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Institutional Quality, Gross Capital Formation, and Inclusive Growth in Sub-Saharan Africa: Evidence from Oil- And Non-Oil-Exporting Countries

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Abstract

This study examines the relationship between institutional quality, domestic investment, and inclusive growth in selected oil- and non-oil-exporting Sub-Saharan African countries over the period 2000-2023. Despite sustained economic growth in the region, inclusive development outcomes remain weak, raising concerns about the effectiveness of institutions and investment in translating growth into broad-based welfare gains. Inclusive growth and institutional quality indices are constructed using principal component analysis, while gross capital formation proxies domestic investment. Guided by endogenous growth theory, the study employs second-generation panel econometric techniques, Feasible Generalized Least Squares (FGLS), and pairwise Granger causality tests to address cross-sectional dependence, heteroskedasticity, and endogeneity issues. The results show that institutional quality has a positive and statistically significant effect on inclusive growth in both country groups, with a stronger impact in oil-exporting economies ($\beta = 0.7880$) than in non-oil exporters ($\beta = 0.6976$). Domestic investment significantly promotes inclusive growth in oil-exporting countries ($\beta = 0.0669$) but has no significant effect in non-oil-exporting economies. The study concludes that policymakers should prioritize strengthening governance institutions, improving regulatory quality, and enhancing accountability mechanisms to maximize the inclusive growth benefits of domestic investment in Sub-Saharan Africa.

Keywords: *Institutional Quality; Gross Capital Formation (Domestic Investment); Inclusive Growth; Sub-Saharan Africa.*

JEL Classification Codes: O43; E22; O55.

1. INTRODUCTION

Recent development discourse has increasingly highlighted the importance of institutional quality and governance in explaining differences in economic performance and the extent to which growth translates into broad-based welfare improvements. This shift in focus is largely due to the inability of traditional neoclassical and endogenous growth models to adequately explain persistent poverty, unemployment, inequality, and uneven welfare outcomes in developing economies (Rodrik et al., 2004). Consequently, contemporary literature increasingly emphasizes the role of institutions in shaping incentives, improving resource allocation, and fostering inclusive economic outcomes.

In Sub-Saharan Africa, many countries have recorded periods of moderate economic expansion over the past two decades, supported by macroeconomic reforms, commodity price booms, foreign capital inflows, and increased trade openness. However, this growth has not consistently translated into inclusive development outcomes. High levels of poverty, unemployment, and income inequality continue to persist across several countries in the region,

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raising concerns about the quality and sustainability of growth (Tchamyou et al., 2023). This persistent divergence between economic growth and social welfare outcomes underscores the need to examine the structural drivers of inclusive growth.

A key factor shaping development outcomes in the region is institutional quality. Strong institutions enhance policy credibility, reduce uncertainty, and improve the efficiency of public and private resource allocation (Rodrik, 2004). Empirical evidence suggests that institutional strength, captured through governance effectiveness, regulatory quality, rule of law, and control of corruption, plays a significant role in promoting inclusive development by expanding access to economic opportunities and reducing inefficiencies in resource distribution (Nguyen & Su, 2023). In contrast, weak institutional environments are associated with corruption, rent-seeking behaviour, and inefficient public expenditure, which ultimately undermine inclusive growth outcomes (Rodrik et al., 2004; Nguyen & Su, 2023).

Another important determinant of inclusive growth is domestic investment, which contributes to employment creation, productivity enhancement, and structural transformation. Empirical studies show that domestic investment supports inclusive development when directed toward productive sectors such as agriculture, infrastructure, and manufacturing (Slesman et al., 2023). However, in many Sub-Saharan African countries, the effectiveness of domestic investment is constrained by institutional weaknesses, macroeconomic instability, and infrastructural deficits, thereby limiting its potential developmental impact (Nguyen et al., 2022).

Recent evidence further suggests that institutional quality conditions the effectiveness of domestic investment in promoting inclusive growth. Strong institutional frameworks improve investment efficiency through better contract enforcement, transparency, accountability, and public financial management systems (Nguyen et al., 2022). Conversely, weak institutions distort investment allocation, leading to inefficient outcomes that fail to significantly reduce poverty or inequality. This interaction is particularly relevant in resource-dependent economies, where governance challenges often weaken the developmental impact of investment activities (Tchamyou et al., 2023).

Despite growing empirical attention, three important gaps remain in the literature. First, most existing studies examine institutional quality and domestic investment independently, without adequately capturing their joint effect on inclusive growth. Second, the literature often treats Sub-Saharan Africa as a homogeneous region, thereby overlooking important structural differences across countries. Third, many studies rely on traditional econometric techniques that may not fully account for cross-sectional dependence and heterogeneity commonly observed in panel data for African economies (Pesaran, 2021).

Against this backdrop, this study examines the relationship between institutional quality, domestic investment, and inclusive growth in selected Sub-Saharan African countries over the period 2000–2023. The analysis employs composite indices constructed using Principal Component Analysis (PCA) and applies second-generation panel estimation techniques, including Feasible Generalized Least Squares (FGLS), to ensure robust and reliable inference.

This study contributes to the literature in three main ways. First, it integrates institutional quality and domestic investment within a unified framework of inclusive growth. Second, it provides updated empirical evidence for Sub-Saharan Africa using a comparative perspective. Third, it applies advanced econometric techniques that address cross-sectional dependence and

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improve estimation reliability, thereby offering stronger policy-relevant insights for inclusive development in the region.

2. THEORETICAL ISSUES AND EMPIRICAL STUDIES

The inability of the classical neoclassical growth framework to adequately explain persistent cross-country differences in growth, productivity, and welfare outcomes led to the development of endogenous growth theory. Foundational contributions by Romer (1986), Lucas (1988), and Barro (2001) emphasized the roles of human capital accumulation, technological progress, and capital investment as key drivers of long-run economic growth. However, despite these advancements, endogenous growth models have been criticized for their limited explanatory power regarding why countries with similar factor endowments experience divergent development trajectories. This limitation has shifted attention toward institutional quality as a central determinant of inclusive and sustainable development outcomes.

Institutional theory posits that institutions represent the formal and informal "rules of the game" that structure economic incentives, reduce uncertainty, and influence resource allocation efficiency within an economy. Strong institutions, reflected in effective governance, rule of law, regulatory quality, and control of corruption, enhance economic performance by lowering transaction costs and improving policy predictability (Rodrik et al., 2004; Rodrik, 2023). In contrast, weak institutions generate inefficiencies, distort incentives, and limit the extent to which economic growth translates into broad-based welfare improvements.

Inclusive growth extends beyond aggregate output expansion to include distributional and welfare dimensions such as employment generation, poverty reduction, and access to essential services. It therefore captures whether economic expansion improves living standards across different population groups rather than concentrating gains among a small segment of society (Nguyen & Su, 2023). In Sub-Saharan Africa, inclusive growth outcomes vary significantly across countries, largely due to structural heterogeneity, especially between oil-exporting and non-oil-exporting economies.

Domestic investment is a key channel through which inclusive growth is achieved, as it expands productive capacity, supports industrialization, and generates employment opportunities. However, the developmental impact of domestic investment depends critically on institutional quality. In weak institutional environments, investment is often misallocated toward inefficient or politically motivated projects, thereby limiting its contribution to inclusive development. In contrast, strong institutions improve investment efficiency through transparency, accountability, and effective public financial management systems (Nguyen et al., 2022).

Institutional economics further suggests that development outcomes are shaped by the interaction between institutions and economic incentives. Strong institutions encourage productive investment by reducing uncertainty and protecting property rights, while weak institutions promote rent-seeking behaviour and discourage efficient resource allocation. This dynamic is particularly pronounced in resource-rich economies, where governance weaknesses can generate inefficiencies commonly associated with the "resource curse," thereby weakening the inclusive growth process.

Foreign direct investment (FDI) also plays an important role in development, but its impact is conditional on institutional quality. Empirical evidence indicates that FDI contributes

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more effectively to growth and welfare improvements in countries with strong governance systems that ensure accountability and protect investor rights (Slesman et al., 2023). This reinforces the argument that both domestic and foreign investment require strong institutional foundations to generate inclusive development outcomes.

2.1 Empirical Studies

Nguyen and Su (2023) examined the relationship between institutional quality and inclusive growth using cross-country panel data covering both developed and developing economies. Employing panel regression techniques that account for country-specific heterogeneity, the study investigated how governance quality influences the distributional outcomes of economic growth. The findings reveal that improved institutional quality significantly enhances inclusive growth by reducing income inequality and improving access to economic opportunities. The authors argue that governance effectiveness strengthens the transmission of growth benefits to broader segments of the population by improving policy implementation and institutional responsiveness. However, the study is limited by its cross-country aggregation, which may mask region-specific structural differences, particularly in developing regions such as Sub-Saharan Africa.

Nguyen et al. (2022) analysed the interaction between institutional quality, domestic investment, and inclusive growth in developing economies using panel data econometric techniques. The study applied advanced estimation methods that account for endogeneity and country heterogeneity to isolate the effect of institutional quality on investment efficiency. The results show that stronger institutional frameworks significantly enhance the effectiveness of domestic investment in promoting inclusive growth. Specifically, institutions improve transparency, reduce corruption, and ensure better allocation of investment resources toward productive sectors. The study highlights that weak institutional environments reduce the developmental impact of investment due to inefficiencies and misallocation. A limitation of the study is its limited exploration of structural differences across resource-dependent and non-resource-dependent economies.

Slesman et al. (2023) investigated the relationship between investment, institutional quality, and inclusive development in emerging economies using panel data models that account for heterogeneity across countries. The study examined how institutional quality conditions the impact of investment on inclusive growth outcomes. The findings indicate that investment contributes more significantly to inclusive growth in countries with stronger institutional frameworks. This is because effective institutions improve regulatory efficiency, strengthen contract enforcement, and reduce uncertainty in economic transactions. The authors conclude that institutional quality acts as a complementary factor that amplifies the developmental returns of investment. However, the study primarily focuses on emerging economies broadly, limiting its specific applicability to Sub-Saharan African structural conditions.

Tchamyou et al. (2023) examined the joint effects of institutional quality and structural factors such as technological development on inclusive growth and inequality in African economies. Using panel data techniques, the study assessed how governance quality interacts with information technology diffusion to influence development outcomes. The findings show that improvements in institutional quality, combined with technological advancement, significantly enhance inclusive growth and reduce inequality across African countries. The study emphasizes that institutional weaknesses limit the effectiveness of structural

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transformation processes. However, it does not fully disaggregate the distinct roles of oil-exporting and non-oil-exporting economies, which may exhibit different institutional dynamics.

Pesaran (2021) provides a methodological contribution by developing diagnostic tests for cross-sectional dependence in panel data models. The study demonstrates that ignoring cross-sectional dependence in macro-panel estimations can lead to biased and inconsistent results, particularly in settings involving economically interconnected countries. The proposed techniques improve the reliability of empirical analysis in multi-country studies by accounting for unobserved common shocks and spillover effects. This contribution is particularly relevant for studies on Sub-Saharan Africa, where regional interdependence and external shocks significantly influence macroeconomic outcomes. However, the study is methodological in nature and does not directly examine institutional quality or inclusive growth outcomes.

Overall, the empirical literature consistently indicates that institutional quality plays a central role in promoting inclusive growth, both directly and indirectly through its interaction with domestic investment. Strong institutions enhance investment efficiency, reduce corruption, and improve policy effectiveness, thereby ensuring that economic growth translates into broader welfare improvements. However, the magnitude of these effects varies across contexts, particularly between resource-dependent and diversified economies. In oil-dependent economies, institutional weaknesses tend to weaken the investment-growth nexus, while in more diversified economies, institutional quality plays a stronger and more consistent role in driving inclusive development outcomes.

3. METHODOLOGY

3.1 Theoretical Framework

This study is anchored on the Endogenous Growth Theory (Romer, 1986; Lucas, 1988), which posits that long-run economic growth is driven by internal factors such as human capital accumulation, innovation, and capital investment, rather than external shocks.

Within this framework, institutional quality and domestic investment are central determinants of inclusive growth. Strong institutions enhance efficiency in resource allocation, reduce uncertainty, and promote productive investment, while domestic investment expands productive capacity, generates employment, and fosters structural transformation (Rodrik et al., 2004; Nguyen et al., 2022; Slesman et al., 2023). The interaction of these variables is therefore expected to produce inclusive and sustained growth outcomes.

3.2 Data and Variables

This study examines the relationship between institutional quality (INSQ), domestic investment (GCF), and inclusive growth (INCG) in selected oil- and non-oil-exporting Sub-Saharan African countries over the period 2000–2023. The analysis utilizes secondary panel data obtained from the World Development Indicators (WDI, 2023) and the Worldwide Governance Indicators (WGI, 2023).

The dependent variable, inclusive growth (INCG), captures the extent to which economic growth is broad-based and associated with improvements in welfare outcomes across the population. Domestic investment is proxied by gross capital formation (GCF), while additional macroeconomic control variables include foreign direct investment (FDI), consumer price index (CPI), interest rate (INTR), and exchange rate (EXR).

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Institutional quality (INSQ) is measured using governance indicators obtained from the Worldwide Governance Indicators (WGI) database. The indicators comprise six dimensions of governance, namely voice and accountability, political stability, government effectiveness, regulatory quality, rule of law, and control of corruption. Each governance indicator is measured on an approximate scale ranging from -2.5 to +2.5, where higher values indicate stronger governance performance (Kaufmann et al., 2011). Consistent with existing empirical literature, this study constructs a composite institutional quality index to capture overall governance performance across the selected countries.

To enhance robustness and reduce dimensionality, composite indices for institutional quality and inclusive growth are constructed using Principal Component Analysis (PCA), following Jolliffe and Cadima (2016). The PCA approach enables the extraction of common variation among related indicators, thereby improving measurement efficiency and minimizing potential multicollinearity problems.

3.3 Model Specification

The empirical relationship between inclusive growth, institutional quality, and gross capital formation (domestic investment) is specified as:

$$INCG_{it} = \beta_0 + \beta_1 INSQ_{it} + \beta_2 LGCF_{it} + \beta_3 FDI_{it} + \beta_4 CPI_{it} + \beta_5 INTR_{it} + \beta_6 EXR_{it} + \varepsilon_{it}$$

Where:

- $INCG_{it}$ = Inclusive growth index
- $INSQ_{it}$ = Institutional quality
- $LGCF_{it}$ = Log of Gross Capital Formation (Domestic Investment)
- FDI_{it} = Foreign direct investment
- CPI_{it} = Inflation (consumer price index)
- $INTR_{it}$ = Interest rate
- EXR_{it} = Exchange rate
- ε_{it} = Stochastic error term

i and t denote country and time, respectively.

3.4 Estimation Techniques

To achieve the objectives of this study, two complementary econometric techniques are employed: the pairwise Granger causality test and the Feasible Generalized Least Squares (FGLS) estimator.

The pairwise Granger causality test is used to determine the direction of causality among institutional quality, domestic investment, and inclusive growth. The decision rule is that if the probability value of the F-statistic exceeds the 5% significance level, the null hypothesis of no causality is accepted.

Conversely, if the p-value is less than 5%, the null hypothesis is rejected, indicating the existence of Granger causality. The causal relationship may be unidirectional or bidirectional depending on the test outcomes (Granger, 1969; Lütkepohl, 2005).

The mathematical representation of the Granger causality framework for two stationary

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variables, X and Y, is expressed as:

$$Y_{it} = \sum_{j=1}^{p} \alpha_j Y_{(i,t-j)} + \sum_{k=1}^{q} \beta_k X_{(i,t-k)} + \mu_{it}$$

$$X_{it} = \sum_{j=1}^{p} \gamma_j X_{(i,t-j)} + \sum_{k=1}^{q} \delta_k Y_{(i,t-k)} + \nu_{it}$$

Where $i = 1, \ldots, N$ denotes cross-sectional units (countries), $t = 1, \ldots, T$ represents time periods, and μ_{it} and ν_{it} are stochastic disturbance terms. The variables considered in this framework include INCG, INSQ, GCF, FDI, CPI, INTR, and EXR.

To address econometric issues such as cross-sectional dependence, heteroskedasticity, and potential endogeneity, common in panel data involving heterogeneous Sub-Saharan African economies, the study employs the Feasible Generalized Least Squares (FGLS) estimator (Baltagi, 2008; Pesaran, 2006). This approach provides efficient and unbiased parameter estimates under conditions of panel heterogeneity and error correlation.

PANEL A: OIL-EXPORTING COUNTRIES

4. RESULTS

4.1 Summary Statistics for Institutional Quality and Domestic Investment on Inclusive Growth in Selected Oil Exporting Sub-Saharan African Countries

The descriptive statistics examine the statistical properties of the dataset for selected oil-exporting Sub-Saharan African countries. The results present the mean, standard deviation, minimum, maximum, and number of observations for each variable. The mean indicates the average value of the distribution, while the standard deviation measures the degree of dispersion from the mean. The variables considered include inclusive growth (INCG), institutional quality (INSQ), gross capital formation (GCF), inflation (CPI), interest rate (INTR), exchange rate (EXR), and foreign direct investment (FDI). The average number of observations across all variables is 240. The mean value of inclusive growth (INCG) is 8.718 with a standard deviation of 3.261, indicating moderate dispersion around the mean. The minimum and maximum values are 1.805 and 15.437 respectively, reflecting variation across countries and time. Institutional quality (INSQ) records a mean value of 8.444 and a standard deviation of 5.533, suggesting substantial variability across the panel. The minimum and maximum values are 2.521 and 11.612 respectively. Gross capital formation (GCF) has a mean value of 16.467 and a standard deviation of 10.453, indicating moderate dispersion in domestic investment levels. The minimum value is 3.425 while the maximum is 42.821. Inflation (CPI) shows a mean of 11.465 and a high standard deviation of 25.345, indicating strong volatility in macroeconomic conditions. The minimum value is -9.798 and the maximum is 324.997. Interest rate (INTR) has a mean of 2.410 and a standard deviation of 8.789, reflecting dispersion across countries. The minimum and maximum values are -60.781 and 41.046 respectively. Exchange rate (EXR) records a mean of 277.402 and a standard deviation of 437.656, indicating high volatility across countries. The minimum value is 100.324 while the maximum is 2034.31. Foreign direct investment (FDI) has a mean value of 0.505 and a standard deviation of 4.265, indicating low average inflows with high variability. The minimum value is 0.000 while the maximum value is 8.709.

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Table 4.1: Descriptive Statistics (Oil-Exporting Countries)

Variable	Obs	Mean	Std. Dev.	Min	Max
INCG	240	8.718317	3.261325	1.80543	15.43663
INSQ	240	8.44444	5.53285	2.521286	11.61171
GCF	240	16.46739	10.4529	3.42500	42.8209
CPI	240	11.46505	25.34509	-9.79765	324.997
INTR	240	2.409543	8.788836	-60.7813	41.0461
EXR	240	277.402	437.6561	100.3240	2034.31
FDI	240	0.505236	4.265123	0.000000	8.709000

Source: Author's computation (2024)

Note: INCG = Inclusive growth; INSQ = Institutional quality; GCF = Gross capital formation; CPI = Inflation; INTR = Interest rate; EXR = Exchange rate; FDI = Foreign direct investment.

4.2 Correlation Analysis and Multicollinearity Test for Institutional Quality, Domestic Investment and Inclusive Growth

The correlation results indicate a generally positive relationship between inclusive growth (INCG), institutional quality (INSQ), and domestic investment (LGCF). Institutional quality exhibits the strongest positive association with inclusive growth (r = 0.596), suggesting its central role in driving inclusive economic outcomes. Other macroeconomic variables show weak correlations with inclusive growth, while inflation is negatively related, consistent with theoretical expectations. Importantly, there is no evidence of strong inter-correlations among the explanatory variables. This is further confirmed by the Variance Inflation Factor (VIF) results, which range from 1.07 to 1.30 with a mean of 1.23. Since all values are below the conventional threshold of 5, multicollinearity is not a concern, and the model is suitable for regression analysis.

Table 4.2: Correlation Matrix and Variance Inflation Factor (VIF) for Institutional Quality, Gross Capital Formation (Domestic Investment) and Inclusive Growth

Panel A: Correlation Matrix

Variables	INCG	INSQ	LGCF	LCPI	LINTR	LEXR	LFDI
INCG	1.000						
INSQ	0.596	1.000					
LGCF	0.424	0.373	1.000				
LCPI	-0.072	-0.148	-0.072	1.000			
LINTR	0.100	0.131	0.028	-0.454	1.000		
LEXR	0.197	-0.051	-0.061	-0.101	0.074	1.000	
LFDI	0.084	-0.218	0.115	-0.047	-0.091	0.213	1.000

Panel B: Variance Inflation Factor (VIF)

Variable	VIF	1/VIF
INSQ	1.29	0.7728
LGCF	1.23	0.8130
LCPI	1.30	0.7709
LINTR	1.29	0.7764
LEXR	1.07	0.9338
LFDI	1.18	0.8476
Mean VIF	1.23	

Source: Author's computation (2024)

Note: INCG = Inclusive Growth; INSQ = Institutional Quality; LGCF = Gross Capital

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Formation; LCPI = Consumer Price Index (Inflation); LINTR = Interest Rate; LEXR = Exchange Rate; LFDI = Foreign Direct Investment.

4.3 Preliminary Diagnostic Tests for Institutional Quality, Gross Capital Formation (Domestic Investment) and Inclusive Growth

Prior to estimation, several diagnostic tests were conducted to determine the appropriate econometric approach. The Wooldridge test indicates no first-order serial correlation (p = 0.3493). However, the White test confirms the presence of heteroskedasticity (p = 0.0000), suggesting non-constant variance across units. The Pesaran-Yamagata test supports slope homogeneity, indicating no significant variation in slope coefficients across countries. Conversely, the Pesaran CD test confirms the presence of cross-sectional dependence (p = 0.0080), implying that shocks in one country affect others within the panel. Overall, these results justify the use of second-generation panel estimation techniques, particularly Feasible Generalized Least Squares (FGLS), to obtain efficient and robust estimates.

Table 4.3: Summary of Preliminary Diagnostic Tests

Diagnostic Test	Test Statistic	P-value	Decision
Wooldridge Serial Correlation Test	F = 0.975	0.3493	No first-order serial correlation
White's Heteroskedasticity Test	$\chi^2 = 96.67$	0.0000***	Heteroskedasticity present
Pesaran-Yamagata Slope Homogeneity Test	$\Delta = 1.287$	0.1980	Homogeneous slopes
Adjusted Delta Test	Adj. Δ = 1.577	0.1150	Homogeneous slopes
Pesaran Cross-Sectional Dependence (CD) Test	CD = -2.64	0.0080***	Cross-sectional dependence exists

Source: Author's computation (2024)

Note: *** denotes statistical significance at the 1% level. The CD statistic reported corresponds to the dependent variable (INCG). The existence of heteroskedasticity and cross-sectional dependence supports the use of second-generation panel techniques and the Feasible Generalized Least Squares (FGLS) estimator.

4.4 Panel Unit Root Test

Following the evidence of cross-sectional dependence, second-generation panel unit root tests (CADF and CIPS) were employed. The results show a mixed order of integration. Inclusive growth (INCG), institutional quality (INSQ), inflation (LCPI), and interest rate (LINTR) are stationary at level, I(0).

In contrast, gross capital formation (LGCF), exchange rate (LEXR), and foreign direct investment (LFDI) become stationary after first differencing, I(1). This mixed integration order justifies the use of panel cointegration techniques to examine long-run relationships among the variables.

Table 4.4: Summary of Second-Generation Panel Unit Root Test Results

Variables	Order of Integration
INCG	I(0)
INSQ	I(0)
LGCF	I(1)
LCPI	I(0)
LINTR	I(0)

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Variables	Order of Integration
LEXR	I(1)
LFDI	I(1)

Source: Author's Computation (2024)

Note: INCG = Inclusive Growth; INSQ = Institutional Quality; LGCF = Gross Capital Formation; LCPI = Consumer Price Index; LINTR = Interest Rate; LEXR = Official Exchange Rate; LFDI = Foreign Direct Investment. Detailed CADF and CIPS test statistics are reported in Appendix A.

4.5 Panel Cointegration Test

Following the panel unit root results, the Westerlund panel cointegration test was employed to determine whether a long-run equilibrium relationship exists among inclusive growth, institutional quality, domestic investment, and the control variables. The Westerlund test is robust to cross-sectional dependence and is therefore appropriate for the panel structure of this study. The results presented in Table 4.5 indicate a variance ratio statistic of 1.607 with a p-value of 0.0058. Since the probability value is less than the 1% significance level, the null hypothesis of no cointegration is rejected. This finding confirms the existence of a long-run relationship among the variables, implying that institutional quality, domestic investment, and the control variables move together with inclusive growth over time in the selected oil-exporting Sub-Saharan African countries.

Table 4.5: Westerlund Panel Cointegration Test Results

Statistic	Value	P-value	Decision
Variance Ratio	1.607	0.0058	Reject H_0: Cointegration exists

Source: Author's Computation using Stata (2024)

Note: H_0 = No cointegration; H_1 = Cointegration exists. A significant p-value indicates the presence of a long-run relationship among the variables.

4.6 Effects of Institutional Quality and Gross Capital Formation (Domestic Investment) on Inclusive Growth in Selected Oil-Exporting Sub-Saharan African Countries

The Feasible Generalized Least Squares (FGLS) estimator was applied due to heteroskedasticity and cross-sectional dependence. The model is statistically significant (Wald $\chi^2 = 221.88$, $p = 0.000$), indicating strong explanatory power. Results show that institutional quality (INSQ), gross capital formation (LGCF), exchange rate (LEXR), and foreign direct investment (LFDI) exert positive and statistically significant effects on inclusive growth. Institutional quality has the strongest effect, highlighting the critical role of governance in promoting inclusive development. Inflation and interest rate are positive but statistically insignificant, suggesting limited influence on inclusive growth within the period studied.

Table 4.6: FGLS Results on the Effects of Institutional Quality and Gross Capital Formation (Domestic Investment) on Inclusive Growth

Variables	Coefficient	Std. Error	z-Statistic	P-value
INSQ	0.788	0.0741	10.64	0.000***
LGCF	0.0669	0.016	4.15	0.000***
LCPI	0.0102	0.0068	1.5	0.134
LINTR	0.0201	0.0196	1.03	0.305
LEXR	0.0016	0.0004	4.4	0.000***
LFDI	0.4744	0.1648	2.88	0.004***
Constant	-5.5096	2.3321	-2.36	0.018**

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Model Diagnostics	Value
Wald χ^2 (6)	221.88
Prob > χ^2	0
Number of Observations	240

Source: Author's Computation (2024)

Note: *** p < 0.01, ** p < 0.05. INCG = Inclusive Growth; INSQ = Institutional Quality; LGCF = Gross Capital Formation; LCPI = Consumer Price Index; LINTR = Interest Rate; LEXR = Official Exchange Rate; LFDI = Foreign Direct Investment.

4.7 Moderating Effect of Institutional Quality on the Relationship between Gross Capital Formation (Domestic Investment) and Inclusive Growth

The interaction term between institutional quality and domestic investment (INSQLGCF) is positive and statistically significant (β = 0.0178, p < 0.01). This indicates that institutional quality strengthens the effect of domestic investment on inclusive growth. Although the interaction effect is significant, its magnitude is smaller than the direct effects of institutional quality and domestic investment, suggesting that while institutions enhance investment effectiveness, direct channels remain more influential. Other controls such as exchange rate are significant, while inflation, interest rate, and FDI are not statistically significant.

Table 4. 7: The Moderating Effects of Institutional Quality on the Effects of Gross Capital Formation (Domestic Investment) on Inclusive Growth in Selected Oil-Exporting Sub-Saharan African Countries

INCG	Panel-COEF.	Corrected STD. ERR	Z	P>|Z|	[95% COEF. INTERVAL]	
INSQLGCF	.0177664	.0017818	9.97	0.000*	.0142742	.0212586
LCPI	.007958	.0077576	1.00	0.317	-.0076367	.0235527
LINTR	.0480022	.0254105	1.89	0.059	-.0018014	.0978058
LEXR	.0018553	.0004258	0.21	0.000*	.0010207	.0026899
LFDI	.0409414	.1939337	4.36	0.833	-.3391617	.4210445
C	2.245184	1.983506	1.13	0.025	-1.642416	6.132784
Wald chi2(6)	117.03					
Prob>chi2	0.0000					
No of obs.	216					

Source: Author's computation (2024)

Note: INSQLGCF = Interaction term between Institutional Quality and Gross Capital Formation; LCPI = Consumer Price Index; LINTR = Interest Rate; LEXR = Official Exchange Rate; LFDI = Foreign Direct Investment.

4.8 Granger Causality between Institutional Quality, Gross Capital Formation (Domestic Investment) and Inclusive Growth

The Granger causality results reveal mixed dynamics among the variables. Bidirectional causality exists between institutional quality and inclusive growth, gross capital formation and inclusive growth, and FDI and inclusive growth, indicating feedback effects.

Unidirectional causality runs from institutional quality to domestic investment and from domestic investment to inflation. Other macroeconomic variables show weak or no meaningful causal influence on inclusive growth. Overall, institutional quality and domestic investment emerge as central transmission channels for inclusive growth.

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Table 4.8: Summary of Granger Causality Results

Relationship	Direction
INSQ ↔ INCG	Bidirectional
LGCF ↔ INCG	Bidirectional
LFDI ↔ INCG	Bidirectional
INSQ → LGCF	Unidirectional
LGCF → LCPI	Unidirectional

Source: Author's computation (2024)

PANEL B: NON-OIL EXPORTING COUNTRIES

4.9 Summary Statistics for Institutional Quality and Gross Capital Formation (Domestic Investment) on Inclusive Growth

The results in Table 4.9 present the descriptive statistics for the selected non-oil exporting Sub-Saharan African countries. The variables include inclusive growth (INCG), institutional quality (INSQ), gross capital formation (GCF), interest rate (INTR), exchange rate (EXR), foreign direct investment (FDI), and inflation (CPI).

The results show that inclusive growth (INCG) has a mean value of 10.843 and a standard deviation of 3.296, indicating moderate variation across countries. Institutional quality (INSQ) records a mean of 8.298 with a standard deviation of 2.362, suggesting relatively low dispersion across the panel.

Gross capital formation (GCF) has a mean value of 18.699 and a standard deviation of 11.694, reflecting substantial variation in domestic investment across countries. Interest rate (INTR) shows a mean of 9.021 and a standard deviation of 12.052, indicating volatility in monetary conditions within the sample.

Exchange rate (EXR) records a mean of 778.161 and a standard deviation of 1030.828, reflecting significant macroeconomic instability and wide fluctuations across countries. The minimum and maximum values range from 300.0121 to 4096.12, confirming high exchange rate variability within the panel.

Foreign direct investment (FDI) has a mean value of -8.251 and a standard deviation of 3.078, indicating that several country-year observations experienced net capital outflows or disinvestment during the period under review. This negative mean reflects episodes where repatriation of capital or low inflows outweighed investment receipts in some economies. Inflation (CPI) records a mean of 7.462 and a standard deviation of 7.147, suggesting moderate inflationary variation across countries, with values ranging from -16.860 to 44.357.

Table 4.9: Descriptive Statistics (Non-Oil Exporting Countries)

Variable	Obs	Mean	Std. Dev.	Min	Max
INCG	240	10.84319	3.296067	5.493301	23.85438
INSQ	240	8.297943	2.361766	2.331835	11.9635
GCF	240	18.6989	11.69442	3.425451	40.9335
INTR	240	9.02104	12.05211	-34.7434	52.4368
EXR	240	778.1612	1030.828	3009.0121	4096.12
FDI	240	-8.25068	3.07809	-14.10201	5.40309
CPI	240	7.46154	7.147304	-16.8597	44.3567

Source: Author's computation (2024)

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4.10 Correlation Matrix and Variance Inflation Factor (VIF) Effects of Institutional Quality and Gross Capital Formation (Domestic Investment) on Inclusive Growth

The correlation matrix shows that inclusive growth is positively related to institutional quality and gross capital formation but negatively related to inflation, exchange rate, FDI, and interest rate.

The strongest correlation is between exchange rate and interest rate (r = 0.5039), while the weakest is between FDI and inclusive growth (-0.2159). Overall, the results indicate no serious multicollinearity problem. VIF results further confirm this, with all values below 5.

Table 4.10: Correlation Matrix on the Effects of Institutional Quality and Gross Capital Formation (Domestic Investment) on Inclusive Growth

Variables	INCG	INSQ	LGCF	LINTR	LEXR	LFDI	LCPI
INCG	1						
INSQ	0.3781	1					
LGCF	0.1411	0.3744	1				
LINTR	-0.0594	0.1955	-0.0421	1			
LEXR	-0.1321	0.3257	0.3088	0.5039	1		
LFDI	-0.2159	-0.035	-0.0797	0.0775	0.0424	1	
LCPI	-0.0622	0.1886	-0.1188	-0.0543	-0.0692	-0.0217	1

Source: Author's computation (2024)

Variance Inflation Factor (VIF)

The variance inflation factor (VIF) test is used to detect multicollinearity among explanatory variables in the model. As shown in Table 11, all VIF values are below the conventional threshold of 5, with the highest value recorded at 1.61.

This confirms that multicollinearity is not a concern in the model, and the variables are suitable for further econometric analysis.

Variance inflation factor

Variables	VIF	1/VIF
LEXR	1.61	.622463
LINTR	1.46	.686260
LGCF	1.37	.5728657
INSQ	1.36	.737273
LCPI	1.10	.906318
LFDI	1.01	0.985665
MEAN VIF	2.221	.

Source: Author's computation (2024)

Table 4.11: Preliminary Diagnostic Tests (Non-Oil Exporting African Countries)

This section presents the results of key diagnostic tests used to examine the statistical properties of the panel model, including serial correlation, heteroskedasticity, slope homogeneity, and cross-sectional dependence.

The results are crucial for determining the appropriateness of the estimation techniques employed in the study and for ensuring robust and reliable inference.

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Table 4.11: Summary of Diagnostic Tests

Test	Statistic	P-value	Decision
Wooldridge	8.450	0.0174	First-order autocorrelation present
White Test	59.18	0.0003	Heteroskedasticity present
Yamagata Test	1.841	0.066	Slope heterogeneity (weak evidence)
CD Test	—	Mixed	Cross-sectional dependence present

Source: Author's Computation (2024)

The Wooldridge test indicates serial correlation (p = 0.0174), while the White test confirms heteroskedasticity (p = 0.0003). The Yamagata test suggests slope heterogeneity, particularly after adjustment. The Pesaran CD test confirms cross-sectional dependence, indicating interdependence among countries. Overall, these findings justify the use of robust second-generation estimators such as FGLS.

4.12: Unit Root Summary (Non-Oil Exporting African Countries)

To ensure the reliability of the estimated model and avoid spurious regression results, second-generation panel unit root tests, specifically the Cross-sectional Augmented Dickey-Fuller (CADF) and Cross-sectional Im-Pesaran-Shin (CIPS) tests, were employed to determine the stationarity properties of the variables. The results indicate a mixed order of integration among the variables, with some being stationary at level and others becoming stationary after first differencing.

Table 4.12: Panel Unit Root Summary

Variable	Order of Integration
INCG	I(0)
INSQ	I(0)
LGCF	I(1)
LCPI	I(0)
LINTR	I(0)
LEXR	I(1)
LFDI	I(1)

Source: Author's Computation (2024)

The unit root results show a mixture of I(0) and I(1) variables. INCG, INSQ, LCPI, and LINTR are stationary at level, while LGCF, LEXR, and LFDI become stationary after first differencing. This confirms mixed integration and supports further cointegration analysis.

4.13: Panel Cointegration Test Result (Westerlund)

Following the unit root results, the Westerlund panel cointegration test was applied to examine whether a long-run equilibrium relationship exists among the variables in the model. The test accounts for cross-sectional dependence detected in the preliminary diagnostics. The null hypothesis assumes no cointegration among the variables.

Table 4.13: Panel Cointegration Test Result (Westerlund)

Test Statistic	Value	P-value
Variance Ratio	1.2779	0.006

Source: Author's Computation using Stata (2024)

The Westerlund test confirms a long-run relationship among variables (variance ratio = 1.2779; p = 0.006), leading to rejection of the null hypothesis of no cointegration. This implies that inclusive growth and its determinants move together in the long run.

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4.14 Effects of Institutional Quality and Gross Capital Formation (Domestic Investment) on Inclusive Growth in Selected Non-Oil Exporting Sub-Saharan African Countries

The presence of cross-sectional dependence, heteroskedasticity, and serial correlation led to the use of the Feasible Generalized Least Squares (FGLS) estimator to obtain reliable and efficient results.

Table 4.14: Effects of Institutional Quality and Gross Capital Formation (Domestic Investment) on Inclusive Growth in Selected Non-Oil Exporting Sub-Saharan African Countries

INCG	Coefficient	Std. err	Z	P|Z|	(95% Conf. Interval)	
INSQ	.6976335	.0888666	7.85	0.000*	.5220873	.8718089
LGCF	.0031777	.018053	0.18	0.856	-.0322055	.038561
LCPI	-.083081	.0264854	-3.14	0.002*	-.1349915	-.0311705
LINTR	.0002776	.0180502	0.02	0.988	-.0351001	.0356554
LEXR	-.7779701	.0002216	-4.38	0.000*	-.0014044	-.0005358
LFDI	-.6216075	.1815203	-3.42	0.000*	-.9773808	-.2658343
_CONS	14.51535	2.503198	5.80	0.000	9.609175	19.42153
Wald chi2(6)	145.12					
Prob>chi2	0.0000					
No of obs.	240					

Source: Author's Computation (2024)

Institutional quality has a positive and statistically significant effect on inclusive growth. Gross capital formation and interest rate are positive but insignificant. In contrast, inflation, exchange rate, and foreign direct investment exert negative and significant effects. The model is statistically significant (Wald $\chi^2 = 145.12$, $p < 0.01$).

4.15 Moderating Effect of Institutional Quality on the Relationship between Gross Capital Formation (Domestic Investment) and Inclusive Growth

To examine the moderating role of institutional quality on the relationship between Gross Capital Formation (Domestic Investment) and inclusive growth, the Feasible Generalized Least Squares (FGLS) estimator was employed. The choice of FGLS was informed by the presence of heteroskedasticity, autocorrelation, and cross-sectional dependence identified during the preliminary diagnostic tests.

Table 4.15: Moderating Effect of Institutional Quality on Gross Capital Formation (Domestic Investment) and Inclusive Growth

INCG	Coefficient	Std. err	Z	P|Z|	(95% Conf. Interval)	
INSQLGCF	.0073537	.0019265	3.82	0.000*	.0035778	.0111295
LINTR	-.025386	.0280899	-0.90	0.366	-.0804412	.0296692
LCPI	.024674	.0197876	1.25	0.212	-.0141089	.0634569
LEXR	-.0008664	.0002496	-3.47	0.001*	-.0013556	-.0003772
LFDI	-.6396948	.2007762	-3.19	0.001*	-1.033209	-.2461807
_CONS	18.65244	2.686561	6.94	0.000	13.38687	23.918
Wald chi2(6)	136.16					
Prob>chi2	0.0000					
No of obs.	240					

Source: Author's Computation (2024).

The interaction term between institutional quality and Gross Capital Formation (Domestic Investment) is positive and significant ($\beta = 0.0074$, $p < 0.01$), indicating that

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institutional quality enhances the effect of Gross Capital Formation (Domestic Investment) on inclusive growth. However, the magnitude is relatively small, suggesting that while institutions matter, the direct effect of investment remains limited. Exchange rate and FDI remain negatively significant, while inflation and interest rate are insignificant.

4.16 Granger Causality between Institutional Quality, Gross Capital Formation (Domestic Investment) and Inclusive Growth

To determine the direction of causality among the variables, the Pairwise Granger Causality Test was conducted. The results reveal the existence of bidirectional, unidirectional, and weak causal relationships among the variables. For ease of presentation, the summary of the major causal relationships relevant to the study objectives is presented in Table 4. 16

Table 4.16: Granger Causality Summary (Non-Oil Exporters)

Relationship	Direction
INSQ ↔ INCG	Bidirectional
LGCF ↔ INCG	Bidirectional
LINTR ↔ INCG	Bidirectional
LEXR → INCG	Unidirectional
INSQ ↔ LGCF	Bidirectional
LGCF ↔ LCPI	Bidirectional
LFDI → INCG	Weak/No strong direction

Source: Author's Computation (2024)

The results indicate bidirectional causality between institutional quality and inclusive growth, as well as between gross capital formation and inclusive growth. Interest rate also shows bidirectional causality with inclusive growth. Exchange rate Granger-causes inclusive growth, while FDI shows weak or no strong causal relationship. Overall, institutional quality and domestic investment remain key drivers of inclusive growth dynamics.

4.17 Comparative Analysis of Oil and Non-Oil Exporting Countries

The comparative FGLS results indicate that institutional quality exerts a positive and statistically significant effect on inclusive growth in both oil-exporting and non-oil-exporting Sub-Saharan African countries, although the magnitude is higher in oil-exporting economies (0.7880) relative to non-oil exporters (0.6976). This suggests that institutional improvements yield stronger inclusive growth outcomes in resource-rich economies, potentially due to greater fiscal space and investment capacity. Similarly, gross capital formation positively influences inclusive growth in oil-exporting countries (0.0669), but its effect is statistically insignificant in non-oil-exporting countries (0.0032). This divergence may reflect structural constraints in non-oil economies, including weaker infrastructure, limited absorptive capacity, and institutional inefficiencies that reduce the productivity of investment. The moderating effect of institutional quality on **gross capital formation (domestic investment)** is positive in both groups, though relatively small in magnitude. This indicates that while institutional quality enhances the effectiveness of **gross capital formation (domestic investment)**, the interaction effect does not outweigh the direct effects of either institutional quality or investment. Granger causality results further confirm the presence of feedback effects, with bidirectional causality observed between institutional quality, **gross capital formation (domestic investment)**, and inclusive growth across both groups. Overall, these findings are consistent with theoretical expectations and much of the empirical literature, although some studies report heterogeneous

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effects depending on institutional strength, governance quality, and macroeconomic conditions.

5. CONCLUSION AND POLICY IMPLICATIONS

This study investigated the effects of institutional quality and **gross capital formation (domestic investment)** on inclusive growth in selected oil-exporting and non-oil-exporting Sub-Saharan African countries over the period 2000–2023 using second-generation panel econometric techniques. The findings reveal that institutional quality remains a critical driver of inclusive growth across both country groups, while the effectiveness of **gross capital formation (domestic investment)** depends largely on the quality of institutions and the structural characteristics of the economy. The empirical findings show that institutional quality and gross capital formation significantly influence inclusive growth across the sampled countries. Furthermore, bidirectional causality exists between institutional quality and inclusive growth, as well as between gross capital formation and inclusive growth, indicating feedback mechanisms in which institutional improvements and investment mutually reinforce inclusive development. The results also reveal heterogeneity across country groups. In particular, foreign direct investment contributes significantly to inclusive growth in oil-exporting countries, while its effect is statistically insignificant in non-oil-exporting economies. Based on these findings, several policy implications emerge. First, governments in Sub-Saharan Africa should prioritize institutional reforms aimed at strengthening transparency, accountability, regulatory effectiveness, and the rule of law, as these are critical for sustaining inclusive growth and improving investment efficiency. Second, policies that promote **gross capital formation (domestic investment)** should be reinforced through improved infrastructure provision, industrial development strategies, and enhanced access to productive financing, particularly in non-oil economies where investment effectiveness is weaker. Third, maintaining macroeconomic stability through prudent management of inflation, exchange rates, and interest rates is essential for creating a stable environment conducive to inclusive growth. Finally, non-oil-exporting countries should adopt targeted strategies to improve the quality and absorptive capacity of foreign direct investment by directing inflows toward productive, employment-generating, and value-added sectors. Overall, achieving sustainable inclusive growth in Sub-Saharan Africa requires a coordinated policy framework that integrates strong institutions, productive investment, and sound macroeconomic management.

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