val. represents cumulative values of the Eigenvalue; Prop. denotes proportion of the Eigenvalues; Cum. Prop. denotes the cumulative proportion of the eigenvalues, while PC denotes the principal component.

Source: Authors' compilations.

3.2. Empirical and Econometric Model Specification

In the quest to achieve the study's objective, the study relied on the model outlined by Abdi et al. (2025), Ifeakachukwu (2020), and Osode et al. (2022), following the Kuznets (1995) hypothesis, as

$$GINI_t = f(GDPPC_t, (GDPPC_t)^2) \quad \dots (1)$$

Where $GINI_t$ designates the Gini coefficient, $GDPPC_t$ symbolises per capita gross domestic product, while $(GDPPC_t)^2$ Represents the square of per capita gross domestic product. Thus, as expressed in (1), the Kuznets hypothesis posits that economic growth should have a positive linear effect on income inequality, whereas the square of economic growth should have a negative nonlinear effect. By building on the work of Anagun et al. (2024), Abdi et al. (2025), and Lawal and Yusuf (2022), this study advances the state of the art by integrating an augmented model to examine how capital accumulation, globalisation, and institutions affect income inequality in Nigeria. As such, to advance interpretability of data, to reduce the outlier effects of the results, linearise the relationship between the variables, reduce skewness, and stabilise the variance, health expenditure (LHE_t), education expenditure (LEE_t), and gross fixed capital formation ($LGFCF_t$) was transformed into natural logarithms while the

Gini coefficient ($GINI_t$), KOF globalisation index (GI_t), and institution index (II_t) were scaled on an index score ranging between 1 and 100, resulting in a linear-log model as specified in (2), as

$$GINI_t = \alpha_0 + \alpha_1 GDP_{PC_t} + \alpha_2 (GDP_{PC_t})^2 + \alpha_3 LHE_t + \alpha_4 LEE_t + \alpha_5 LGFCF_t + \alpha_6 GI_t + \alpha_7 II_t + \epsilon_t \quad \dots (2)$$

Where α_0 represents the constant term, α_{it} indicates the vector parameter of the estimated model. Two econometric models, ARDL and Granger causality, were developed for the study. The ARDL model examines both short-run and long-run effects of variables, while the Granger causality test investigates short-run causal relationships. The ARDL model is beneficial for small samples and allows for mixed-order data, making it more reliable (Pesaran et al., 2001; Anagun & Agosu, 2024). Key steps in the analysis include unit root tests (Phillips-Perron), ARDL estimation, Granger causality, and robustness checks to ensure data reliability and address potential serial correlation and endogeneity. The ARDL framework, which is further tested by employing the unrestricted ARDL bounds test as specified in (3),

$$\begin{aligned} \Delta GINI_t = & \alpha_0 + \alpha_1 GINI_t + \alpha_2 GDP_{PC_t} + \alpha_3 (GDP_{PC_t})^2 + \alpha_4 LHE_t + \alpha_5 LEE_t \\ & + \alpha_6 LGFCF_t + \alpha_7 GI_t + \alpha_8 II_t + \sum_{l=1}^a \gamma_1 \Delta GINI_{t-l} + \sum_{l=1}^c \gamma_2 \Delta GDP_{PC_{t-l}} \\ & + \sum_{l=1}^c \gamma_3 \Delta (GDP_{PC})^2_{t-l} + \sum_{l=1}^c \gamma_4 \Delta LHE_{t-l} + \sum_{l=1}^c \gamma_5 \Delta LEE_{t-l} \\ & + \sum_{l=1}^c \gamma_6 \Delta LGFCF_{t-l} + \sum_{l=1}^c \gamma_7 \Delta GI_{t-l} + \sum_{l=1}^c \gamma_8 \Delta II_{t-l} + \epsilon_t \quad \dots (3) \end{aligned}$$

Where α_0 denotes the constant term, α_{it} denotes the vector parameter of the long-run estimates, ϵ_t denotes the error term of the estimated model, a and ci denote the optimal lag lengths of the short-run estimates, and the γ_{it} Denote the vector parameters of the short-run estimates. However, to examine the dynamic long-run relationship between the variables in (3), the null hypothesis of no cointegration for the ARDL bound test is hypothesised in (4), while the F-statistic bound model is specified in (5) as,

$$H_0 : \alpha_1 = \alpha_2 = \alpha_3 = \alpha_4 = \alpha_5 = \alpha_6 = \alpha_7 = \alpha_8 \quad \dots (4)$$

The rejection threshold of the hypothesised bounds tests in (4) indicates that the F-statistic exceeds the 5% significance level; the upper-bound critical value establishes a short-run correction using the Error Correction Model (ECM) framework, as shown in (5).

$$\begin{aligned} \Delta GINI_t = & \alpha_0 + \sum_{l=0}^a \gamma_1 \Delta GINI_{t-l} + \sum_{l=0}^{c_1-1} \gamma_2 \Delta GDP_{t-l} + \sum_{l=1}^{c_2-1} \gamma_3 \Delta (GDP)^2_{t-l} \\ & + \sum_{l=1}^{c_3-1} \gamma_4 \Delta LHE_{t-l} + \sum_{l=1}^{c_4-1} \gamma_5 \Delta LEE_{t-l} + \sum_{l=1}^{c_5-1} \gamma_6 \Delta LGFCF_{t-l} + \sum_{l=1}^{c_6-1} \gamma_7 \Delta GI_{t-l} \\ & + \sum_{l=1}^{c_7-1} \gamma_7 \Delta II_{t-l} + \vartheta ECT_{t-1} + \epsilon_t \end{aligned} \quad \dots (5)$$

As specified in (5), Δ denotes the first-difference operator, ϑ denotes the parameter of the error term, which expresses the speed of the short-run adjustment, and ECT denotes the coefficient of the error term.

4. Empirical Results and Discussion of Findings

4.1. Descriptive Statistics

Table 3 summarises 32 years of descriptive statistics showing an average Gini coefficient of 42.540, indicating worsening income inequality due to structural shocks. The per capita GDP growth rate averaged 1.4%, with volatility that hampers sustainable reduction in inequality. The square of per capita GDP exhibits a leptokurtic distribution, indicating a nonlinear income-growth relationship across economic phases. Government health expenditures averaged ₦128.6 billion but had limited outcomes for reducing income inequality through improved human capital. Conversely, public education expenditures averaged ₦211.6 billion, reflecting significant investment but a diminished effect on human capital accumulation and income inequality. Gross fixed capital formation averages ₦8.78 billion, indicating low fixed capital investment that limits capital accumulation and job creation, thereby exacerbating income inequality. A reduced globalisation index averaging 49.15 suggests moderate integration but poses a threat to future capital investment. Moreover, weak institutions are indexed at 0.82, with a high standard deviation, indicating significant political instability, poor governance, and corruption. These weaknesses adversely affect capital accumulation, public expenditures, globalisation, economic growth, and environmental sustainability.

Table 3. Summary of Descriptive Statistics

Series	Income inequality	GDP per capita	GDP per capita (squared)	Health expenditure	Education expenditure	Gross fixed capital formation	Globalization index	Institutions index (PCA)
Code	$GINI_t$	GDP_{t-1}	$(GDP_{t-1})^2$	HE_t	EE_t	$GFCF_t$	GI_t	II_t

Unit	Index	%	%	₦'Bn	₦'Bn	₦'Bn	Index	Index
Mean	42.540	1.380	14.342	128,590,700,000	211,593,600,000	8,785,391,000	49.1465	-0.817
Max.	57.152	12.210	149.094	437,521,200,000	702,978,700,000	11,445,860,000	55.0192	2.761
Min.	35.595	-4.597	0.000	150,161,000	291,298,000	6,860,444	39.230	-2.740
Std. Dev.	7.740	3.583	26.317	139.847	217.374	1271.347	5.333	2.120
Skewness	0.714	0.489	4.382	0.925	0.869	0.335	-0.747	1.085
Kurtosis	1.910	3.960	22.945	2.593	2.514	1.932	2.022	2.288
Obs.	32 years	32 years	32 years	32 years	32 years	32 years	32 years	32 years

₦'Bn represents billion naira; % denotes percentage; Max. Denotes maximum values, Min. represents minimum values, and Std. Dev. signifies standard deviation, and Obs. implies observations.

Source: Authors' compilations, 2026

4.2 Results of the Unit Root Test

Table 4 displays the results of the Phillips-Perron unit root test, which evaluates the suitability of the ARDL econometric technique. Findings indicate that income inequality, per capita GDP growth rate, health and education expenditures, and the globalisation index are stationary at the first difference. Conversely, the square of per capita GDP, gross fixed capital formation, and the index of institutions are stationary at the level. The results reveal a mixed order of stationarity, meeting the necessary conditions for applying the ARDL bound test.

Table 4. Unit Root Results

Series	PP test statistic	5% test critical value	Prob.	Decision
$GINI_t$	0.123	-3.563	0.996	I(0)
$\Delta(GINI_t)$	-7.014	-3.568	0.000	I(1)
$GDPPC_t$	-2.918	-3.563	0.171	I(0)
$\Delta(GDPPC_t)$	-15.992	-3.568	0.000	I(1)
$(GDPPC_t)^2$	-5.004	-3.563	0.002	I(0)
LHE_t	-2.977	-3.563	0.154	I(0)
$\Delta(LHE_t)$	-16.033	-3.568	0.000	I(1)
LEE_t	-3.364	-3.563	0.075	I(0)
$\Delta(LLEE_t)$	-10.726	-3.568	0.000	I(1)
$LGFCF_t$	-5.686	-3.563	0.000	I(0)
GI_t	-1.088	-3.563	0.915	I(0)
$\Delta(GI_t)$	-4.208	-3.568	0.012	I(1)
II_t	-5.7819	-3.563	0.000	I(0)

Source: Authors' compilations, 2026

4.3. Results of the Cointegration Test

Before the mixed stationarity of the PP unit root test at constant and linear trend, the positions of Pesaran and Shin (1995), Pesaran et al. (2001), Shrestha and Bhatta (2018), Anagun et al. (2024), and

Gold and Yusuf (2025) support the employment of the ARDL consistency. The ARDL bounds test results in Table 5 are used to investigate the short- and long-run effects of capital accumulation, globalisation, and institutions on income inequality. As revealed in Table 6, the value of the F-statistic is greater than the 1%, 2.5, 5%, and 10% significance levels of the upper bound, which implies the rejection of the null hypothesis of no cointegration for the ARDL bound test as hypothesised in (4). These findings indicate a need to correct the dynamic long-run adjustments using the error-correction model specified in (6).

Table 5. ARDL Bound Tests

Automatic model selection	F-Statistic value	K	Level of Significance	I(0)	I(1)	Decision
ARDL (2, 2, 1, 1, 2, 1, 2, 2)	9.308024	7	1%	2.73	3.9	Cointegration
			2.5%	2.43	3.51	
			5%	2.17	3.21	
			10%	1.92	2.89	

Source: Authors' compilations, 2026

4.4. Results of the Error Correction Model

Table 6 reveals that a 1% increase in per capita GDP growth leads to a 0.07% rise in income inequality in the short term, following a prior 0.03% decrease. Additionally, the squared growth rate reduces inequality by 0.003%. This suggests that short-term growth, fueled by employment and manufacturing, may not ensure long-term equitable distribution, aligning with the N-shape trajectory of the Kuznets hypothesis and studies by Zhang (2023), Shehzad et al. (2022), and Chi (2024). Moreover, an increase in public health expenditures significantly decreases income inequality by 1.3%, highlighting the distributional advantages of health investments, especially in rural areas. Modest rises in public health spending can produce significant distributional benefits without economic shock. This is supported by the findings of Oburota and Olaniyan (2020), Ogujiuba (2022), and Anagun et al. (2024).

Public expenditures on education significantly exacerbate income inequality in the short run, which implies that a 1% increase in education expenditures is associated with a 1.51% increase in inequality, and a lagged 1% increase is associated with a 0.66% increase. This effect stems from unequal access to quality education and structural unemployment among graduates. This aligns with the findings of Chatterjee et al. (2024) and Ogbeide-Osaretin et al. (2024). Conversely, gross fixed capital formation reduces income inequality; a 1% increase reduces it by 0.57%. However, this effect is insignificant, underscoring Nigeria's reliance on imports and the limited short-term employment benefits of physical capital accumulation. This relates to the studies by Asogwa et al. (2022), Adeleye (2021), Anagun et al.

(2024), and Ifeakachukwu (2020). Globalisation negatively affects income inequality, reducing it by 0.56% for every 1% increase in globalisation in the initial period and 0.24% when lagged by one year. This finding indicates a distortion in the empowerment channels, which uniformly undermines the attainment of income inequality reduction within Nigeria's Kuznets hypothesis framework. This finding relates to the results reported by Ifeakachukwu (2020). Despite weak institutional frameworks in Nigeria, institutions worsen income inequality by 0.05%, and the effect is 0.11% higher in the short run when lagged. This means that for every 1% increase in institutional quality, income inequality worsens by 0.05% in the initial short-run period but increases by 0.11% when lagged. This is in tandem with Akinlo (2024) and Osode et al. (2022).

Subsequently, the coefficient of the speed of adjusting the long-run disequilibrium (ECT) Posits a corrected and stable structural model for policy implementation and recommendations. These short-run findings revealed a structural inelasticity in the short run by 0.05, which takes a correction term of 5.3% to adjust the short-run disequilibrium back to normal after its volatility, *ceteris paribus*.

Table 6. Short-run Estimates

Variable	Coefficient	Std. Error	t-Statistic	Prob.
$\Delta(GINI_{t-1})$	0.136**	0.054	2.507	0.034
$\Delta(GDPPC_t)$	-0.026**	0.010	-2.782	0.021
$\Delta(GDPPC_{t-1})$	0.073***	0.011	6.429	0.000
$\Delta((GDPPC)^2_t)$	-0.003**	0.001	-3.103	0.013
$\Delta(LHE_t)$	-1.304***	0.378	-3.448	0.008
$\Delta(LEE_t)$	1.505**	0.371	4.053	0.003
$\Delta(LEE_{t-1})$	0.663***	0.106	6.266	0.000
$\Delta(LGFCF_t)$	-0.573	0.485	-1.180	0.268
$\Delta(GI_t)$	-0.055*	0.026	-2.081	0.067
$\Delta(GI_{t-1})$	-0.244***	0.030	-8.036	0.000
$\Delta(II_t)$	0.046	0.028	1.629	0.138
$\Delta(II_{t-1})$	0.108**	0.029	3.735	0.005
ECT_t	-0.053***	0.004	-12.579	0.000
R-squared	0.985	Adjusted R-squared		0.974

Where ***, **, and * signify significance at 1%, 5%, and 10%.

Source: Authors' computations, 2026

4.5. Results of the reverse Short-run Granger causality

Table 7 shows the Granger causality test results, indicating that the growth rate of per capita GDP, health expenditures, education expenditures, globalisation, and institutions Granger-cause income inequality in Nigeria, while the squared growth rate of per capita GDP does not Granger-cause income inequality. The Granger model reveals bidirectional causality among the growth rate of per capita GDP,

health, and education expenditures, where the latter two have short-run predictive effects on income inequality, highlighting significant short-run influences on capital accumulation. Also, gross fixed capital formation, globalisation index, and institutions exhibit unidirectional causality, which aligns with empirical findings such as Heshmati (2007), Osode et al. (2022), Uzar (2023), and Çelik (2025), implying that institutional shocks temporally precede the reverse feedback effects of inequality on public capital investments.

Table 7. Granger causality

Null hypothesis	F-Statistic	Prob.	Decision
$GDPPC_t = \sum_{l=2}^c \delta_{11} GDPPC_{t-l} + \sum_{l=2}^a \theta_{11} GINI_{t-l} + \varepsilon_{11t}$	4.912**	0.015	Bidirectional
$GINI_t = \sum_{i=2}^c \delta_{12} GINI_{t-i} + \sum_{i=2}^a \theta_{12} GDPPC_{t-i} + \varepsilon_{12t}$	4.103**	0.028	
$(GDPPC_t)^2 = \sum_{l=2}^c \delta_{21} (GDPPC_{t-l})^2 + \sum_{l=2}^a \theta_{21} GINI_{t-l} + \varepsilon_{21t}$	1.444	0.254	No causal link
$GINI_t = \sum_{i=2}^c \delta_{22} GINI_{t-i} + \sum_{i=2}^a \theta_{22} (GDPPC_{t-i})^2 + \varepsilon_{22t}$	0.765	0.475	
$LHE_t = \sum_{i=2}^c \delta_{31} LHE_{t-i} + \sum_{i=2}^a \theta_{31} GINI_{t-i} + \varepsilon_{31t}$	3.856**	0.034	Bidirectional
$GINI_t = \sum_{i=2}^c \delta_{32} GINI_{t-i} + \sum_{i=2}^a \theta_{32} LHE_{t-i} + \varepsilon_{31t}$	9.168***	0.001	
$LEE_t = \sum_{i=2}^c \delta_{41} LEE_{t-i} + \sum_{i=2}^a \theta_{41} GINI_{t-i} + \varepsilon_{41t}$	5.332**	0.012	Bidirectional
$GINI_t = \sum_{i=2}^c \delta_{42} GINI_{t-i} + \sum_{i=2}^a \theta_{42} LEE_{t-i} + \varepsilon_{41t}$	13.552***	0.000	
$LGFCF_t = \sum_{l=2}^c \delta_{51} LGFCF_{t-l} + \sum_{l=2}^a \theta_{51} GINI_{t-l} + \varepsilon_{51t}$	1.037	0.369	Unidirectional
$GINI_t = \sum_{i=2}^c \delta_{52} GINI_{t-i} + \sum_{i=2}^a \theta_{52} LGFCF_{t-i} + \varepsilon_{52t}$	6.890**	0.004	
$GLO_t = \sum_{l=2}^c \delta_{61} GLO_{t-l} + \sum_{l=2}^a \theta_{61} GINI_{t-l} + \varepsilon_{61t}$	1.890	0.172	Unidirectional
$GINI_t = \sum_{i=2}^c \delta_{62} GINI_{t-i} + \sum_{i=2}^a \theta_{62} GLO_{t-i} + \varepsilon_{62t}$	4.650**	0.019	
$II_t = \sum_{l=2}^c \delta_{71} II_{t-l} + \sum_{l=2}^a \theta_{71} GINI_{t-l} + \varepsilon_{71t}$	0.571	0.572	Unidirectional
$GINI_t = \sum_{i=2}^c \delta_{72} GINI_{t-i} + \sum_{i=2}^a \theta_{72} II_{t-i} + \varepsilon_{72t}$	3.658**	0.040	

Where ***, **, and * signify significance at 1%, 5%, and 10%.

Source: Authors' computations, 2026

4.6. ARDL Long-run Results

Table 8 of the study indicates that per capita GDP growth lowers income inequality in the short term and after a two-period lag, by 0.03% and 0.07%, respectively. In contrast, a one-period lag shows an insignificant positive effect, raising inequality by 0.04%. Furthermore, while the square of per capita GDP has a negative and insignificant initial impact of 0.003%, it significantly worsens inequality by 0.007% when lagged by one period. This reflects uneven growth in Nigeria, primarily benefiting elites in non-oil sectors, aligning with the Kuznets hypothesis that predicts initial increases in inequality followed by long-term improvements. This further supports the Kuznets hypothesis, as it exhibits employment creation and fiscal redistribution (Mdingi & Yo, 2021; Shahbaz, 2010; Kolawole et al., 2015; Pocho, 2025).

Public health expenditures in Nigeria show a complex relationship with income inequality. Initially, an increase in public health spending has a negative but insignificant long-term effect, reducing inequality by 1.3% for a 1% rise in expenditures. However, when accounting for lagged effects, a past increase can instead raise inequality by 1.73% in the long run. These findings indicate inefficiencies in health spending, which disproportionately favour urban and wealthier groups, exacerbated by corruption and poor service delivery. Thus, merely increasing health expenditures may not enhance equity, as supported by Wu and Pu (2020), Jianu (2020), Verberi and Yasar (2021), Sidek (2021), and Amakom (2016). Government expenditures on education initially worsen income inequality by 1.51% with a 1% increase, but when lagged by one period, they reduce inequality by 1.46% and 0.66% in the following year. Investment in education serves as a long-term equaliser, improving skill development and income mobility. However, early benefits may primarily accrue to the advantaged, with significant returns taking time to materialise. These findings corroborate previous studies by Celikay and Sengur (2016), Kolawole (2016), Lee and Lee (2018), and Kouadio and Mom (2025). Likewise, gross fixed capital formation has a negative and insignificant impact on income inequality in Nigeria, with long-run reductions of 0.57% and 1.45% for each 1% increase. This suggests that capital formation is labour-intensive but primarily leads to sectors with few job creations. While these findings are supported by Purba et al. (2019), Lian et al. (2024), Hakim and Rosimi (2022), and Olaniyi (2025), but not by Anyanwu et al. (2016), it highlights challenges in reducing unemployment and poverty, necessitating more inclusive infrastructure investments that enhance labour absorption and connect capital spending with employment growth.

Globalisation initially has a slight negative effect on income inequality in Nigeria, reducing it by 0.06% per 1% increase. However, after one year, the effect becomes more significant, decreasing inequality by 0.18%. In contrast, after two years, globalisation is linked to a 0.24% increase in inequality.

This pattern suggests that while early globalisation provides access to markets and jobs, its advantages tend to favour skilled and urban workers, thereby marginalising unskilled labour and rural areas. Studies such as Osode et al. (2022), Osinubi and Olomola (2021), and Aigheyisi and Egbon (2020) support the position of this study by highlighting the weakened globalisation-inequality relationship due to inadequate integration strategies and limited industrial competitiveness in Nigeria. In the long run, institutions insignificantly worsen income inequality by 0.05% in the initial period. Still, when lagged by one and two periods, institutions hurt income inequality by 0.08% and 0.11%, respectively, indicating that with a corresponding one-unit increase in institutions, income inequality after its initial period is worsened by 0.08% and 0.11%, respectively, but at its initial period, income inequality is worsened by approximately 0.05%. Institutional reforms in Nigeria take time to positively affect income distribution. Improved governance reduces inequality through better service delivery, reduced corruption, and effective policy enforcement, underscoring the crucial long-term role of strong institutions in promoting equality. This result provides consistent empirical evidence from the empirical findings of Kunawoto et al. (2020), Adeleye (2024), Aluko et al. (2024), and Baruwa (2025). Despite weak institutional effectiveness, unstable capital accumulation, and open globalisation, Nigeria's trade and employment are threatened, which indicates a 99% dynamic long-run model stability for policy implementation.

Results from residual and stability diagnostic tests indicated that both the short-run and long-run models are stable and reliable for policy implementation. The models passed various tests, including normality tests, serial correlation, and heteroskedasticity tests. Additionally, stability tests such as the Ramsey RESET test and CUSUM tests confirmed the models' robustness and the absence of econometric misspecification, as shown in Fig. 3.

Table 8. Long-run results

Variable	Coefficient	Std. Error	t-Statistic	Prob.
$GINI_{t-1}$	1.083***	0.151	7.179	0.000
$GINI_{t-2}$	-0.136	0.122	-1.119	0.292
$GDPPC_t$	-0.026	0.028	-0.950	0.367
$GDPPC_{t-1}$	0.036	0.030	1.232	0.249
$GDPPC_{t-2}$	-0.073**	0.029	-2.553	0.031
$(GDPPC)^2_t$	-0.003	0.003	-1.023	0.333
$(GDPPC)^2_{t-1}$	-0.007**	0.002	-3.157	0.012
LHE_t	-1.304	0.761	-1.714	0.121
LHE_{t-1}	1.733*	0.876	1.979	0.079
LEE_t	1.505*	0.782	1.926	0.086
LEE_{t-1}	-1.464	0.849	-1.725	0.112
LEE_{t-2}	-0.663**	0.188	-3.527	0.006
$LGFCF_t$	-0.573	1.194	-0.479	0.643
$LGFCF_{t-1}$	-1.451	1.030	-1.409	0.193
GI_t	-0.055	0.051	-1.066	0.314
GI_{t-1}	-0.181**	0.072	-2.520	0.033
GI_{t-2}	0.244**	0.079	3.096	0.013
II_t	0.046	0.078	0.592	0.569
II_{t-1}	-0.077	0.122	-0.634	0.542
II_{t-2}	-0.108	0.077	-1.395	0.196
Constant	9.888	14.404	0.686	0.510
R-squared	0.999	Adjusted R-squared		0.999
F-statistic	3662.632***	Prob. (F-statistic)		0.000
Diagnostic Test Results				
Test	Type	F-statistic	Prob.	Decision
Histogram-Normality	Jarque-Bera	0.076	0.963	Normally distributed
Serial autocorrelation	Breusch-Godfrey serial correlation LM test	1.974	0.209	No serial autocorrelation
Heteroskedasticity	Breusch-Pagan-Godfrey	0.844	0.644	Reject homoscedasticity
Functional	Ramsey RESET Test	0.004	0.954	The model is functionally dependent.
Recursive estimation	CUSUM	Stable		
	CUSUM of Squares	Stable		

Where ***, **, and * signify significance at 1%, 5%, and 10%.

Source: Authors' computations, 2026

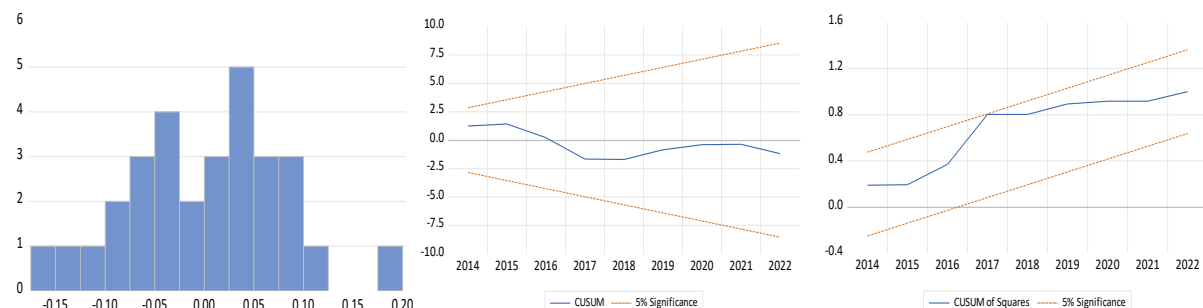


Fig. 3. Histogram, Cumulative Sum (CUSUM) Test, and the Cumulative Sum of Squares (CUSUM Sq.) Test.

Source: Authors' compilation, 2026

4.7. Results of the robustness check

Table 9 assesses short-run and long-run estimates via the Fully Modified Ordinary Least Squares (FMOLS) method, demonstrating its effectiveness in handling endogeneity and small-sample bias in economic policy applications. It reveals that a 1% increase in per capita GDP results in an insignificant 0.08% decrease in income inequality in Nigeria. The squared GDP growth rate shows a positive but insignificant effect, correlating with a 0.01% increase in inequality. Significant negative effects on inequality are identified from health expenditures, gross fixed capital formation, and the globalisation index, with respective impacts of -9.61%, -2.84%, and -0.55% for 1% increases. In contrast, education expenditures and institutions significantly increase inequality by 5.91% and 0.49%, respectively, for each 1% rise.

In comparison to long-run outcomes, the growth rates of per capita GDP and gross fixed capital formation align with the FMOLS robustness findings, while other independent variables do not. The FMOLS results were analysed against classical regression assumptions, yielding R-squared values of 99%. The differences between ARDL long-run results and FMOLS findings suggest econometric sensitivity to time-variant factors and macroeconomic performance, indicating that the short-run effects on income inequality have more significant long-term economic implications. Studies such as Adegboyega et al. (2022) reinforce the reliability of these robustness findings in Nigeria.

Table 9. Robustness Check (Fully Modified Least Squares)

Variable	Coefficient	Std. Error	t-Statistic	Prob.
$GDPPC_t$	-0.083	0.083	-0.999	0.328
$(GDPPC_t)^2$	0.014	0.009	1.597	0.124
LHE_t	-9.608***	2.137	-4.495	0.000
LEE_t	5.914**	1.973	2.997	0.006
$LGFCF_t$	-2.848	4.193	-0.679	0.504
GI_t	-0.546***	0.125	-4.369	0.000
II_t	0.488**	0.129	3.784	0.001
Constant	84.959***	16.625	5.110	0.000
R-Squared	0.979			
Adj. R-squared	0.973			

Where ***, **, and * signify significance at 1%, 5%, and 10%.

Source: Authors' computations, 2026

5. Conclusion and Recommendations

The study employs ECM-ARDL, Granger causality, and FMOLS methods to assess the impact of capital accumulation, globalisation, and institutional frameworks on income inequality in Nigeria. Results indicate that while per capita growth, education expenditures, and institutions increase inequality, health expenditures and globalisation reduce it. In the short run, per capita GDP growth

exacerbates inequality, with its squared value mitigating it. Health expenditures and globalisation also play a significant role in decreasing inequality. The robustness test reinforces the findings, showing reliable impacts of per capita GDP and gross fixed capital formation on inequality. Granger causality results reveal bidirectional causality between GDP growth and human capital, and unidirectional causality from gross fixed capital formation, globalisation, and institutions, highlighting the effect of institutional changes on inequality and public capital investment.

The findings suggest that Nigerian public sector investments should focus on primary healthcare to address structural inefficiencies. Additionally, a scholarship program must be negotiated with private organisations to promote equitable education access for disadvantaged groups. Trade and international policies should aim to enhance Nigeria's globalisation index, while coordinated governance reforms are needed to strengthen institutional resilience during budget processes. Periodic reviews of projects are essential for the efficient use of public funds. Implementing these strategies could help achieve Goal 10 of the SDGs. Further research should explore the impacts of capital accumulation and institutions on income inequality, acknowledging limitations within the Nigerian context.

References

- Abdi, A. H., Mohamed, A. A., Mohamed, A. A., & Mohamed, A. A. (2025). Do globalisation, foreign direct investment, and inflation drive income inequality? Evidence from Somalia within the Kuznets curve hypothesis. *Research in Globalisation*, 100301. <https://doi.org/10.1016/j.resglo.2025.100301>
- Acemoglu, D., Johnson, S., & Robinson, J. A. (2001). The colonial origins of comparative development: An empirical investigation. *American Economic Review*, 91(5), 1369-1401. <https://doi.org/10.1257/aer.91.5.1369>
- Acemoglu, D., Johnson, S., Robinson, J. A., & Yared, P. (2009). Reevaluating the modernisation hypothesis. *Journal of Monetary Economics*, 56(8), 1043-1058. <https://doi.org/10.1016/j.jmoneco.2009.10.002>
- Adegboyega, S. B., Odusanya, I. A., Ogede, J. S., & Ajayi, F. O. (2022). Modelling the nexus between income inequality and the shadow economy in Nigeria. *Journal of Enterprise and Development (JED)*, 4(2), 210-231. <https://doi.org/10.20414/jed.v4i2.5486>
- Adeleye, B. N. (2021). Unbundling interest rate and bank credit nexus on income inequality: structural break analysis from Nigeria. *Journal of Financial Regulation and Compliance*, 29(1), 63-78. <https://doi.org/10.1108/JFRC-04-2020-0035>
- Adeleye, B. N. (2024). Income inequality, human capital, and institutional quality in sub-Saharan Africa. *Social Indicators Research*, 171(1), 133-157. <https://doi.org/10.1007/s11205-023-03244-0>
- Adeleye, B. N., Arogundade, S., & Mduduzi, B. (2023). Empirical analysis of inclusive growth, information and communication technology adoption, and institutional quality. *Economies*, 11(4), 124. <https://doi.org/10.3390/economies11040124>

- Adeleye, N., Osabuohien, E., & Bowale, E. (2017). The role of institutions in the finance-inequality nexus in Sub-Saharan Africa. *Journal of Contextual Economics–Schmollers Jahrbuch*, (1–2), 173-192.
- Aigheyisi, O. S., & Egbon, H. O. (2020). Effect of FDI on income inequality in Nigeria: Does trade openness matter?. *Journal of Academic Research in Economics*, 12(2), 336-346.
- Akinlo, A. E. (2024). Oil price shocks and income inequality in Nigeria: Evidence from a nonlinear ARDL approach. *African Journal of Economic Review*, 12(1), 1-24. <https://doi.org/10.22004/ag.econ.340552>
- Aluko, O. A., Odewale, A. T., Taiwo, K., & Adefeso, H. (2024). Unlocking inclusive growth and sustainable development in Nigeria: A roadmap through challenges and opportunities. *African Journal of Applied Research*, 10(1), 201-223. <https://doi.org/10.26437/ajar.v10i1.683>
- Amakom, U. (2016). Nigeria's government spending on basic education and healthcare in the last decade: What has changed after reforms?. *Social Indicators Research*, 127(3), 1085-1102. <https://doi.org/10.1007/s11205-015-1004-8>
- Anagun, A. M., & Agosu, P. M. (2024). Do exchange rate depreciation and trade balance impede economic growth in Nigeria?. *Jurnal Ilmu Ekonomi Terapan*, 9(2), 171-184. <https://doi.org/10.20473/jiet.v9i2.52444>
- Anagun, A. M., Oluwo, P. O., & Agosu, P. M. (2024). Human capital investments and income inequality in Nigeria: Does institutional quality matter?. *Business & Management Compass*, 68(3), 55-69. <https://doi.org/10.56065/mg84qh74>
- Anyanwu, J. C., Erhijakpor, A. E., & Obi, E. (2016). Empirical analysis of the key drivers of income inequality in West Africa. *African Development Review*, 28(1), 18-38. <https://doi.org/10.1111/1467-8268.12164>
- Arogundade, S., Biyase, M., & Bila, S. (2022). Be nice to thy neighbours: Spatial impact of foreign direct investment on poverty in Africa. *Economies*, 10(6), 128. <https://doi.org/10.3390/economies10060128>
- Asogwa, F. O., Onyeke, Q. O., Kuma, P. M., Arazue, W. O., & Nkalu, C. N. (2022). Do macroeconomic indicators determine income inequality in selected African countries?. *Journal of Public Affairs*, 22(4), e2560. <https://doi.org/10.1002/pa.2560>
- Babatunde, M. A. (2018). Foreign direct investment and income inequality in Nigeria. *International Journal of Economic Development*, 11(2), 266-315.
- Baruwa, O. Y. (2025). Impact of institutional quality on inclusive growth in Nigeria. *African Journal of Economic Review*, 13(2), 1-24.
- Çelik, H. (2025). Does institutional quality matter in achieving income inequality? Panel causality analysis for G-8 countries. *Van Yüziüncü Yıl Üniversitesi İktisadi ve İdari Bilimler Fakültesi Dergisi*, 10(20), 559-573. <https://doi.org/10.54831/vanyyuiibfd.1811163>
- Celikay, F., & Sengur, M. (2016). Education expenditures and income distribution: an empirical analysis on European countries. *Humanomics*, 32(3), 248-257. <https://doi.org/10.1108/H-01-2016-0005>
- Chatterjee, T., Teame, G. T., & Sen, S. (2024). Impact of income inequality on health and education in Africa: The long-run role of public spending with short-run dynamics. *Journal of Computational Social Science*, 7(1), 259-304. <https://doi.org/10.1007/s42001-023-00237-4>
- Chi, J. (2024). Tourism development and income inequality in OECD countries: New insights from the method of moments quantile regression. *Tourism Economics*, 30(3), 767-784. <https://doi.org/10.1177/13548166231184796>

- Flores, I. (2021). The capital share and income inequality: Increasing gaps between micro and macro-data. *The Journal of Economic Inequality*, 19(4), 685-706. <https://doi.org/10.1007/s10888-021-09482-x>
- Gold, K. L., & Yusuf, H. A. (2025). The effect of exchange rate and other macroeconomic indicators on Nigeria's non-oil export performance. *SN Business & Economics*, 5(9), 113. <https://doi.org/10.1007/s43546-025-00886-9>
- Hakim, D. R., & Rosini, I. (2022). Regional income inequality in Indonesia: The role of public and private investment. *Jurnal Ekonomi Malaysia*, 56(3), 87-101. <http://dx.doi.org/10.17576/JEM-2022-5603-05>
- Heshmati, A. (2007). The relationship between income inequality, poverty and globalisation. In *The Impact of Globalisation on the World's Poor: Transmission Mechanisms* (pp. 59-93). London: Palgrave Macmillan UK. https://doi.org/10.1057/9780230625501_3
- Hui, Y., & Bhaumik, A. (2023). Economic globalisation and income inequality: A review. *Advancement in Management and Technology (AMT)*, 3(4), 1-9. <https://doi.org/10.46977/apjmt.%202023.v03i04.001>
- Ifeakachukwu, N. P. (2020). Globalisation, economic growth and income inequality in Nigeria. *Indian Journal of Human Development*, 14(2), 202-212. <https://doi.org/10.1177/0973703020948484>
- Jianu, I. (2020). The impact of government health and education expenditure on income inequality in the European Union. *arXiv preprint arXiv:2007.11409*. <https://doi.org/10.48550/arXiv.2007.11409>
- Kolawole, B. O. (2016). Government spending and inclusive-growth relationship in Nigeria: An empirical investigation. *Zagreb International Review of Economics & Business*, 19(2), 33-56. <https://doi.org/10.1515/zireb-2016-0007>
- Kolawole, B. O., Omobitan, O. A., & Yaqub, J. O. (2015). Poverty, inequality and rising growth in Nigeria: Further empirical evidence. *International Journal of Economics and Finance*, 7(2), 51-62. <http://dx.doi.org/10.5539/ijef.v7n2p51>
- Kouadio, M., & Mom, A. N. (2025). Education expenditure and income inequalities reduction in West African countries: Does governance matter?. *Development and Sustainability in Economics and Finance*, 5, 100051. <https://doi.org/10.1016/j.dsef.2025.100051>
- Kuznets, S. (2019). Economic growth and income inequality. In *The Gap Between Rich and Poor* (pp. 25-37). Routledge.
- Langnel, Z., Amegavi, G. B., Donkor, P., & Mensah, J. K. (2021). Income inequality, human capital, natural resource abundance, and ecological footprint in ECOWAS member countries. *Resources Policy*, 74, 102255. <https://doi.org/10.1016/j.resourpol.2021.102255>
- Lawal, S., & Yusuf, M. B. O. (2022). Impact of globalisation, economic growth and income inequality in Nigeria. *Journal of Smart Economic Growth*, 7(3), 87-115.
- Lee, J. W., & Lee, H. (2018). Human capital and income inequality. *Journal of the Asia Pacific Economy*, 23(4), 554-583. <https://doi.org/10.1080/13547860.2018.1515002>
- Lian, C., Pei, J., & Li, J. (2024). Income inequality effect of government investment behaviour: Comparisons based on different investment areas, different regions and different groups in China. *Heliyon*, 10(5). <https://doi.org/10.1016/j.heliyon.2024.e26452>
- Lima, G. T., Carvalho, L., & Serra, G. P. (2021). Human capital accumulation, income distribution, and economic growth: A demand-led analytical framework. *Review of Keynesian Economics*, 9(3), 319-336. <https://doi.org/10.4337/roke.2021.03.02>
- Mdingi, K., & Ho, S. Y. (2021). Literature review on income inequality and economic growth. *MethodsX*, 8, 101402. <https://doi.org/10.1016/j.mex.2021.101402>

- Nissanke, M., & Thorbecke, E. (2010). Globalisation, poverty, and inequality in Latin America: Findings from case studies. *World Development*, 38(6), 797-802. <https://doi.org/10.1016/j.worlddev.2010.02.003>
- North, D. C. (1990). *Institutions, institutional change, and economic performance*. Cambridge University Press.
- Oburota, C. S., & Olaniyan, O. (2020). Health care financing and income inequality in Nigeria. *International Journal of Social Economics*, 47(11), 1419-1431. <https://doi.org/10.1108/IJSE-05-2020-0286>
- Ofori, I. K., Freytag, A., & Asongu, S. A. (2024). Economic globalisation and Africa's quest for greener and more inclusive growth: The missing link. *International Economics*, 178, 100509. <https://doi.org/10.1016/j.inteco.2024.100509>
- Ogbeide-Osaretin, E. N., Shedrack, I., & Aliu, T. (2024). Human capital development, income inequality and public sector investment in Nigeria. *Studia Universitatis Babes-Bolyai*, 69(1), 1-20. <https://doi.org/10.2478/subboec-2024-0001>
- Ogujiuba, K. K. (2022). Which demographic quintile benefits from public health expenditure in Nigeria: A marginal benefit analysis. *Economies*, 10(10), 253. <https://doi.org/10.3390/>
- Okafor, V. I., Olurinola, I. O., Bowale, E., & Osabohien, R. (2023). Financial development and income inequality in Africa. *Humanities and Social Sciences Communications*, 10(1). <https://doi.org/10.1057/s41599-023-01810-y>
- Olaniyi, O. A. (2025). Tax structure and inclusive growth in Nigeria: The mediating role of income inequality. *Journal of Applied Economic Research*, 24(4), 1165-1187. <https://doi.org/10.15826/vestnik.2025.24.4.038>
- Osode, O. E., Iheonu, C. O., & Dauda, R. (2022). On the relationship between globalisation and income inequality: Do institutions matter?. *Journal of Public Affairs*, 22(2), e2433. <https://doi.org/10.1002/pa.2433>
- Pesaran, M. H., & Smith, R. (1995). Estimating long-run relationships from dynamic heterogeneous panels. *Journal of Econometrics*, 68(1), 79-113. [https://doi.org/10.1016/0304-4076\(94\)01644-F](https://doi.org/10.1016/0304-4076(94)01644-F)
- Pesaran, M. H., Shin, Y., & Smith, R. J. (2001). Bounds testing approaches to the analysis of level relationships. *Journal of Applied Econometrics*, 16(3), 289-326. <https://doi.org/10.1002/jae.616>
- Phillips, P. C. (1995). Fully modified least squares and vector autoregression. *Econometrica: Journal of the Econometric Society*, 1023-1078.
- Phillips, P. C., & Perron, P. (1988). Testing for a unit root in time series regression. *Biometrika*, 75(2), 335-346. <https://doi.org/10.1093/biomet/75.2.335>
- Pinto, A. S., Abreu, A., Cota, M. P., & Paiva, J. (2025). Mapping the process of digital transformation in shared services centres: A scoping literature review. *Future Business Journal*, 11(1), 228. <https://doi.org/10.1186/s43093-025-00654-z>
- Pocho, A. G. (2025). Asymmetric relationship between income inequality and economic growth in Nigeria. *International Journal of Economics and Management*, 3(01), 1-12.
- Purba, B., Masbar, R., Maipita, I., & Jamal, A. (2019, May). The effect of capital expenditure and gross fixed capital formation on income disparity in the West Coast Region of North Sumatera. In *IOP Conference Series: Earth and Environmental Science* (Vol. 260, No. 1, p. 012022). IOP Publishing.
- Richard, K. (Ed.). (2003). *Development Centre seminars on globalisation, poverty and inequality*. OECD Publishing.
- Selem-Amachree, I., & Ezekwe, C. I. (2021). A disaggregated impact analysis of public capital expenditure on income inequality in Nigeria. *American Journal of Humanities and Social Sciences Research (AJHSSR)*, 5(5), 35-43.

- Shahbaz, M. (2010). Income inequality, economic growth and non-linearity: A case of Pakistan. *International journal of social economics*, 37(8), 613-636. <https://doi.org/10.1108/03068291011060652>
- Shehzad, K., Zeraibi, A., & Zaman, U. (2022). Testing the N-shaped environmental Kuznets Curve in Algeria: An imperative role of natural resources and economic globalisation. *Resources Policy*, 77, 102700. <https://doi.org/10.1016/j.resourpol.2022.102700>
- Shrestha, M. B., & Bhatta, G. R. (2018). Selecting an appropriate methodological framework for time series data analysis. *The Journal of Finance and Data Science*, 4(2), 71-89. <https://doi.org/10.1016/j.jfds.2017.11.001>
- Sidek, N. Z. M. (2021). Do government expenditure reduce income inequality: evidence from developing and developed countries? *Studies in Economics and Finance*, 38(2), 447-503. <https://doi.org/10.1108/SEF-09-2020-0393>
- Ullah, A., Kui, Z., Ullah, S., Pinglu, C., & Khan, S. (2021). Sustainable utilisation of financial and institutional resources in reducing income inequality and poverty. *Sustainability*, 13(3), 1038. <https://doi.org/10.3390/su13031038>
- UNU-WIDER, World Income Inequality Database (WIID). Version 29 April 2025. <https://doi.org/10.35188/UNU-WIDER/WIID-290425>
- Uzar, U. (2023). Income inequality, institutions, and freedom of the press: potential mechanisms and evidence. *Sustainability*, 15(17), 12927. <https://doi.org/10.3390/su151712927>
- Verberi, C., & Yaşar, S. (2021). The effects of social spending on income inequality in 30 OECD countries. *İstanbul İktisat Dergisi*, 71(1), 39-57. <https://izlik.org/JA52MX55GC>
- Wu, J., & Pu, Y. (2020). Air pollution, general government public-health expenditures and income inequality: Empirical analysis based on the spatial Durbin model. *PLoS One*, 15(10), e0240053. <https://doi.org/10.1371/journal.pone.0240053>
- Zhang, J. (2023). The nonlinear effects of tourism on rural income inequality and urban–rural income inequality: Evidence from China. *Tourism Economics*, 29(1), 172-193. <https://doi.org/10.1177/13548166211041802>