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Impact of Foreign Direct Investment on economic growth: Examining the role of Absorptive Capacity

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Abstract

The study examines the impact of foreign direct investment (FDI) on economic growth in 11 Sub-Saharan African (SSA) countries from 1990 to 2022. Also, the study examines the interaction effect of absorptive capacity on the association between FDI and growth. The paper employed the Driscoll and Kraay standard errors approach, Westerlund's cointegration method, and Breitung's unit root test. The labor force, FDI inflows, FDI outflows, trade openness, and tertiary school enrollment have a positive and significant influence on economic growth in the selected SSA countries. However, the interaction terms between foreign direct investment net inflow and tertiary school enrollment, as well as foreign direct investment net outflow and tertiary school enrollment, show negative coefficients, indicating that higher levels of tertiary school enrollment reduce the positive impact of FDI net inflow and FDI net outflow on growth, and vice versa. Therefore, the study recommends that more FDI net inflow be encouraged, that tertiary school enrollment be improved, and that the quality of tertiary education be enhanced.

Keywords: Foreign direct investment, economic growth, absorptive capacity, and Sub-Saharan African countries.

1. Introduction

Sub-Saharan Africa's economic growth has been subdued in recent years due to a combination of external shocks and internal challenges. In 2023, growth slowed to 2.6%, but it is expected to rebound slightly to 3.4% in 2024. This recovery is attributed to easing inflation and a rebound in private consumption (Zeufack et al., 2024). However, growth remains below pre-pandemic levels, hindered by high inflation, public debt, and slow structural reforms. Growth across the region is uneven, with some countries and sectors performing better than others. Countries rich in natural resources, such as Uganda, Tanzania, and the Democratic Republic of Congo, are benefiting from investments in the extractive industries. Meanwhile, others are witnessing growth in sectors such as telecommunications, digital services, and agriculture (United Nations Conference on Trade and Development, UNCTAD, 2023). Inflation remains a significant challenge, expected to fall to around 5.1% in 2024 but still higher than pre-2020 levels. Public debt burdens have worsened, with many SSA countries spending a large portion of their revenues on debt service (Zeufack et al., 2024). Investment in infrastructure and digital services, spurred by the African Continental Free Trade Area (AfCFTA), continues to drive economic activity in certain regions. Countries such as South Africa and Kenya are experiencing an increase in foreign direct investment (FDI) in technology and infrastructure (UNCTAD,

2023). Despite some recovery, many countries face challenges related to political instability, climate change, and social unrest. Additionally, lower commodity prices and global economic uncertainty pose risks to the region's medium-term growth prospects (Adegboye & Okorie, 2023).

The recent trends in inward foreign direct investment (FDI) in SSA reveal some mixed outcomes. FDI flows to Africa saw a significant decline in 2022, dropping to $45 billion from a peak of $80 billion in 2021. This reflects global economic challenges, such as higher interest rates, inflation, and geopolitical uncertainty, which affected investor confidence. However, there were some positive developments, such as a 39% rise in greenfield project announcements across the continent (UNCTAD, 2023). Nigeria's FDI turned negative, falling to -$187 million due to equity divestments. Despite this, greenfield investment rose by 24% to reach $2b. Senegal's FDI flows held steady at $2.6b, while Ghana saw a sharp 39% drop, bringing its FDI down to $1.5b. While countries such as, Ethiopia recorded a 14% decline in FDI, attracting $3.7b but still remaining the region's second-largest recipient. Uganda experienced a 39% increase, with FDI rising to $1.5b, due to investments in the extractive industries. Tanzania also posted an 8% increase, reaching $1.1 billion (UNCTAD, 2023). In Central Africa, the Democratic Republic of the Congo maintained stable FDI flows at $1.8b, supported by investments in offshore oil and mining projects. Southern Africa saw FDI normalize after an unusually high peak in 2021. South Africa attracted $9b in FDI lower than in 2021 but still about twice the average of the past decade. In Zambia, FDI recovered to $116 million after two consecutive years of negative flows (Adegboye & Okorie, 2023; Giroud, 2024; Zeufack et al., 2024).

The Sub-Saharan African (SSA) region is renowned for its abundant natural resources, which have the potential to drive economic growth and prosperity if managed and utilized effectively. However, challenges such as inadequate investment in human capital, a struggling educational system, large population size, pervasive corruption, and weak institutions continue to hinder sustainable economic growth. SSA countries have been attracting substantial foreign direct investment (FDI), which contributes to the region in the form of capital infusion to complement domestic resources, as well as bringing in valuable technical knowledge, innovative techniques, advanced equipment, and improved managerial skills to enhance various sectors (Akisik, Gal, & Mangaliso, 2020; Panford & Panford, 2017). Foreign Direct Investment (FDI) occurs when a foreign investor invests in business and production activities in another country. In other words, FDI refers to a situation where an investor from one country makes a 10% or more investment in an enterprise located outside their country of origin (Nguyen, 2022; Yavas & Malladi, 2020). Theoretically, the endogenous growth theory (Romer, 1956) and the neoclassical growth theory (Solow, 1956) best explain the influence of FDI on growth, through enhancing specialization and technological innovation in the host countries' production activities, thereby enhancing economic growth.

Today, FDI stands as the most crucial external source of capital inflow into developing economies. FDI brings substantial benefits to the host country through technology and knowledge transfer, enhanced productivity, and the encouragement of competition and entrepreneurship. The impact of FDI is profound, leading to increased production, exports, and employment opportunities in

various economies. Additionally, it contributes to improved standards of living, reduced poverty and inflation, and overall economic growth. (Abubakar & Haruna, 2023; Shittu, Yusuf, El Houssein, & Hassan, 2020; Sunde, 2023). To attract external capital, several economies in Sub-Saharan Africa have embraced foreign direct investment (FDI) by implementing policies conducive to FDI. This includes measures such as establishing economic zones (SEZs), streamlining administrative investment processes, privatizing state-owned assets, and opening up domestic markets through liberalization (Arogundade, Mduduzi, & Eita, 2022; Desarrollo, 2018).

Numerous recent studies have found that various factors influence the link between FDI and growth. The influence of FDI on growth is likely to be influenced by the ability of the host regions to absorb new knowledge. Innovation is a gradual and cumulative process. The host regions can fully leverage the advanced technology brought by FDI only if they can identify, assimilate, and develop valuable external knowledge (Acquah & Ibrahim, 2020; Arogundade et al., 2022; Hayat, 2019; Nguyen, 2022). The cumulative nature of knowledge is closely tied to another key factor influencing absorptive capacity: the educational background of employees. The greater the education and training an employee possesses, the stronger their ability to absorb and apply new knowledge becomes. Since a firm's absorptive capacity is built on the collective capabilities of its workforce, the overall level of education, experience, and training among employees positively impacts the firm's ability to assimilate and utilize new information effectively (Schmidt, 2005). Absorptive capacity typically refers to the ability of a firm, industry, or region to assimilate and leverage knowledge from its surroundings effectively. Put simply, absorptive capacity encompasses the capability to discern the significance of new knowledge, integrate it, and utilize it for business purposes. The extent of absorptive capacity is contingent upon the source of knowledge and existing expertise (Arogundade et al., 2022; Cohen & Levinthal, 1990; Todorova & Durisin, 2007). This examines the influence of FDI on growth. Also, the study examines the impact of absorptive capacity on the relationship between FDI and economic growth. Examining how absorptive capacity interacts with the FDI–growth relationship is key to capturing partial, direct, indirect, and overall effects — an area still underexplored in the context of SSA economies. This study applies second-generation analytical techniques that account for cross-sectional dependence, a common characteristic of panel data. The rest of the paper is structured as follows: Section 2 provides a detailed literature review, Section 3 outlines the methodology, Section 4 presents the estimation results and their interpretation, and Section 5 concludes with recommendations.

2. Literature Review

Theoretical Review - FDI is widely acknowledged as a significant growth enhancer, particularly in developing economies. The theoretical framework surrounding FDI and growth can be comprehended through several key concepts and theories: Exogenous Growth Theory suggests that FDI contributes to growth by increasing the capital stock of the host country and introducing new goods and technologies, which can drive higher productivity and economic expansion. Additionally, the Endogenous Growth Theory states that FDI enriches the stock of knowledge in the host country by transferring skills, technology, and

managerial practices, leading to sustained economic growth through improved human capital and innovation. In relation to technological spillovers, FDI can lead to local firms benefiting from advanced technologies and practices introduced by foreign firms, consequently improving productivity and competitiveness in the host economy. Moreover, the human capital formation perspective suggests that FDI often brings training and skill development to local workers, which strengthens the host country's human capital base and, in turn, boosts productivity and economic growth (Mahembe & Odhiambo, 2014; Riker & Wickramarachi, 2020; Romer, 1986; Solow, 1956).

Empirical Review **–** The numerous past research on the influence of FDI on growth have mixed outcomes. On one hand, numerous kinds of literature suggest FDI positively enhance growth (Abubakar & Haruna, 2023; Fatima, 2017; Hanafy & Marktanner, 2019; Opoku, Ibrahim, & Sare, 2019; Sahu, 2021; Shittu et al., 2020; Tahir, Estrada, & Afridi, 2019). For instance, studies such as Ayenew (2022) analyzed the impact of FDI on economic progress in 22 SSA economies from 1988 to 2019 and found that FDI encourages economic growth. The study identified a stable political environment, subsidies, and infrastructure development as a sure way to attract more FDI. Similarly, Ennin and Wiafe (2023) analyzed the influence of FDI on growth in Ghana covering the 1996 to 2015, evidence indicates that in the short run, FDI in the mining sector stimulates economic progress however, in the long run FDI retard growth. The study recommends more research and development in the mining sector. In analyzing the impact of FDI on growth in 38 economies from 1960 to 2014, Opoku et al. (2019) indicate that FDI unconditionally influences growth. The study finds FDI more influential in the agricultural and service sectors. Also, Sunde (2023) analyzes the effect of FDI on growth in Namibia from 1990 to 2020. Evidence suggests FDI encourages growth in Namibia. The study advised on government provision of a stable macroeconomic environment, investment in human capital, physical infrastructure, and the encouragement of entrepreneurship culture to achieve productive investment and accelerate sustainable growth. Examining the impact of trade openness and FDI on growth in BRICS countries spanning 1990 to 2018, Banday, Murugan, and Maryam (2021) find that long-term growth is driven by trade openness and FDI. It also points to bidirectional causality between trade openness and FDI, as well as between FDI and growth, alongside a unidirectional causality running from trade openness to FDI. Maintaining balanced macroeconomic conditions and adopting liberal trade policies appear to support increased inflows of foreign direct investment.

Similarly, Sahu (2021) looks at how FDI inflows affect growth in 45 developing countries over the period from 1990 to 2014. The findings show that FDI supports growth both in the short and long term. The impact of FDI inflows is particularly strong in both emerging and non-emerging economies, with positive effects observed in regions like Africa and Asia. In the same line, Sothan (2017) explores the relationship between FDI and growth in Cambodia from 1980 to 2014. The results show that FDI has a strong causal impact on the country's growth. Wondimu (2023) examines the influence of FDI on growth in Ethiopia from 1992 to 2019. The evidence shows that FDI influences growth in Ethiopia, and a unidirectional causality runs from growth to FDI. Also, Panagiotis (2015) analyzes the linked between FDI and growth, and also the

influence of FDI on growth in Eurozone economies spanning from 2002 to 2012. Evidence indicates that FDI encourages growth, and FDI is positively related to growth. Also, Nistor (2014) investigated the influence of FDI inflow on growth in the host country in Romania from 1990 to 2000; the outcome suggests that FDI has a positive relationship with growth. Also, the study reveals that the influence of FDI on growth depends largely on the quantity and quality of the inflows.

In addition, Ben Jelili (2020) examined the influence of FDI on growth in Middle East and North African countries from 1990 to 2016. The study adopts a semi-parametric fixed effects regression technique. Evidence suggests that inward FDI encourages growth in economies with lower endowed stocks of FDI. Similarly, in analyzing the impact of FDI on growth in Namibia from 1990 to 2020, Sunde (2023) utilized the ARDL cointegration technique. Outcomes indicate that FDI stimulates economic growth, helps stabilize the macroeconomic environment, and facilitates an entrepreneurship culture. Similarly, Claudio-Quiroga, Gil-Alana, and Maiza-Larrarte (2022) examined the association between FDI from China and growth in five African nations. Using the two-step fractional integration. Evidence suggests that in four out of five countries, FDI from China is positively associated with growth. Also, while analyzing the effect of sector-specific FDI on economic growth in ninety developing economies from 2005 to 2018, Emako, Nuru, and Menza (2022) used the two-step GMM. The outcome suggests that manufacturing sector FDI enhances growth; however, tertiary sector FDI retard growth.

3. Methodology

3.1 Model Specification

This study looks at how FDI affects growth and also explores how absorptive capacity shapes the linked between FDI and growth. It uses data from 1990 to 2023, covering ten SSA countries, listed in Appendix A. The data were sourced from the World Bank Development Indicators (WDI). Following Shittu et al (2020) and Ennin and Wiafe (2023) with some modification, the model is specified to test the link between FDI and school enrollment at the tertiary level on growth in SSA nations.

$$logRDGP_{it} = \beta_0 + \beta_1 FDIIN_{it} + \beta_2 FDIOUT_{IT} + \beta_3 TO_{it} + \beta_4 logLABOR_{it} + \beta_5 SET_{it} + \mu_{it} \quad [1]$$

$$logRDGP_{it} = \beta_0 + \beta_1 FDIIN_{it} + \beta_2 FDIOUT_{IT} + \beta_3 TO_{it} + \beta_4 logLABOR_{it} + \beta_5 SET_{it} + \beta_6 FDIIN * SET_{it} + \beta_7 FDIOUT * SET_{it} + \mu_{it} \quad [2]$$

Equation [1] estimates the direct relationship between RGDP and FDIIN, FDIOUT, TO, LABOR, and SET. Equation [2] extends this by including the interaction effects of SET with FDIIN and FDIOUT on RGDP across the ten selected SSA countries. In this model, RGDP represents real gross domestic product. FDIIN stands for FDI net inflows, while FDIOUT is FDI net outflows. TO measures trade openness, LABOR refers to the total labor force, and SET captures tertiary school enrollment. The terms FDIINSET and FDIOUTSET reflect the interaction between FDI (both inflows and outflows) and tertiary education. βi (where i = 0, 1, 2, ..., 11) are the parameters representing the intercept and slope coefficients. ε_{it} denotes the stochastic error terms, capturing the effects of variables not included in the model. Here, I index the

countries in the sample, and t refers to the time dimension (years).

Panel Unit-Root Test **-** The Breitung unit-root approach help in ascertaining whether a time series is stationary or has a unit root. It's an alternative to the more widely known Levin-Lin-Chu (LLC) test but aims to improve performance under certain conditions, particularly by addressing weaknesses in the LLC test, such as its sensitivity to model specification and initial conditions. Null Hypothesis (H0): The panel data has a unit root, i.e., the time series is non-stationary. Alternative Hypothesis (H1): The panel data is stationary across individuals (Breitung, 2001). The Breitung test avoids the bias from cross-sectional dependence by removing individual-specific means and trends. It also uses data transformations to eliminate deterministic components before testing for unit roots. The test is more robust to the inclusion of deterministic components like trends (Breitung & Das, 2005). It is considered to have more power compared to the LLC test under certain circumstances. Like other panel unit root tests, it assumes CDS, meaning that if dependencies exist across units, the results may be unreliable. Breitung and Das (2005) addressed this by using a different approach that involves transforming the data before estimating the regression model. The data are assumed to follow an AR(1) process, so that $y_{it}\ as$ can be expressed as:

$$y_{it} = z'_{it}\gamma_i + \mathcal{X}_{it} \quad [3]$$

where

$$\mathcal{X}_{it} = \alpha_1 \mathcal{X}_{i,t-1} + \alpha_2 \mathcal{X}_{i,t-2} + \varepsilon_{it} \quad [4]$$

Panel Cointegration Test **–** The Westerlund cointegration test is a statistical test used to determine whether a long-run equilibrium relationship (cointegration) exists between variables in a panel data set. It is an alternative to traditional cointegration tests like the Pedroni test, focusing on error-correction-based methods, which generally offer more power and flexibility (Westerlund, 2005). The group-mean tests (Gt and Ga) check whether cointegration is present in at least one of the cross-sections in the panel. The panel tests (Pt and Pa) assess whether cointegration holds for the entire panel as a whole. This approach is based on an error correction model (ECM) framework, which directly tests how quickly the system returns to equilibrium after a shock. A faster speed of adjustment indicates the presence of cointegration. The test also allows for heterogeneity, meaning different units in the panel can adjust at different speeds toward the long-run equilibrium. It is robust to cross-sectional dependence, so it can handle contemporaneous correlations between units.

The Westerlund test's calculation criteria are expressed as:

$$\Delta y_{it} = \delta'_{it} d_i + \alpha_i (y_{i(t-i)} - \beta'_i \mathcal{X}_{i(t-1)}) + \sum_{j=1}^{\rho i} \alpha_{ij}\, \Delta y_{i(t-j)} + \sum_{j=0}^{\rho i} \theta_{ij}\, \Delta \mathcal{X}_{i(t-j)} + \varepsilon_{it} \quad [5]$$

The ECM is:

$$(y_{i,t-1} - \beta'_i X_{i,t-1}) \quad [6]$$

Driscoll and Kraay Estimation Technique **-** The modified Driscoll and Kraay estimation approach is a robust approach for calculating standard errors in regression models with panel data, particularly when dealing with cross-sectional dependence, autocorrelation, and heteroscedasticity. It adjusts the standard errors to make them robust in the presence of these common issues in panel datasets, which ordinary least squares (OLS) or other standard estimators may not handle adequately. The technique is robust to CSD, meaning it accounts for correlations between the error terms across different individuals

in the panel (Hoechle, 2007). It corrects for autocorrelation (serial correlation) within each individual time series, handling correlations between observations at different time points. The method is robust to heteroscedasticity, which means it accommodates cases where the variance of errors differs across observations (Haruna & Bakar, 2021). Driscoll and Kraay's standard errors are computed using a nonparametric approach, making no assumptions about the underlying distribution of the errors. This technique is especially useful for long time series (large T) and large cross-sections (large N) in panel data, where traditional methods might fail to account for the complexities in the data structure. The technique calculates standard errors by applying a Newey-West type correction to the OLS residuals, but it extends it to handle cross-sectional correlations.

4. Result and Discussion

Empirical Analysis

4.1 Descriptive Statistics

Descriptive analysis is a statistical technique used to summarize, organize, and present data in a meaningful way, allowing researchers to identify patterns, trends, and key characteristics of the dataset. It provides a simple yet effective way to describe the basic features of data, focusing on what is happening without making any inferences or predictions.

Table 1
Descriptive Statistics

Variable	Description	Mean	Std. Dev.	Min	Max	Obs
RGDP	Real Gross Domestic Product (RGDP) is a macroeconomic measure that reflects the total value of all goods and services produced within a country's borders over a specific period, adjusted for inflation. Unlike nominal GDP, which measures economic output using current prices, RGDP uses constant prices from a base year to eliminate the effects of inflation, providing a more accurate representation of economic growth over time.	139662.8	238214	7488	1071043	363
FDIIN	Foreign Direct Investment (FDI) net inflows refer to the total amount of investment made by foreign entities into a country's economy, minus any disinvestment or capital outflows. FDI net inflows represent the net contribution of foreign capital to a country's economic activities, including investments in businesses, infrastructure, and other productive assets.	2.090012	4.269003	-17.2921	37.32278	363
FDIOUT	Foreign Direct Investment (FDI) net outflows refer to the total value of outward direct investments made by domestic entities in foreign economies, minus the value of inward repatriations. It represents how much capital a country's investors are placing in businesses abroad, signifying their expansion beyond domestic markets.	0.057938	2.073201	-24.9446	10.95702	362
TO	Trade openness refers to the extent to which a country allows trade with other nations, without restrictive barriers such as tariffs, quotas, or strict regulatory measures. It is a measure of a country's integration into the global economy and reflects its willingness to engage in international trade.	68.17976	31.04857	16.35219	156.8618	362
L	The labor force total refers to the total number of individuals in an economy who are either employed or actively	9976307	1.47e+07	434076	7.34e+07	363

SET	seeking employment. It includes both those currently working (the employed) and those who are unemployed but available and looking for work. School enrollment, tertiary refers to the total number of students enrolled in post-secondary education, which includes universities, colleges, and other institutions offering academic, vocational, or professional degrees. Tertiary education typically follows secondary schooling and is aimed at providing advanced knowledge and skills.	10.56561	8.830625	-2.07981	44.3887	363

Table 2
Correlation Analysis

Variable	FDIIN	FDIOUT	TO	logL	SET	FDIOUT*SET	FDIIN*SET
FDIIN	1						
FDIOUT	0.2797	1					
TO	0.2971	-0.0633	1				
logL	-0.1561	0.0525	-0.7767	1			
SET	0.1036	0.1536	0.266	-0.1589	1		
FDIOUT*SET	0.2979	0.7948	-0.0086	0.0322	0.1972	1	
FDIIN*SET	0.8102	0.2299	0.0291	0.0525	0.308	0.3304	1

Source: Author's computation.

As observed in Table 2, the correlation of FDIOUT and FDIIN is 0.28. This implies a positive and lower. The correlation of TO and FDIIN is 0.29, which implies a lower. The variable TO has a negative correlation coefficient with FDIOUT, which stood at -0.06. This suggests an inverse association with FDIOUT. The variable logL has a negative correlation coefficient with FDIIN and TO, which are -0.15 and -0.77, respectively. This indicates an inverse relationship with variables. The variable SET has a positive association with FDIIN, FDIOUT, and TO at 0.10, 0.15, and 0.26. This implies a direct relationship; also, the variable SET has a negative relationship with logL.

4.3 Unit Root Test

The estimation results from the diagnostic test indicate the existence of CDS in the model. On this, the second-generation technique is recommended.

Table 3
Panel Unit Root Test

	Second Generation Breitung			First Generation Breitung		
Variable	Level Zt-bar	First Difference Zt-bar	Order of Integration 0 or I	Level Zt-bar	First Difference Zt-bar	Order of Integration 0 or I
RGDP	5.4197	-1.7453**	I(1)	13.4251	-2.6908***	I(1)
L	12.9491	-3.8553***	I(1)	14.0188	-2.6530***	I(1)
FDIIN	-3.4328***	-7.8223***	I(0)	-4.6990***	-12.0995***	I(0)
FDIOUT	-3.3541***	-7.8052***	I(0)	-5.7015***	-10.4130***	I(0)
TO	-1.7315*	-8.9855***	I(0)	-2.0085**	-10.0383***	I(0)
SET	4.4456	-9.4594***	I(1)	7.9962	-7.6744***	I(1)

Source: Author's computation.

Table 3 presents the unit root estimates. As observed, variables FDIIN, FDIOUT, and TO are stationary at I(1). However, RGDP, L, and SET are stationary at first difference using the second-generation Breitung unit root technique. Furthermore, for robustness purposes, the study utilized Breitung's first and second generations.

4.4 Panel Cointegration

The study applied the Westerlund panel cointegration test, which is robust to CSD. This method was chosen because the model shows evidence of CSD.

Table 4
Westerlund Cointegration Tests

Statistic	value	P-value
Variance ratio	2.5573	0.0053

Source: *Authors' computation*.

As observed in Table 4, the estimation results indicate a long-run association between the variables in the model. The P-value is less than 0.05, which suggests a significant level.

4.5 Driscoll and Kraay Estimation Results

Table 5
Driscoll and Kraay's Regression Results

Variables DV = logRGDP	Coefficient	Drisc/Kraay Std. Err.	t-Statistics	Prob-Value
logL	1.0631	0.0273	38.81	0.029
FDIIN	0.0145	0.0174	2.55	0.023
FDIOUT	-0.0470	0.0352	-2.69	0.006
TO	0.0125	0.0010	12.14	0.000
SET	0.0467	0.0033	14.14	0.000
Cons	-6.6874	0.4548	-14.70	0.000
F-Statistics	*1137.18*			
R-squared	*0.8865*			
Breusch-Pagan LM test	*588.937****			
Breusch-Pagan for heteroskedasticity	*0.0254*			
Mean VIF	*1.80*			

Source: *Author's computation*. 2024

In Table 5, logL suggests a positive association, indicating that a 1% rise in labor results in a 1.06% rise in growth. It implies that labor spurs growth in the sample nations of Sub-Saharan Africa. This lends support to studies like Keho (2017), who found labor retarding growth. Additionally, the result of FDIIN indicates a significant and positive correlation, suggesting that a 1% rise in FDI net inflow results in a 0.01% rise in growth. This finding lends support to all economic theories, which see FDI is a vital catalyst for achieving growth. The result lends support to Haruna and Bakar (2021) and Abubakar and Haruna (2023), both of whom reported that growth is positively influenced by FDI net inflow. Also, the estimate for FDIOUT suggests a significant and negative. This means that a 1% rise in FDI net outflow results in a reduction in growth. This implies that capital outflow has a negative impact on growth. Also, the results for TO suggest a significant and positive. This suggests that a one percentage point increase in trade openness results in a 0.01 percentage point increase in growth. This means that trade openness stimulates growth. The result is consistent with studies by Keho (2017), who reports a positive influence of trade openness on economic growth. Similarly, the estimation result for SET indicates a positive and significant effect. This means that a 1% rise in school enrollment at the tertiary level leads to a 0.05% increase in growth. This implies that school enrollment at the tertiary level enhances growth.

4.5 Driscoll and Kraay Estimation Results for the Interaction Model

Table 6

Driscoll and Kraay's Regression Results

Variables DV = logRGDP	**Coefficient**	**Drisc/Kraay Std. Err.**	**t-Statistics**	**Prob-Value**
logL	1.0680	0.0236	45.17	0.000
FDIIN	0.0332	0.0145	3.82	0.001
FDIOUT	0.1232	0.0352	3.49	0.006
TO	0.0106	0.0011	9.17	0.000
SET	0.0557	0.0048	11.60	0.000
FDIOUT*SET	-0.0148	0.0032	-4.54	0.001
FDIIN*SET	-0.0039	0.0014	-2.64	0.025
F-Statistics	*656.75*			
R-squared	*0.9045*			
Mean VIF	*1.80*			

Source: *Author's computation*. 2024

In Table 6, logL suggests a significant and positive value, indicating that a 1% increase in logL will result in a 1.1% increase in growth. This indicates that the labour force total stimulates growth. This is supported by Aliyara and Solomon (2022)and Hye and Wizarat (2013), who found labor to be negative and to reduce growth. The results are contrary to Naveed and Mahmood (2017) and Haruna and Bakar (2021), who reported labor to be positive and enhances growth. Similarly, results indicate that FDIIN is positive and significant at a one percent level. It implies that a 1% rise in FDIIN leads to a 0.03% rise in growth in the sample SSA countries. This implies that FDI net inflow encourages growth. The result is in agreement with studies by Abubakar and Haruna (2023) and Aliyara and Solomon (2022), who found that FDI net inflows have a positive, growth-enhancing effect. The estimates for FDIOUT also show a positive and statistically significant relationship, suggesting that a one percent increase in FDIOUT leads to a 0.12 percent increase in growth. Similarly, the results for trade openness (TO) reveal a positive and significant relationship, indicating that a one percent increase in TO leads to a 0.01 percent increase in economic growth across the selected SSA countries. This suggests that greater trade openness supports growth in the region. The result is supported by studies such as Rahman, Saidi, and Ben Mbarek (2017) and Hye, Wizarat, and Lau (2016), who reported that growth is positively influenced by trade openness. Similarly, the estimation results for SET show a positive and statistically significant result, indicating that a 1% increase in tertiary school enrollment leads to a 0.06% increase in growth. This suggests that higher tertiary enrollment supports growth.

The results of the interaction terms meaningfully shape how foreign direct investment (FDI) and tertiary school enrollment (SET) together influence economic growth. For FDI inflows (FDIIN), the negative interaction coefficient means higher tertiary enrollment reduces FDI's marginal impact on growth; mathematically, the total effect becomes $0.0332-0.0039\times SET$, so a one-percentage-point rise in SET trims that effect to 0.0293%. Conversely, the impact of SET on growth is $0.0557-0.0039\times FDIIN$, which drops SET's benefit to 0.0518% when FDIIN increases by one percentage point. We see a similar pattern with FDI outflows (FDIOUT): the total effect on growth is $0.1232-0.0148\times SET$, reducing to 0.1084% when SET rises by one point; likewise, SET's growth effect is $0.0557-0.0148\times FDIOUT$, bringing it

down to 0.0409% if FDIOUT increases by one point. This suggests diminishing returns when both FDI (inflows or outflows) and tertiary enrollment rise; the incremental positive impact of each on growth wanes. Recent studies confirm this nuanced interplay: Rahman et al. (2023) find that human capital attracts FDI only up to a point; beyond that, additional capital may actually discourage investment. Meanwhile, a 2024 study on the effects of FDI on human capital in Southeast Asia highlights mixed outcomes, showing that while FDI can foster skill development through multinational firms, its impact depends on local educational and labor market contexts. These patterns align with older, well-documented findings on the conditional nature of FDI–growth linkages, rooted in absorptive capacity and spillover dynamics (e.g., Borensztein et al., 1998; Li & Liu, 2005; Azman-Saini et al., 2010). In plain terms, though both FDI and tertiary education independently spur growth, their combined effect isn't simply additive. High levels of one can dampen the impact of the other, so policymakers should consider this interplay when designing complementary education and investment strategies.

5. Conclusion and recommendation

This study investigated the impact of FDI on growth in selected SSA economies, with a focus on the moderating role of absorptive capacity, measured by tertiary school enrollment. The results reveal that labor force participation, FDI inflows, FDI outflows, trade openness, and tertiary education all have significant positive effects on economic growth. However, the interaction terms between FDI (both inflows and outflows) and tertiary education show negative coefficients, indicating that higher tertiary enrollment reduces the marginal growth benefits of FDI, and likewise, increased FDI diminishes the incremental contribution of tertiary education to growth. These findings highlight a complex, non-linear relationship between FDI, human capital, and economic growth, consistent with theories of absorptive capacity. While FDI and education independently stimulate growth, their combined effects are not purely complementary, suggesting that there are diminishing returns when both rise simultaneously. SSA governments should promote quality, growth-enhancing FDI by ensuring a stable macroeconomic environment, transparent regulations, and strong infrastructure. Efforts should focus on attracting investments that match local human capital capacity and foster technology transfer. Tertiary education should be improved in both quality and industry relevance to enhance the workforce's ability to absorb FDI spillovers. Policies should encourage collaboration between investors and educational institutions, and direct FDI toward sectors with high absorptive capacity to maximize growth benefits and avoid diminishing returns.

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