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ANALYSIS OF HUMAN DEVELOPMENT, FDI AND INSTITUTIONAL QUALITY: EVIDENCE FROM CS-ARDL AND GRANGER NON- CAUSALITY MODELS

¹Nwosu Chinedu A., ²Marcus Samuel N., ¹Okonkwo Osmond N., & ³Desmond
Echeta O.

¹Department of Economics, Alvan Ikoku Federal University of Education, Owerri, Nigeria.

²Department of Economics, Abia State University, Uturu, Nigeria.

³University of Agriculture and Environmental Sciences, Umuagwo,
Imo State, Nigeria.

Email: chinedu.nwosu@alvanikoku.edu.ng

ABSTRACT

This study examined the relationship between human development, foreign direct investment, and institutional quality. Panel data on 34 Sub-Saharan countries spanning 1999 and 2022 were utilized to estimate a cross-sectional augmented autoregressive distributed lag (CS-ARDL) model and the Granger non-causality test. The findings based on the CS-ARDL model reveal that human development shares a long-run relationship with FDI inflows and institutional quality. The Granger non-causality test reveals that FDI and institutional quality granger causes human development. Also, there is a positive and significant relationship between human development, FDI, and institutional quality, both in the short run and long run. The finding further confirmed that the impact of FDI on human development is enhanced by institutional quality. The study recommends strengthening institutions and governance frameworks in SSA to maximize the benefits of FDI on human development. There should be institutional reforms, improved human capital, and macroeconomic stability to attract FDI, leading to improved human development outcomes in the region.

Keywords: Human Development, FDI, Institutional Quality, CS-ARDL, Granger non-causality.

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1. Introduction

Foreign Direct Investment (FDI) has been widely recognized as a significant catalyst for economic development in recipient countries. Alongside international trade, FDI inflows constitute an important mechanism of economic globalization (UNCTAD, 2017) and represent the largest component of foreign capital flows to developing countries (Katoka and Kwon, 2018). In many developing countries, FDI is strategically employed to alleviate poverty and stimulate economic activity (Osabohien *et al.*, 2020). Though indirect spillover of FDI may generate environmental degradation and social fragmentation, effective governance mechanisms can mitigate these effects (Ahmed *et al.*, 2022; Nam and Ryu, 2023). As an agent of institutional transformation, FDI introduces advanced business practices, legal standards, and corporate governance frameworks that incentivize institutional reforms in host countries.

The use of GDP growth to measure development fails in capturing declines in living standards, which prompted a paradigm shift toward a more holistic framework. Using the human capability approach, Sen (1999) and Fukuda-Parr (2004) viewed human development as a holistic measure that the United Nations Development Program (UNDP) operationalized through the Human Development Index (HDI). This framework prioritizes capabilities in education, health, and living standards, which compels policy-makers to refocus developmental objectives on human welfare rather than purely economic expansion. Furthermore, sustainable economic progress is dependent on human capital through quality education and healthcare systems, which elevate productivity, income levels, and societal well-being (Thi Cam Ha *et al.*, 2024). FDI further amplifies human development in countries with robust absorptive capacity in terms of human capital and institutional quality (Nam and Ryu, 2023; Uddin *et al.*, 2023).

Empirical studies reveal that institutional quality is crucial in ensuring that FDI achieves its developmental impact. Strong institutions serve as public goods that enforce contractual obligations, safeguard property rights, and ensure regulatory stability. This fosters a conducive environment for investment and growth (Acemoglu and Robinson, 2008). FDI catalyzes capital accumulation, technological diffusion, and skill development, which bolsters productivity where institutions are strong (Shah *et al.*, 2016). Contrarily, weak institutions mismanage FDI gains, which worsens inequality and undermines human development. In most Sub-Saharan African countries, poor governance limits the effectiveness of FDI through growth-inhibiting policy syndromes necessitating constant institutional reforms (Ndulu *et al.*, 2014; Fosu, 2018).

Most empirical studies focused on the FDI-growth relationship (Abbes *et al.*, 2015; Raza *et al.*, 2021; Ali *et al.*, 2022; Nam and Ryu, 2023). Others explored how institutional quality moderates the impact of FDI on the economy (Nguyen *et al.*, 2018; Uddin *et al.*, 2023). However, there is still a scarcity of empirical studies devoted to examining the role of institutional quality in moderating the impact of FDI on human development, particularly in SSA. Due to the capital-deficient status of SSA countries, foreign capital inflows have usually been relied upon to augment domestic capital. Despite the rising inflow of foreign

capital, SSA still ranks among the lowest in HDI measures. Empirical studies found that this low ranking is linked to weak institutions (Ndulu *et al.*, 2014; Fosu, 2018; Adegboye *et al.*, 2020).

This study's motivation stems from inconsistent outcomes of FDI-enhanced human development in the context of SSA. OECD, MENA, and ASEAN experience reveal that strong institutions efficiently translate FDI to improvement in welfare (Assadzadeh and Pourqoly, 2013; Raza *et al.*, 2021; Ahmed *et al.*, 2022; Nam and Ryu, 2023). Contrarily, studies of SSA reveal the existence of weak institutions that stifle potential benefits from FDI, leading to underutilized resources and minimal welfare gains (Adegboye *et al.*, 2020; Githaiga and Kilong'i, 2023). These divergent positions indicate that SSA needs an elaborate study to ascertain why FDI yields disproportionate human development outcomes when compared to other regions. This study addresses the research question:

Research Question

- a) What are the short-run and long-run effects of foreign direct investment (FDI) and institutional quality on human development in sub-Saharan Africa?
- b) To what extent does institutional quality moderate the relationship between foreign direct investment (FDI) and human development outcomes in sub-Saharan Africa?

Thus, the objective of the study is to analyze the relationship between human development, FDI, and institutional quality in SSA. To achieve this objective, HDI, FDI, and the institutional quality index (IQI) were used to estimate the CS-ARDL model in SSA.

Objectives of the Study

The specific objectives of this study are to:

- a) Examine the short-run and long-run effects of FDI and institutional quality on human development
- b) Evaluate the moderating role of institutional quality in enhancing FDI's impact on human development outcomes in sub-Saharan Africa.

2. Literature Review

2.1 Theoretical Framework

This study is anchored on two theories: Endogenous Growth Theory and the Institutional Theory.

Endogenous Growth Theory

Endogenous growth theory emphasizes that internal mechanisms such as human capital accumulation, technological innovation, and institutional arrangements drive long-term economic growth (Romer, 1986). This theory is relevant to this study because human development improves the workforce through education and health. This further improves the absorptive capacity of FDI's technological transfers, which enhances productivity. Strong institutional quality, on the other hand, ensures that resources are allocated efficiently and property rights are protected, which reduces transaction costs.

Institutional theory

Institutional theory explains how formal and informal rules shape economic performance by influencing the incentives of economic agents (North, 1990). Strong institutions promote transparency, reduce corruption, and strengthen investor confidence. Lack of strong institutional arrangements thus discourages FDI inflows, which negates human development outcomes. This implies that the impact of FDI inflows on human development is moderated by institutional quality. These theories support the linkage that human development, FDI, and institutional quality reinforce each other to stimulate sustained economic and social development.

Romer (1994) emphasized that FDI enhances growth through technology transfers and capital accumulation. Through this channel, human development is improved because growth fosters business expansion, which in turn increases per capita income, engendering an improved standard of living, access to quality healthcare services, and education. As national income rises, more tax revenues are collected by the government, which enables allocation of more resources to expand public goods and services (Thi Cam Ha *et al.*, 2024). The effect of FDI on human development depends on the quality of institutions. Through strong institutions, FDI creates more jobs, leading to increased demand for skilled labor. This leads to an increase in labor income due to improved skills, which in turn yields long-term productivity growth. As a result, there is an increase in tax revenue to the government to provide investment in healthcare, education, and technological advancement, which in turn improves human development (Acemoglu and Robinson, 2008).

2.2 Empirical Review

The debate on the relationship between human development and FDI is still ongoing, with many empirical studies showing mixed results. For instance, Assadzadeh and Pourqoly (2013), Abbes *et al.* (2015), and Kouladoun (2024) found that FDI shares a positive relationship with economic growth, while Ali *et al.* (2022) and Nam and Ryu (2023) found a negative relationship. However, these mixed findings agree on the moderating role of institutional quality (Nguyen *et al.*, 2018; Hayat, 2019; Ahmed *et al.*, 2022). The following reviewed relevant empirical literature on institutional quality, FDI, and economic growth. A few selected studies that focused on institutional quality, FDI, and human development that used different proxies to

represent development were also reviewed. Assadzadeh and Pourqoly (2013) examined the relationship between FDI, institutional quality, and HDI for 21 MENA countries from 2000 to 2009 using the REM model and GLS estimator. The result shows that FDI and institutional quality have a significant positive effect on HDI, indicating that FDI improves living standards while strong legal institutions and governance enhance the positive effects of FDI.

Abbes *et al.* (2015) examined the causal interaction between FDI and economic growth for 65 countries across seven regions (Asia and Oceania, the Middle East, North America, Europe, North Africa, and Central Africa) covering the period between 1980 and 2010 in a dynamic panel cointegration model. The results show evidence of a long-run relationship between FDI and economic growth, with FDI having a positive and significant influence on economic growth across all seven regions. This confirms FDI as a driver of growth.

Nguyen *et al.* (2018) studied institutional quality and economic growth for 29 emerging economies for the period 2002 to 2015 using the system GMM estimator. The study found that strong institutions positively impact economic performance. Moreover, trade openness and FDI are important growth drivers but require strong institutions to maximize their benefits. Hayat (2019) examined the moderating role of institutional quality in the FDI-growth nexus across 104 countries from 1996 to 2015 while deploying the GMM estimation method for the different models. The study found that FDI alone does not guarantee economic growth as its effect depends on IQ. Furthermore, the study showed that FDI enhances growth in low- and middle-income countries but has a negative effect on high-income countries. The result confirms that IQ strengthens the FDI-growth relationship in developing countries.

Adegboye *et al.* (2020) studied the impact of institutional quality and FDI on HDI for 30 SSA countries between 2000 and 2018 using Fixed- Effect and Random-Effect panel models. The study found a positive relationship between FDI and HDI. The result indicates that, though FDI and institutional quality were crucial for economic development in SSA, the presence of weak institutions resulted in the underutilization of domestic resources, which leads to the underdevelopment of domestic sector investments. On their part, Raza *et al.* (2021) studied the relationship between FDI, economic growth, and institutional quality for 35 OECD countries for the period 1996 to 2013 using FEM and GMM estimators. Their result shows a positive relationship between FDI and economic growth. It further showed the moderating role of IQ in the positive relationship, implying that good governance enhances the benefits of FDI. Examining the role of institutional quality on the nexus between foreign capital flows and human development in 65 developing countries between 1984 and 2014, Ali *et al.* (2022) deployed a dynamic two-step system GMM estimation method. Their result showed that FDI and FPI exert a negative impact on living standard while remittances positively impact living standards. However, the result from institutional quality showed that IQ mitigates the negative impact of FDI and FPI on living standards but does not completely reverse it.

Ahmed *et al.* (2022) studied the relationship between institutional quality, financial development, and

sustainable development for South Asian countries from 2000 to 2018 using FMOLS and DOLS methods. Institutional quality was found to have a positive long-run relationship with sustainable development. The study concluded that strong governance and corruption control enhance sustainable economic performance. Githaiga and Kilong'i (2023) studied the relationship between foreign capital flows, institutional quality, and HDI for 41 SSA countries covering from 2009 to 2019. Employing the system generalized method of moment (S-GMM), the study found that FDI and remittances contribute positively and significantly to human development in the presence of better institutional frameworks, while ODA's contribution to HDI is less effective, particularly in countries with poor governance. Nam and Ryu (2023) examined the role of governance, ODA, and competitiveness in mediating the relationship between FDI and human development for 10 ASEAN member countries between 2001 and 2020. The study estimated a fixed effect model with interaction terms. Their finding showed that FDI alone negatively impacts human development due to its predatory nature, exploitation of human resources, and costs to the environment. However, good governance significantly moderates the negative effect of FDI and HDI by making it positive for countries with higher governance quality.

Uddin *et al.* (2023) explored the role of institutional quality in boosting HDI for 70 developing countries between 2002 and 2018. The study estimated a CS-ARDL model and found that institutional quality and globalization have a positive impact on HDI. The study equally found a bidirectional causality between institutional quality and HDI, indicating that improvements in institutional quality drive economic development and vice versa. Delessa *et al.* (2024) studied the role of institutional quality and macroeconomic stability in the relationship between remittances inflow and economic growth in SSA. The study used panel data from 24 SSA countries covering the period 2005 to 2019 while estimating the panel cointegration model and DOLS. The results show that remittances alone do not drive economic growth in SSA, but their effectiveness depends on institutional quality and macroeconomic stability. The study further found that weak institutions reduce the developmental impact of remittances. Thi Cam Ha *et al.* (2024) examined the relationship between FDI, HDI, and institutional quality for 143 developed and developing countries between 2002 and 2019 using a GMM estimator and threshold estimation method. The study found a positive relationship between FDI and HDI, with a stronger effect on developing countries. The result indicates a governance threshold of 0.1411 below which FDI's impact on HDI turns negative. This implies that governance quality enhances the positive impact of FDI on HDI. They further found that countries with moderately high institutional quality experienced a larger impact of FDI on human development, irrespective of income level.

Sohail *et al.* (2024) examined the role of FDI and institutional quality in promoting HDI in Pakistan between 2002 and 2022. Estimating a nonlinear ARDL model, the study found a strong long-term positive impact of institutional quality on HDI but a weak long-term impact of FDI on HDI, suggesting that FDI alone does not improve welfare. However, institutional quality improves the impact of FDI on the HDI relationship,

showing that FDI inflows without institutional reforms do not significantly impact HDI. Okoh (2024) examined the relationship between institutional quality, FDI, and sustainable economic growth in emerging African economies. Utilizing panel data for the period 1990 to 2020, the study estimated the FEM. The results show that FDI and IQ have a significant positive impact on sustainable economic growth. Kouladoum (2024) examined the role of institutional quality in moderating the impact of Chinese FDI on human capital development and macroeconomic performance for four CEMAC countries. The study utilized panel data from 2003 to 2020. The study estimated a linear regression model with correlated panels corrected standard errors (PCSE) and found that Chinese FDI has a positive but weak impact on macroeconomic performance. However, the impact became stronger when governance quality improved.

3. Methodology

This study focused on analyzing the relationship between HDI, FDI, and institutional quality while controlling for macroeconomic stability proxied by inflation. The data covered 34 SSA countries from 1999 to 2022. The countries were selected based on the availability of complete data on the selected variables. At the time of this study, data for 2023 were not available for most of the variables. Table 1 presents the description and sources of data.

Table 1: Description and Sources of Variables

Variables	Description	Unit of Measurement	Sources
HDI	Human Development Index	Index	OWID (2023)
FDI	Foreign Direct Investment	Millions (\$)	WDI (2023)
IQI	Institutional Quality Index	Index (based on 6 governance indicators)	WGI (2023)
INFR	Inflation	Inflation, (annual %)	WDI (2023)

(OWID = Our World in Data; WDI = World Development Indicators; WGI = World Governance Indicators)

Angola, Benin, Botswana, Burkina Faso, Cameroon, Chad, Congo Rep, Congo Dem, Cote d’Ivoire, Equatorial Guinea, Ethiopia, Gambia, Gabon, Ghana, Guinea, Kenya, Liberia, Malawi, Madagascar, Mali, Mauritania, Mauritius, Mozambique, Namibia, Nigeria, Niger, Rwanda, Senegal, South Africa, Tanzania, Togo, Uganda, Zimbabwe, Zambia

Empirical studies indicate no uniformity in institutional quality indicators (Adeleye *et al.*, 2023). Utilizing the six governance indicators is problematic due to their high correlation, which renders the results unreliable. To overcome this, the Principal Component Analysis (PCA) was used to create an institutional quality index (IQI). Table 2 shows the correlation matrix of the institutional quality variables and the IQI from PCA. The correlation coefficients indicate that IQI strongly explains the individual variables. Table 3 shows that the eigenvalue of the first PCA component was 4.8887, while the second component was 0.461.

The first component explained 81.48 percent of the joint variance of the variables, while the second component explained just 7.6 percent. Since the eigenvalue of the first component is greater than 1, it implies that it captures a greater proportion of the overall variance of the variables. Thus, the first component is utilized. The Kaiser-Meyer-Olkin (KMO) index was further used to confirm the adequacy of the sample. KMO index of 0.9179, which is greater than 0.5, justifies the application of PCA.

Table 2: Correlation Matrix of PCA IQI and Individual Institutional Quality Variables

Variables	IQI	CCor	GoEF	PoSt	ReQu	RuLa	VoAc
IQI	1						
CCor	0.919	1					
GoEF	0.937	0.858	1				
PoSt	0.781	0.652	0.644	1			
ReQu	0.932	0.833	0.898	0.631	1		
RuLa	0.957	0.866	0.881	0.739	0.872	1	
	0.874	0.748	0.764	0.616	0.789	0.812	1

Note: IQI=Institutional Quality Index; CCor= Control of Corruption; GoEF= Government Effectiveness; PoSt= Political Stability and Absence of Violence/Terrorism; ReQu= Regulatory Quality; RuLa= Rule of Law; VoAc= Voice and Accountability. Source: Authors Computation

Table 3: Principal Component Analysis of Institutional Quality Indicators

Variables	Sample
Highest PCA eigenvector	4.8887
Explained Proportion	0.8148
Kaiser-Meyer-Olkin	0.9179

Source: Author's computation

Model Specification

The study followed the model utilized in the study of Uddin *et al.* (2023). The econometric model of the relationship between HDI, FDI, IQI, and INFR is presented in equation (1)

$$HDI_{i,t} = \beta_0 + \beta_1 HDI_{i,t} + \beta_2 IQI_{i,t} + \beta_3 INFR_{i,t} + u_{i,t} \quad (1)$$

The variables in equation (1) have been defined in Table I. β_i represent the slope parameters of the model, u denote the error term, i and t represent the index of cross-section (country) and time (yearly),

respectively. All the variables are transformed to their natural logarithm except the inflation rate, which is already in percentage form.

Model Estimation Procedures

Cross-sectional Dependence

Cross-sectional dependence (CSD) arises in panel data models due to the dependence of error terms across sections. Results from panel models with cross-sectional dependence are biased and inconsistent (Ditzen, 2021). Free (2004) and Pesaran (2004) were deployed for this study, which are appropriate for our sample. Free (2004) CSD test follows a Q-Distribution given in Equations (2)

$$Q = a(T)(\chi_1^2 - (T-1)) + b(T)(\chi_2^2 - T(T-3)/2) \quad (2)$$

Where χ_1^2 and χ_2^2 are independent chi-square random variables, $(T-1)$ and $T(T-3)/2$ are their respective degrees of freedom. $a(T)$ and $b(T)$ are constants.

Pesaran (2004) CSD test is a pairwise correlation given in Equation (3)

$$CD = \sqrt{\frac{2T}{N(N-1)}} \left(\sum_{t=1}^{N-1} \sum_{j=i+1}^N \hat{\rho}_{ij} \right) \quad (3)$$

Slope Homogeneity and Structural Break Tests

Panel data models assume that the slope coefficients are identical or homogeneous in all cross-sections. However, assuming that the slope coefficients of the estimated model are homogeneous across all cross-sections when indeed they are heterogeneous yields inconsistent results. Pesaran and Yamagata (2008) developed a test for slope coefficients homogeneity with a null hypothesis that the slopes are homogenous across all cross-sections. Rejecting this null hypothesis implies that the slope coefficients are heterogeneous across cross-sections, requiring that this be considered in the modeling framework. Similarly, many time series and panel data models usually contain multiple breakpoints, which gives inconsistent results. Bai and Perron (2003) proposed a test for structural breaks based on different test hypotheses of known or unknown breakpoints. The null hypothesis indicates that there is no structural break in the model.

CIPS Unit Root Test

First-generation panel data unit root tests do not consider cross-sectional dependence in their tests. Pesaran (2007) developed a second-generation test for stationarity by including the cross-sectional averages of the lagged levels and first differences of the individual series in the standard ADF regressions. This yields the CADF test or its modified version of IPS test, called the CIPS unit root test. CIPS test calculation

follows Equation (4)

$$\Delta Y_{it} = \varphi_i + \varphi_i Y_{it-1} + \varphi_i \bar{X}_{t-1} + \sum_{i=0}^p \varphi_{it} \Delta \bar{Y}_{t-1} + \sum_{i=0}^p \varphi_{it} \Delta Y_{t-1} + u_{it} \quad (4)$$

The cross-sectional averages in Equation (4) are captured in $\bar{X}_{t-1}$ and $\Delta \bar{Y}_{t-1}$. The null hypothesis of the CADF and CIPS test assumes that the data is non-stationary. Pesaran (2007) calculates the CIPS statistic through Equation (5)

$$CIPS = \frac{1}{n} \sum_{i=1}^n CADF_i \quad (5)$$

Cross-sectional Dependent Cointegration Test

Westerlund (2007) developed four panel tests for cointegration that integrate cross-sectional dependence. The first two tests are designed for group (group-mean) cointegration, and the second two are designed to test at least one-unit (panel statistics) cointegration. The group-mean test and panel statistics are calculated from Equations (6),(7),(8), and (9), respectively:

$$G_\tau = \frac{1}{N} \sum_{i=1}^N \frac{\hat{\alpha}_i}{SE(\hat{\alpha}_i)} \quad (6)$$

$$G_\alpha = \frac{1}{N} \sum_{i=1}^N \frac{T \hat{\alpha}_i}{\hat{\alpha}_i(1)} \quad (7)$$

$$P_\tau = \frac{\hat{\alpha}_i}{SE(\hat{\alpha}_i)} \quad (8)$$

$$P_\alpha = T \hat{\alpha} \quad (9)$$

Cross-sectional ARDL Test

Chudik *et al.* (2016) developed a Cross-Sectional Augmented Autoregressive Distributed Lag (CS-ARDL) model to estimate long-run effects when the panel data model is large with cross-sectional dependent errors in a dynamic heterogeneous model. Chudik *et al.* (2016) proposed taking the cross-sectional means of the regressors in order to eliminate correlated errors in the cross-section. It is shown that the CS-ARDL type of estimator is robust to model misspecification of dynamics and serial correlation in the errors, whether in large or small samples. Following Uddin *et al.* (2023), we present the CS-ARDL model and its estimation method in Equation (10)

$$HDI_{i,t} = \vartheta_i + \sum_{j=0}^p \varphi_{ij} HDI_{i,t-j} + \sum_{j=0}^q \psi'_{ij} X_{i,t-j} + \sum_{j=0}^r \phi'_{ij} \bar{Z}_{i,t-j} + v_{it} \quad (10)$$

Where $\bar{Z}_{i,t-j}$ are the cross-sectional averages of the dependent and independent variables calculated

as $\overline{HDI}_{it} = N^{-1} \sum_{i=1}^N HDI_{it}$, $\overline{X}_{it} = N^{-1} \sum_{i=1}^N X_{it}$. The CS-ARDL long-run coefficient estimator is

$$\text{given as } \hat{\gamma}_{CS-ARDL,i,j} = \frac{\sum_{j=0}^q \psi'_{ij}}{\sum_{j=0}^q \phi_{ij}} \quad (11)$$

While the mean group estimator is given as

$$\hat{\gamma}_{MG} = \sum_{j=1}^N \hat{\gamma}_{ij} \quad (12)$$

Finally, the short-run coefficient is estimated by Equation (13)

$$\Delta HDI_{it} = \omega_i \left[HDI_{i,t-j} - \hat{\gamma}_{i,j} X_{i,t-j} \right] - \sum_{j=1}^{p-1} \phi_{it} \Delta HDI_{i,t-j} + \sum_{j=0}^q \psi'_{it} \Delta X_{i,t-j} + \sum_{j=0}^q \phi'_{ij} \bar{Z}_{i,t-j} + v_{it} \quad (13)$$

Granger Non-Causality Test

So far, the models presented above do not contain information on the causality relationship between the dependent and independent variables. Earlier panel causality tests assume cross-sectional independence in a homogenous panel setting, which leads to invalid inferences (Im *et al.*, 2003; Karavias and Tzavalis, 2017). The approach developed by Dumitrescu and Hurlin (2012) has been widely applied in this regard when the panel T and N dimensions are large, which leads to Nickell bias for small T panels. Juodis *et al.* (2021) developed a new causality test that accounts for cross-sectional dependence in both homogenous and heterogeneous slopes while accounting for Nickell bias in the panel. The null hypothesis of this test is Granger non-causality because it assumes that the Granger-causality parameters are equal to zero. Equations (14) – (20) present the respective models to ascertain collective and individual causality.

$$HDI_{it} = \beta_i + \sum_{p=1}^p \beta_{p,i} HDI_{i,t-p} + \sum_{p=1}^p \beta_{1,p,i} FDI_{i,t-p} + \sum_{p=1}^p \beta_{2,p,i} IQI_{i,t-p} + \sum_{p=1}^p \beta_{3,p,i} INFR_{i,t-p} + \varepsilon_{it} \quad (14)$$

$$HDI_{it} = \beta_i + \sum_{p=1}^p \beta_{p,i} HDI_{i,t-p} + \sum_{p=1}^p \beta_{1,p,i} FDI_{i,t-p} + \varepsilon_{it} \quad (15)$$

$$HDI_{it} = \beta_i + \sum_{p=1}^p \beta_{p,i} HDI_{i,t-p} + \sum_{p=1}^p \beta_{1,p,i} IQI_{i,t-p} + \varepsilon_{it} \quad (16)$$

$$HDI_{it} = \beta_i + \sum_{p=1}^p \beta_{p,i} HDI_{i,t-p} + \sum_{p=1}^p \beta_{1,p,i} INFR_{i,t-p} + \varepsilon_{it} \quad (17)$$

$$FDI_{it} = \beta_i + \sum_{p=1}^p \beta_{p,i} FDI_{i,t-p} + \sum_{p=1}^p \beta_{1,p,i} HDI_{i,t-p} + \varepsilon_{it} \quad (18)$$

$$IQI_{it} = \beta_i + \sum_{p=1}^p \beta_{p,i} IQI_{i,t-p} + \sum_{p=1}^p \beta_{1,p,i} HDI_{i,t-p} + \varepsilon_{it} \quad (19)$$

$$INFR_{it} = \beta_i + \sum_{p=1}^p \beta_{p,i} INFR_{i,t-p} + \sum_{p=1}^p \beta_{1,p,i} HDI_{i,t-p} + \varepsilon_{it} \quad (20)$$

4. Result and Discussion

4.1 Result

In what follows, the results are presented and discussed from the respective methods described above. Table 4 reports the summary statistics of the data used in the study from 1999 to 2022 for 34 selected SSA countries. The mean value of HDI is -0.720944 with a standard deviation of 0.210822 shows a fairly consistent measure across the sample. Unlike developed economies, this is reflective of low human development in developing countries in Africa. The mean value of FDI is 19.6958 with a standard deviation of 1.59548. This shows that there is relative stability across all the observations. The reported mean value of IQI is very close to zero, with a standard deviation of

2.211.3, which indicates significant variability across the sample. The minimum value of -3.64799 and the maximum value of 5.69359 show that there is a mixture of weak and strong institutions in the sample. The mean value of INFR is 14.7937 with a standard deviation of 101.597, indicating high inflation episodes typical of the sample countries.

Table 4: Summary Statistics

	HDI	FDI	IQI	INFR
Mean	-0.720944	19.6958	1.24e-08	14.7937
Min	-1.36257	12.1547	-3.64799	-21.1652
Max	-0.215671	24.4284	5.69359	230.12
Std. Dev	0.210822	1.59548	2.21103	101.597
Observation	816	816	816	816

Table 5 reports the results of Pesaran (2004) and Free (2004) cross-sectional dependence tests. The two tests result rejected the null hypothesis of weak cross-sectional dependence at 1% level of significance in favor of strong cross-sectional dependence. This implies that this issue must be considered in the modeling framework.

Table 5: Cross-sectional Dependence Tests Result

	Pesaran CSD	Frees CSD	Q-distribution critical value
HDI=f (FDI, IQI, INFR)	[61.4] {0.0000} ***	[12.013] {0.0000} ***	10% = 0.108 5% = 0.141 1% = 0.203

Note: *** indicates 1% significance, [.] indicate test statistic, and {.} represents the p-values.

Table 6 presents the results from Pesaran and Yamagata (2008) test for slope homogeneity and Bai and Perron (2003) test for structural break. With the Delta statistic of 23.310 (adj. 26.198) and p- value of zero, the null hypothesis of slope homogeneity across all cross-sectional units is rejected at 1% level of significance. This implies that the slope coefficients are heterogeneous across all sections. Similarly, judging from the 1%,5% and 10% critical values, which are all greater than test statistics at different breakpoints, the null hypothesis of no structural break in the model is not rejected.

Table 6: Slope Homogeneity and Structural Break Tests.

Slope Homogeneity Test	Delta statistic		p-value		
HDI=f (FDI, IQI, INFR)	23.310***		0.0000		
	Adj. 26.198***		0.0000		
Breakpoints	Statistic	1% critical value	5% critical value	10% critical value	
F(1 0)	0.65	6.09	4.66	4.03	

F(2 1)	0.90	6.59	5.24	4.64
F(3 2)	3.43	6.92	5.61	4.99
F(4 3)	3.34	7.33	5.87	5.23

Note: *** indicates 1% significance

From Table 7, HDI, FDI, and INFR are stationary at a level, while IQI is non-stationary at a level. This shows a mixed order of integration typical of ARDL models. However, all the variables became stationary at their first differences.

Table 7: Cross-sectional Im Pesaran and Shin (CIPS) Unit Root Test Result

Variables	Level	First Difference
HDI	-2.282***	-3.799***
FDI	-3.454***	-5.782***
IQI	-1.928	-4.557***
INFR	-3.772***	-5.921***

***, **, * denotes 1% level of significance, critical values:-2.04,-2.11,-2.23

Table 8 presents the tests for the existence of a long-run relationship among the variables of the model. Westerlund (2007) used four cointegration tests. Table VIII showed that three of the tests rejected the null hypothesis of no cointegration as shown by the respective p-values, which are less than 1% significant level. Thus, it is concluded that there is evidence of a long-run relationship among the variables of this study.

Table 8: Cross-sectional Dependent Cointegration Test Result

Statistic	Value	z-value	p-value
G_{τ}	-1.581***	-3.388	0.000
G_{α}	-4.591	-1.011	0.156
P_{τ}	-8.680***	-4.886	0.000
p_{α}	-3.766***	-5.518	0.000

*** denotes 1% level of significance.

Having established the existence of a long-run relationship among the variables, the CS-ARDL model was implemented to ascertain both the short and long run effects on the dependent variable, HDI. The result of the CS-ARDL model is presented in Table 9.

Table 9: Cross-sectional ARDL Test Result.

Variables	CSD = -1.8	CD-pvalue = 0.07
<i>Longrun</i>	Coefficient	p-value
FDI	0.0047**	0.035
IQI	0.0155**	0.027
INFR	-0.0014	0.552
<i>Shortrun</i>		
ECT	-1.2***	0.000
FDI	0.0039**	0.025
IQI	0.0124**	0.011
INFR	-0.0028	0.202

Note: estimated CS-ARDL model (1,1,1). ECT = Error correction term. Dependent Variable = HDI. ***, ** denote 1% and 5% level of significance, respectively.

In the model, control for the presence of a strong cross-sectional dependence (CD) was considered. The Pesaran CD test of -1.8 is too small and statistically insignificant at 5% level. This implies that the null hypothesis of no CD is not rejected, and the CS-ARDL model result is free from CD. The estimates of FDI show a positive and statistically significant relationship between FDI and HDI. The estimated coefficient of FDI reveals that 1% rise in FDI causes HDI to increase by 0.39 percent in the short-run, while causing HDI to rise by 0.47% in the long-run. The result confirms the role of FDI as an economic growth catalyst through the channel of technology transfer, improved human capital development, and job creation, which increases income and enhances human development. The finding is in line with those of Raza *et al.* (2021), Kouladoun (2024), and Thi Cam Ha *et al.* (2024), who found that FDI fosters growth in investments, which results to increase in income while engendering an improved standard of living. Furthermore, increased national income leads to more tax revenues to the government, which enables allocation of more resources towards expansion of public goods and services (Acemoglu and Robinson, 2008). However, this finding contradicts Nam and Ryu (2023), who found that FDI hurts human development, particularly when it is predatory in nature. The study further suggests that this negative relationship can be upturned with improvement in the quality of governance.

The estimates of institutional quality are statistically significant and positively signed, indicating a positive relationship between institutional quality and human development both in the long run and the short run. In the short run, the estimated coefficient of IQI shows that a one percent increase in institutional quality causes HDI to increase by 1.24 percent. The estimated long-run coefficient of IQI shows that HDI increases by 1.55

percent for a 1 percent increase in IQI. The result shows that there is evidence of greater improvement in HDI when there is a sustained improvement in IQI from the short term to the long term. Institutional reforms engender an increase in economic growth, which in turn leads to improvement in human development outcomes. Strong institutions engender the rule of law, a stable political system, reduced incidences of corruption, and ensure government effectiveness. This raises productivity through investment in physical and human capital, creating wealth and improved welfare. Higher institutional quality strengthens the ease of doing business and guarantees a favorable investment climate, which attracts more foreign investments. This finding corroborates the findings of Nguyen *et al.* (2018), Hayat (2019), and Ahmed *et al.* (2022), who emphasized that transparency leads to effective utilization of foreign investment, which fosters inclusive growth and improved human development outcomes. Therefore, the effectiveness of FDI in advancing human development can be limited by poor governance (Ali *et al.*, 2022).

The coefficient of INFR is negatively signed, indicating a negative relationship with HDI. Though statistically insignificant, a 1% increase in the inflation rate leads to 0.28% decrease in the human development index in the short-run and a 0.14% decrease in the long-run. Rising inflation indicates macroeconomic instability, particularly for countries aiming to attract foreign investments. Despite the potential benefits of FDI, a sustained rise in the inflation rate is harmful to HDI, affecting the value of income and the price of inputs, which hinders economic growth. This finding is in line with Ahmad and Ahmed (2014), who found that foreign investors avoid economies with unstable prices and high transaction costs. This further hinders the potential benefits to human development (Azam and Khan, 2022)

The error correction term, ECT, is -1.2 and statistically significant. This shows that deviations from long-run equilibrium are corrected up to 120% annually. This is in accordance with the theoretical expectation of error correction models.

Table 10: Granger Non-Causality Test Result

Variable Y	Direction	Variable X	Wald Test	pvalue	Causality
HDI	←	FDI, IQI, INFR	33.6***	0.000	Bidirectional
HDI	↔	FDI	11.6***	0.000	
FDI	↔	HDI	17.8***	0.000	
HDI	←	IQI	5.70**	0.017	Unidirectional
IQI		HDI	0.571	0.445	Non-causality
HDI		INFR	1.09	0.294	Non-causality
INFR	←	HDI	62.2***	0.000	Unidirectional

Note:***,** denote 1% and 5% level of significance, respectively

The cointegration and CS-ARDL tests established a short-run and long-run relationship but did not indicate causality. However, it is important in empirical research of this nature to ascertain the causal relationship and its direction between the variables that collectively and individually align with the dependent variable. Juodis *et al.* (2021) Granger non-causality test results are presented in Table 10. The null hypothesis of this test assumes no causality between the dependent variable and the covariates. The Wald test of 33.6 is statistically significant at 1%. Thus, the null hypothesis of Granger non-causality is rejected. It is concluded that all the selected variables together granger causes HDI, which justifies their inclusion in the study. There is evidence of bidirectional causality between HDI and FDI. This is expected because improvement in human capability through education and improved health leads to enhancement of human capital, which in turn fosters FDI-induced economic growth (Githaiga and Kilong'i, 2023; Uddin *et al.*, 2023). The Wald test of 11.6 and 17.8 is statistically significant at 1%. There is a unidirectional causality running from IQI to HDI, as the Wald test result of 5.7 is statistically significant at 5%. This confirms the finding that strong institutions that ensure transparency, control of corruption, and government effectiveness guarantee equitable welfare distribution (Nam and Ryu, 2023; Thi Cam Ha *et al.*, 2024). Similarly, there is a unidirectional causality running from HDI to INFR, as the Wald test result of 62.2 is statistically significant at 1%. This may indicate a poor macroeconomic policy environment in SSA, as most of the economies face high inflation rates, leading to a counterfactual result from human development outcomes.

4.2 Discussion of Findings

This study examined the relationship between FDI, IQ, and human development in sub-Saharan African countries. The result reveals important insights into the linkage between FDI and governance structures towards enhancing welfare outcomes. The short-run and long-run positive and significant impact of FDI on human development suggests that foreign investment improves welfare through the accumulation of capital, transfer of technology, generation of employment, and income growth. Increased FDI inflows expands productive capacity of the host country, which improves labour productivity and income. Through this process, access to education and healthcare is improved, which enhances living standards. This finding is supported by Assadzadeh and Pourqoly (2013), Adegboye *et al.* (2020), Raza *et al.* (2021), and Thi Cam Ha *et al.* (2024), who found that FDI inflows positively influence human development in developing countries. It further aligns with the endogenous growth theory, which emphasizes the role of technological spillover and external capital in fostering human capital development (Romer, 1994). Despite this positive relationship, FDI was found to have adverse effects on welfare when governance arrangements are weak, as documented by Ali *et al.* (2022) and Nam and Ryu (2023). This suggests that institutional quality is crucial

for a meaningful, positive impact of FDI inflows on human development gains in SSA.

Institutional quality was found to be positively and significantly related to human development. The effects appear stronger in the longrun which indicates that sustained improvements in governance are important towards enhancing human development outcomes. This finding is in alignment with Nguyen et al. (2018), Hayat (2019), Ahmed et al. (2022), and Uddin et al. (2023), who emphasized the critical role of institutional quality in the promotion of inclusive development. This is further supported by North (1990), who emphasizes the role of effective institutions in reducing uncertainties, improving resource allocation, and strengthening public service delivery, which in turn fosters long-term human development.

Strong institutions equally play a crucial moderating role in the relationship between FDI and human development. The findings suggest that the positive impact of FDI on human development is stronger in countries with stronger institutional arrangements. This implies that Institutional quality helps host countries' absorptive capacity to harness foreign capital for welfare-enhancing purposes. This finding corroborates the studies by Raza et al. (2021), Ahmed et al. (2022), and Thi Cam Ha et al. (2024) and explains why SSA countries with weak institutions often experience limited welfare gains from rising FDI inflows (Adegboye et al., 2020; Githaiga and Kilong'i, 2023).

5. Conclusion and Recommendation

5.1 Conclusion

The role of institutions in fostering the benefits of FDI has attracted attention. This study analyzed the relationship between FDI, institutional quality, and human development in SSA. The variables included in the study are HDI, FDI, Institutional Quality Index, and inflation rate. Panel data covering the period from 1999 to 2022 among 34 SSA countries was utilized. The study further created an institutional quality index (IQI) and estimated CS-ARDL and Granger Non-causality models. The results showed the existence of a long-run relationship and causal interaction between HDI, FDI, IQI, and INFR. The findings of the study revealed positive relationships between HDI, FDI, and IQI both in the short and long runs. These findings imply that without a strong institutional arrangement in SSA, the benefits of foreign direct investments in improving human development become elusive. This further implies that institutional quality is important in enhancing FDI's impact on human development outcomes in the SSA region.

5.2 Recommendations

Based on the findings, the study recommends the following:

- a) A strong institution is needed to enhance the benefits of FDI. Therefore, the SSA countries should strengthen their institution and governance frameworks. This is essential to maximize the contribution of foreign investment to human development outcomes in the region.
- b) The importance of FDI as an alternative financing option in SSA requires policymakers to prioritize reforms aimed at eliminating corruption, improving regulatory quality, transparency, and the rule of law in the region. This will bolster investors' confidence that contracts will be fairly enforced without unnecessary interference in order to amplify FDI benefits in the region.
- c) There is a need for SSA countries to strengthen their investment in education, healthcare, and social infrastructure. This is essential to boost the absorptive capacity of the workforce to adopt skills from technological spillovers. This will improve human capital for high productivity.
- d) Macroeconomic stabilization policies should be implemented. This is important for maintaining economic stability while bolstering investor confidence and attracting more foreign investments that yield consistent development outcomes.

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