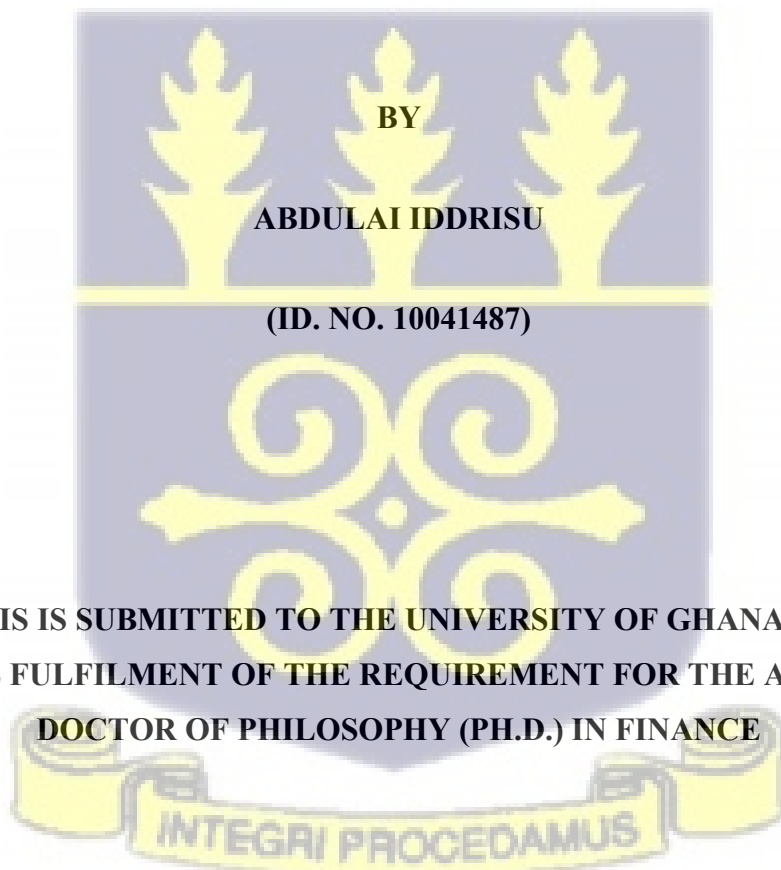


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**EFFICIENCY OF FOREIGN CAPITAL INFLOWS, INSTITUTIONAL QUALITY,  
AND ECONOMIC DEVELOPMENT IN SUB-SAHARAN AFRICA**



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## DECLARATION

At this moment, I declare that this thesis is the product of my research and has not been submitted for any academic award at this or any other university. All references used have been appropriately acknowledged.

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December 16, 2025

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## CERTIFICATION

I certify that this thesis was supervised in accordance with the procedures laid down by the University of Ghana.



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17/12/2025

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**(Supervisor)**

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**Date**



**DEDICATION**

To my mother



## ACKNOWLEDGEMENT

First, I would like to express my heartfelt gratitude to Almighty Allah for bestowing me with the physical and emotional strength to complete this Thesis. All glory to Him, and I am eternally grateful. I would also like to thank my supervisors, Professor A. Q. Q. Aboagye and Professor Lord Mensah, for their guidance, criticism, patience, motivation, and extensive research expertise and experience, which helped guide this thesis in the right direction. This accomplishment would not have been possible without their guidance. I am especially grateful to Professor A. Q. Q. Aboagye, whose health condition did not stop him from pursuing this work to the very end. Finally, I want to convey my heartfelt gratitude to my family, especially my wife and friend, Professor Ibrahim Osman Adam, for their prayers, unconditional love, and emotional support throughout my academic years.



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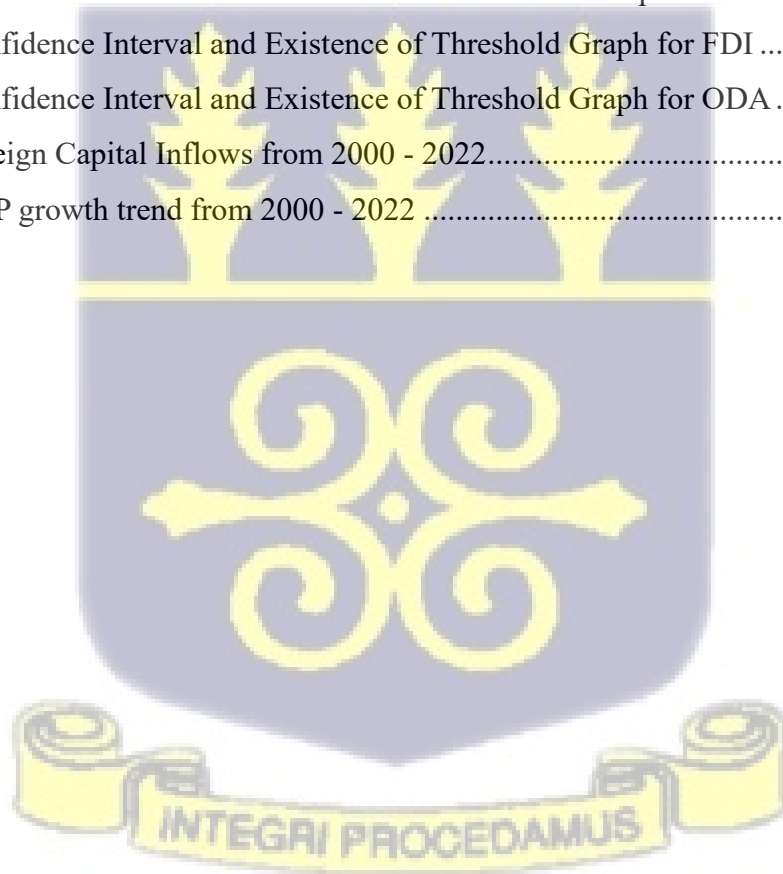
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## LIST OF ACRONYMS

<b>ADF</b>	Augmented Dickey-Fuller
<b>AEO</b>	African Economic Outlook
<b>AMSZ</b>	African Monetary and Economic Zone
<b>ASEAN</b>	Association of Southeast Asian Nations
<b>BCC</b>	Banker-Charnes-Cooper Model
<b>BRICS</b>	Brazil, Russia, India, China, and South Africa
<b>CADF</b>	Cross-Sectional Augmented Dickey-Fuller Test
<b>CEMAC</b>	Central African Economic and Monetary Community
<b>CIPS</b>	Cross-Sectional Im, Pesaran, and Shin Test
<b>CRS</b>	Constant Returns to Scale
<b>CSR</b>	Corporate Social Responsibility
<b>DAC</b>	Development Assistance Committee
<b>DEA</b>	Data Envelopment Analysis
<b>DMU</b>	Decision-Making Unit
<b>DPTM</b>	Dynamic Panel Threshold Model
<b>ECA</b>	Economic Commission for Africa
<b>EFFCH</b>	Efficiency Change Index
<b>FCI</b>	Foreign Capital Inflows
<b>FDI</b>	Foreign Direct Investment
<b>FPI</b>	Foreign Portfolio Investment
<b>FRM</b>	Fractional Regression Model
<b>GDP</b>	Gross Domestic Product
<b>GDPPC</b>	Gross Domestic Product Per Capita
<b>GFC</b>	Global Financial Crisis
<b>GMM</b>	Generalized Method of Moments
<b>GMM-EGLS</b>	Generalized Method of Moments Estimated Generalized Least Squares
<b>HDI</b>	Human Development Index

<b>IMF</b>	International Monetary Fund
<b>MI</b>	Malmquist Index
<b>MPI</b>	Malmquist Productivity Index
<b>NLS</b>	Nonlinear Least Squares
<b>ODA</b>	Official Development Assistance
<b>OECD</b>	Organization for Economic Co-operation and Development
<b>OFDI</b>	Outward Foreign Direct Investment
<b>PCA</b>	Principal Component Analysis
<b>PSM</b>	Public Sector Management quality
<b>QMLE</b>	Quasi-Maximum Likelihood Estimation
<b>SAP</b>	Structural Adjustment Programs
<b>SDG</b>	Sustainable Development Goals
<b>SFA</b>	Stochastic Frontier Analysis
<b>SSA</b>	Sub-Saharan Africa
<b>TFP</b>	Total Factor Productivity
<b>UNCTAD</b>	United Nations Conference on Trade and Development
<b>UNDP</b>	United Nations Development Programme
<b>VECM</b>	Vector Error Correction Model
<b>VRS</b>	Variable Returns to Scale
<b>WAEMU</b>	West African Economic and Monetary Union
<b>WBG</b>	World Bank Group
<b>WDI</b>	World Development Indicators
<b>WGI</b>	Worldwide Governance Indicators
<b>WIR</b>	World Investment Report



## ABSTRACT

Foreign capital inflows – specifically foreign direct investment (FDI), official development assistance (ODA), and remittances are essential sources of financing in Sub-Saharan Africa (SSA). However, their transformation into economic development remains inconsistent. This study evaluates the efficiency of foreign capital inflows, the threshold effects of institutional quality on their attraction, and the moderating role of efficiency on economic growth across 35 SSA countries (1990–2021).

The first objective measures the utilization efficiency of foreign capital inflows based on the growth paths of macroeconomic and human development. The results derived from the Data Envelopment Analysis (DEA) and Malmquist Productivity analyses suggest that while the efficiency of these foreign inflows is generally low in Sub-Saharan Africa, it is comparatively higher in human development. The efficiency levels for growth along the macroeconomic path are 40.7% for FDI, 40.9% for ODA, and 43.6% for Remittances. Human development growth is much higher, with efficiency levels of approximately 69% for FDI, 63% for ODA, and 65% for Remittances. The results also suggest that efficiency growth has stagnated over the period from 1990 to 2021. The findings show that overall utilization efficiency in SSA is low. For macroeconomic growth, efficiency averages about 40.7% for FDI, 40.9% for ODA, and 43.6% for remittances. Human development performs much better, with efficiency levels of about 69% for FDI, 63% for ODA, and 65% for remittances. The results also revealed that efficiency changes remained stagnant between 1990 and 2021, with no clear trend. The relative rankings of countries in terms of efficiency performance place Sierra Leone, Botswana, Burkina Faso, Senegal, and Gabon among the top five countries along the human development growth path. In contrast, Burkina Faso, Ethiopia, and Mali are ranked better along the macroeconomic growth path than their peers. Burkina Faso is the only country with consistent efficiency performance in both dimensions. Efficiency spikes were observed in the immediate years following major global financial crises, emphasizing the importance of international economic crises in SSA countries. The study's findings indicate that policymakers in the sub-region will need to implement prudent, pragmatic policies to promote the efficient use of foreign capital by addressing the significant inefficiencies in deploying these inflows to foster economic development.

The second objective, employing fractional regression modeling, explores the institutional and macroeconomic determinants of FDI, ODA, and remittance efficiencies. The results show that institutional quality factors such as control of corruption, rule of law, political stability, and

regulatory quality significantly enhance the efficiency of all three capital inflows. This underscores the crucial role of governance reforms and institutional capacity-building in attracting and better utilizing foreign capital inflows in sub-Saharan Africa.

The third objective examines the threshold effects of institutional quality on foreign capital inflows using the dynamic panel threshold model (DPTM). The results identify distinct institutional quality thresholds — 0.332 for FDI, -0.402 for remittances, and -0.142 for ODA— indicating a nonlinear relationship. Below these thresholds, institutional improvements drive capital inflows. However, beyond these thresholds, all three inflows decrease. This suggests that SSA countries tend to attract resource-seeking, high-risk investors who prefer high-potential markets with weaker regulations. Specifically, regarding remittances, institutional quality exerts a negative impact above the threshold but shows no significant relationship below it. Conversely, ODA inflows significantly decline regardless of the level of institutional quality. On average, 78% of SSA countries fall below the thresholds across all three categories of foreign capital inflows, while only 22% are above them. Therefore, from a policy perspective, prioritizing the quality of institutions and implementing governance reforms to attract quality, sustainable foreign capital, especially FDI, ODA, and remittance inflows, is critical to the continent's economic success. Also, given the negative impact of FDI above the threshold, the policy should prioritize the quality of these inflows rather than focusing solely on attracting FDI volumes. By focusing on attracting quality capital rather than quantity and on ensuring that improved governance translates into investments that contribute to inclusive growth, technology transfer, and sustainable development, investors with long-term goals would be attracted for mutual benefit. Given that high institutional quality might reduce remittance inflows, policymakers should promote formal remittance channels by improving financial infrastructure and lowering transaction costs. This would ensure that remittances flow through regulated systems, contributing more effectively to financial inclusion and development.

The final objective investigates the moderating role of foreign capital efficiency in the relationship between foreign capital inflows and economic growth using a dynamic Generalized Method of Moments (GMM) approach. The findings reveal that while capital inflows alone often show a negative or insignificant impact on growth, their interaction with *efficiency* is positive and significant, indicating that efficiency acts as a necessary catalyst for growth.

The study underscores the crucial role of policymakers in promoting the efficient use of foreign capital resources. To address inefficiencies and align foreign capital inflows with development goals, policymakers must shift their focus from merely attracting volume to enhancing the economy's absorptive capacity. Achieving this requires institutional reforms that strengthen the rule of law, improve governance effectiveness, reduce corruption, and ensure regulatory quality. Specific recommendations include establishing performance-based monitoring for Official Development Assistance (ODA), digitizing remittance channels to fund education and health, and enforcing the rule of law to reach the identified institutional thresholds necessary for positive capital spillovers.



## CHAPTER ONE

### INTRODUCTION

#### 1.1 Background of the Study

The accumulation of physical and financial capital is universally recognized in economic theory as a foundational prerequisite for sustainable economic development. Capital accumulation, whether domestic or external, is essential for sustained economic growth (Thiel, 2001). However, countries in SSA essentially face serious challenges in generating adequate domestic capital to promote economic development (Iheonu et al., 2017). As a result, developing economies rely on foreign capital inflows to supplement the limited domestic savings to achieve economic growth. Despite the expectation that foreign capital would enhance economic development, SSA countries have experienced volatile and disappointing economic performance, especially in recent decades. In response to a prolonged slowdown in economic performance and rising poverty levels, many SSA countries implemented significant policy reforms and market-friendly incentives in the late 1980s, including structural adjustment programs (SAPs), to enhance market efficiency and attract foreign investment (Ahmed, 2013; Ajakaiye & Jerome, 2014). These reforms, championed by the Bretton Woods institutions, aimed to create a more market-oriented economy by promoting financial and trade liberalization, privatizing state monopolies, and developing capital markets. The ultimate objective was to drive economic growth by attracting foreign capital, strengthening institutional and regulatory frameworks, and promoting an export-led growth strategy.

In line with these policy dynamics, SSA countries' integration into international markets

has increased, boosting foreign capital inflows, especially after the global financial crisis (GFC) of 2007–2008. Notably, SSA saw increased capital inflows during the GFC, a testament to the region's resilience in foreign capital flows, providing reassurance about its economic stability. Three key forms of foreign capital inflows—foreign direct investment (FDI), official development assistance (ODA), and remittances—dominated the region (Calderon et al., 2019). On the other hand, portfolio investments have played a relatively minor role due to the underdevelopment of the financial market and its volatility (Ndikumana & Boyce, 2011). Moreover, Uncerta et al. (2010) maintain that, given the nature of development financing and the problems associated with it in developing countries, it is essential to closely monitor FDI, ODA, and remittances and identify the impact of each on economic development. This implies

that the significant global external financial shocks could not deter these forms of foreign capital from entering SSA. Instead, they affect the magnitude of these inflows into the sub-region. For these reasons, this study focuses on FDI, ODA, and remittance inflows as the more common forms of foreign capital inflows in SSA than others, such as portfolio investments and debt.

The trajectory of foreign capital inflows into SSA shows a steady increase in FDI, ODA, and remittances. Even though the COVID-19 pandemic caused economic disruptions, foreign direct investment (FDI) inflows increased from about \$245 million in 1980 to \$31.7 billion in 2019, reaching a peak of \$83 billion in 2021 (UNCTAD, 2020). ODA inflows grew dramatically, from \$19.58 billion in 2000 to \$55 billion in 2019 and \$63.43 billion in 2020. Likewise, remittances grew from \$1.4 billion in 1980 to \$42.92 billion in 2020, surpassing ODA as the second-largest source of capital inflows after foreign direct investment in recent years. This increasing trend should reassure the audience about the region's economic growth. Table 2.1 presents a five-year average trend of foreign capital inflows from 1990 to 2022, which has been rising steadily for all three types of capital. FDI surged from an average of roughly \$2.26 billion in the early 1990s to a record \$44.44 billion in 2020–2022, but did not consistently outpace other inflows in absolute terms. ODA remained the largest source of external finance for much of this period, peaking at \$63.3 billion for 2020–2022. Remittances have also proved remarkably resilient and have grown, reaching \$48.11 billion in the last period and overtaking FDI in absolute value in recent times. This is indicative of the shifting mix of external finance in SSA, where ODA and remittances remain volume-heavy alongside the growing importance of FDI.

*Table 2.1: Trend of foreign capital inflows in sub-Saharan Africa from 1990 -2020*

Period	1990-1994	1995-1999	2000-2004	2005-2009	2010-2014	2015-2019	2020-2022
<b>ODA (USD Billion)</b>	18.29	15.52	19.55	36.13	46.52	48.52	63.3
<b>FDI (USD Billion)</b>	2.26	5.79	11.93	28.13	41.08	32.38	44.44
<b>Remittance (USD Billion)</b>	2.74	3.6	5.37	25.2	36.64	44.53	48.11

*Source: Author's computations based on data from WDI data*

The growing reliance on foreign capital, particularly FDI, ODA, and remittances, has sparked debates regarding their effectiveness in driving economic growth due to the discussions about

their conception, their potential, the ideal role they play, their actual implementation, and the prerequisites for them to fulfill their functions (Unceta et al., 2010). For instance, Brambila-Macias & Massa, (2010) and Alley, (2015) emphasize the use of private capital, such as FDI, to finance economic development in developing countries. Part of this argument holds that, since FDI has been the primary source of external finance in most developing countries, other international financing flows, such as official development assistance, should complement each other to create an enabling environment for attracting private capital inflows. It must, however, be noted that developing countries, such as SSA countries, face different circumstances and may have different external financing requirements. Therefore, regarding foreign capital financing, it is simplistic to categorize capital inflows based solely on their goals or the purposes for which they take various forms. For instance, while FDI is often credited with boosting productivity through technology transfer and management expertise (Alfaro et al., 2004), remittances provide a stable source of income that enhances household welfare and stimulates local economies (Ratha et al., 2011). This should instill optimism about the region's economic development.

This thesis seeks to consider the different purposes of foreign capital inflows and avoid the challenges associated with general or aggregate analysis. For this reason, we typically select three standard variables—FDI, ODA, and remittances—to assess their efficiencies in promoting economic development in sub-Saharan Africa. Notably, portfolio investment, as one of the sources of foreign capital, has not been considered in this study for several reasons. First, countries in SSA prioritize stable, development-oriented investments such as FDI and ODAs, suggesting that portfolio investment cannot align with the region's infrastructure and productive sector needs (Ndikumana & Boyce, 2011). Besides, Kose et al. (2017) highlight the volatility of portfolio investments and their pro-cyclicality, emphasizing the challenges SSA faces due to global financial instability. Furthermore, Beck et al. (2014) postulate that financial markets in SSA economies are underdeveloped, thereby limiting the ability to attract portfolio investment.

The influx of foreign capital can drive efficiency and economic growth by providing much-needed resources for infrastructure development, technological transfer, and job creation (Alfaro et al., 2004). Regarding specific motives, FDI, as a profit-motive investment, is crucial

in boosting productivity through technological advancements and management expertise, as evidenced in several developing countries (Alfaro et al., 2004). On the other hand, remittances often provide a stable source of income for households, helping to alleviate poverty and stimulate local economies (Ratha et al., 2011). Despite these significant inflows, the growth benefits of foreign capital in SSA remain debatable.

Many recent studies have concluded that the impact of foreign capital flows on economic growth is contingent on other factors. Institutional quality has emerged as one critical factor in determining the effectiveness of foreign capital utilization. Countries with stronger institutions tend to attract more stable and productive foreign investment while being better equipped to manage and regulate these inflows (Acemoglu et al., 2005). Conversely, weak institutions may lead to capital flight, resource misallocation, and increased vulnerability to external shocks (Papaioannou, 2009). Evidence that institutional quality is a significant determinant of capital inflows, both in terms of attracting capital and maximizing the benefits of capital flow spillover effects on the host economy, is observed (Makoni, 2018; Alfaro et al., 2007; Fratzscher, 2012; Agbloyor et al., 2014; Kurul, 2017; Pinar & Volkan, 2018; Lothian, 2006). For instance, Kose et al. (2009) state that while there is evidence of the direct impact of the financial system development, the quality of institutions and macroeconomic stability can be far more critical in directing and utilizing foreign capital flows into host countries. Economic activities in an economy reflect the current institutional environment and the incentives and opportunities it provides (North, 1990).

Some argue that the impact of capital inflows on economic growth depends on a country's absorptive capacity (Agbloyor et al., 2014; Alfaro, Chanda, Kalemli-Ozcan, & Sayek, 2004; Bailliu, 2000). This means that the benefits of these inflows depend on the host economy's effectiveness and efficiency, and on whether it can translate them into economic development. Financial development is a critically recognized factor in the literature that can enhance the growth effects of these inflows while mitigating their associated volatility (Al Nasser & Gomez, 2009; Kinda, 2012; Kose, Prasad, & Taylor, 2011). The financial sector plays a critical role in mobilizing savings (Bencivenga & Smith, 1991; Levine, 1997) and ensuring efficient capital allocation and risk management (Durusu-Ciftci, Ispir & Yetkiner, 2017; Kose et al., 2011; Levine, 1997).

One factor that has garnered increasing attention is the efficiency with which foreign capital inflows (FDI, ODA, and remittances inflows) are transformed within an economy. In an economic context, efficiency refers to optimizing resource use to achieve maximum output with minimal waste (Farrell, 1957). By efficiency of foreign capital, we refer to how effectively a country can leverage foreign capital inflows through macroprudential policies to generate economic benefits rather than merely attract passive investments. It describes how external financial resources are integrated, utilized, and transformed to generate economic growth and human development, potentially through investments in productive industries, technological transfers, skill development, and improved production processes. It is not enough to campaign for foreign investors to come in or to win bilateral and multilateral aid; it is enough to use policy to efficiently allocate these resources to areas of the economy that can improve economic development. The key is not just receiving money but using it as a catalyst for meaningful economic development and structural transformation. The divergence in outcomes across the region illustrates the critical nature of this study. For instance, while countries like Ethiopia have successfully leveraged state-directed foreign capital into significant infrastructure projects (e.g., the Grand Ethiopian Renaissance Dam) to spur growth, others like Zambia have faced debt distress where capital inflows were not matched by efficient productive capacity expansion. These contrasting cases highlight that the mere presence of capital is insufficient; the *efficiency* of its deployment is the determining factor for development.

The concept of efficiency has been extensively studied across disciplines such as economics, management, and engineering. In economic terms, efficiency is often categorized into technical efficiency, the achievement of maximum output with given inputs, and allocative efficiency, the optimal allocation of resources based on market conditions (Kumbhakar & Lovell, 2003). A specific refinement of efficiency is Pareto-Koopmans efficiency, which describes a state in which no improvement can be made in one aspect without compromising another (Koopmans, 1951). This concept integrates technical and allocative efficiency, emphasizing that an entity is efficient if it maximizes output while fully utilizing all resources, with no slack. Pareto-Koopmans efficiency is a benchmark for assessing resource use, particularly in the context of foreign capital inflows. Ndikumana and Boyce, (2011) posit that SSA countries often face inefficiencies stemming from institutional weaknesses, underdeveloped financial markets, and governance difficulties. By applying the Pareto-Koopmans criteria, scholars aim to determine whether resources are used to maximize societal welfare, addressing concerns about productivity and equity.

The extant literature has used parametric and non-parametric approaches to measure the efficiency of decision-making units (DMUs). Data Envelopment Analysis (DEA) and Stochastic Frontier Analysis (SFA) are particularly relevant methodologies for measuring efficiency using both nonparametric and parametric approaches, respectively. These methods capture multiple input-output relationships and identify inefficiencies in resource allocation or technical production processes (Charnes et al., 1978; Coelli et al., 2005). Pareto-Koopmans efficiency also highlights the trade-offs in development policies. For SSA, achieving this efficiency level would require targeted reforms in governance, infrastructure, and financial markets, ensuring that no resource allocation improves one area at the expense of another (Nnyanzi et al., 2022). Thus, Pareto-Koopman's efficiency provides a comprehensive framework for evaluating the optimality of economic decisions in resource-constrained environments.

In this thesis, in Pareto-Koopman's sense, we evaluate the efficiency with which SSA countries transform exogenous inputs (net foreign capital inflows) into final outputs (economic development, economic growth, and human development). Therefore, by measuring the utilization efficiency of foreign capital inflows, we calculate the ability of countries to transform their scarce input resources (net foreign capital inflows) into the maximum possible levels of economic development. By evaluating SSA's efficiency frontier, scholars aim to identify key policy areas that could enhance capital utilization and foster sustainable development (Nnyanzi et al., 2022). This study applies the nonparametric DEA methodology to examine the efficiency with which SSA's net foreign capital inflows (FDI, ODA, and remittances) are translated into economic and human development outcomes. The focus is on how effectively these inflows contribute to macroeconomic indicators such as GDP growth and human capital development.

The thesis focuses on three foreign capital inflows: FDI, ODA, and remittances. We use disaggregated components rather than aggregate foreign capital because they differ in characteristics and flow into developing countries for different motives and with unique characteristics.

Unlike aggregate analyses, this study disaggregates foreign capital inflows to account for their distinct characteristics and developmental implications. First, while the profit motive of external investors drives FDI inflows, FDI enhances host economies through technology

transfer, employment creation, and capital accumulation, helps compensate for the balance of payments, and further contributes to the supply of new technology (Unceta et al., (2010). Moreover, technology and knowledge transfers arising from FDI inflows can increase the production of more sophisticated goods, job creation, and the market capitalization of local companies (Rahman & Bristy, 2015). According to Kenh, (2023), FDI provides additional capital and technological benefits, which are critical in modernizing host economies and promoting growth. In addition, FDI enhances the host country's knowledge base by introducing new management strategies and practices that directly impact labor productivity, improve organizational performance, and indirectly affect the host country's economic development (Santos, 2023). Wang and Le, (2019) argue that the most apparent impact of FDI inflows is on GDP growth. The transfer of technology from developed to developing countries generates spillovers that benefit the recipient country. Therefore, we use FDI transformation or utilization to refer to technological and knowledge transfer in economic growth, supported by government policy that enhances the efficiency of foreign capital inflows.

Unlike FDI, the motive of ODA inflows is mainly political and humanitarian, with donor governments influencing their allocation (Alesina & Dollar, 2002; Tavares, 2003). Under the ODA channel, bilateral and multilateral diplomatic ties, as well as political considerations, govern the flows of public loans and grants. Therefore, in this study, as suggested by Arcelus and Sharma, (2005), the efficiency of ODA transformation is viewed as a government policy planned to ensure the efficient utilization of ODA resources such as the construction of roads, irrigation projects, investment in education and health and the provision of potable water for the population, leading to economic performance and improve quality of life. Finally, while remittance inflows primarily target households for altruistic purposes, they are essential for supporting recipient countries' education and health needs and for promoting the growth of small-scale investments (Unceta et al., 2010). Giuliano and Ruiz-Arranz, (2009) showed that the effect of remittance inflows depends on the level of development of the host and its financial system and concluded that remittance inflows have promoted the growth of low-income countries with less developed financial systems by providing alternatives to the inefficient financial systems of the recipient countries. Thus, the efficiency of remittance inflow transformation depends on policy instruments that harness remittances to improve economic development by supporting household health, education, and investment, among other areas.

This study evaluates the efficiency of FDI, ODA, and remittances inflows in economic growth and human development. Studies by (Teplova & Sokolova, 2019; Wang & Le, 2019; Çilingirtürk & Turanlı, 2014; Naeher & Narayana, 2022; Veiderpass & Andersson, 2007; Alfaro et al., 2004; Batten & Vo, 2009) have contributed to the existing literature on the role of foreign capital efficiency in the economic development of various regions across the globe. Policy instruments that influence the efficient allocation of foreign capital inflows are crucial for transforming these resources into productive investments that yield economic development. Inefficiencies arising from poor macroeconomic policies, corruption, weak institutions, or inadequate infrastructure can hinder the effective utilization of foreign capital and diminish its potential benefits (Nav et al., 2019).

Therefore, the relationship between foreign capital inflows and SSA's economic development is complex and multifaceted. It is not merely the volume of capital inflows that matters, but also how they are managed and efficiently utilized within the economy. Efficiency is crucial for ensuring that foreign capital contributes to sustainable economic development.

This study defines economic development as encompassing macroeconomic growth and human development, representing the quantitative and qualitative aspects of economic progress.

Foreign capital inflows have become increasingly important in shaping human development outcomes, particularly in developing economies. Beyond economic growth, foreign capital significantly influences human development as measured by the Human Development Index (HDI) (Arcelus et al., 2005). Studies examining developing countries have shown that foreign capital can enhance efficiency through multiple channels, including technology transfer, knowledge spillovers, and improved utilization of human capital (Mastromarco & Ghosh, 2009; Noorbakhsh et al., 2001). At the same time, Reiter and Steensma, (2010) suggested that the institutional framework plays a crucial role in determining the efficiency of foreign capital flows. For instance, research has shown that corruption levels and FDI policies significantly influence how foreign investments translate into human development outcomes. This finding is further supported by recent studies that show that institutional quality acts as a critical moderator of the relationship between foreign capital flows and human development in developing countries (Ali et al., 2022). External financial inflows can contribute to inclusive human development, although the impact varies across regions and countries (Asongu & Leke,

2019; Cleeve et al., 2015). Foreign capital inflows can significantly influence human capital development, but their effectiveness depends on effective policy frameworks and fiscal management (Ifeosame, 2023). Ifeosame, (2023) found no significant relationship between foreign portfolio investment (FPI) and human development. On the contrary, Githaiga and Kilong, (2023) emphasize the role of FDI and remittances in human capital development. ODA is noted to have adversely affected human capital development in SSA countries from 2009 to 2019. Shamsan and Samikon, (2022) assert that financial development mediates the impact of foreign direct investment on local human capital efficiency. This finding aligns with the broader suggestion that the shadow economy and the broader development of the economic system influence the relationship between FDI and human development (Bayar et al., 2020). Studies by (Oloke et al., 2022) also highlighted the significance of examining the channels through which foreign capital influences human capital development, especially in developing SSA economies.

Theoretical and empirical research has revealed significant links between foreign capital inflows, institutional development, and economic growth. Theoretically, Blomstrom and Kokko (1998) and Blalock and Gertler (2008) contend that the entry of international companies into national markets leads to lower prices and higher output, suggesting increased efficiency, which is beneficial for intermediate suppliers, producers of final products, and consumers. Çilingirtürk & Turanlı, (2014) showed that DEA efficiency scores require significant testing, with output as a function of inputs and efficiency. This allows for including DEA efficiency scores as an explanatory variable for output, but also as a moderator or mediator. Levine, (1997) opines that market frictions (information asymmetry and transaction cost) motivate the emergence of financial markets and institutions to perform key financial functions such as mobilization of savings, allocation of resources, corporate governance, ease trading of goods, services, and contracts, and facilitate risk management. These functions culminate in capital accumulation for economic activities. Thus, the capital accumulation effect of the financial system's development is based on its ability to mobilize savings (domestic and foreign) and allocate resources efficiently through financial institutions. In the growth models of Romer, (1986), Lucas, (1988), and Sergio Rebelo, (1991), the financial system's functions affect state-level growth through capital accumulation. Also, the pioneering work of Schumpeter (1911) suggests that the changes in innovation play a significant role in influencing growth by providing improved quality and quantity of financial services. The ability of the financial

system to influence adequate and foreign capital inflows depends on the quality and efficiency of financial institutions, which mediate between international investors and the domestic financial system.

The nexus between foreign capital inflows, institutional quality, and economic growth is theoretically anchored in the Absorptive Capacity Hypothesis and New Institutional Economics (NIE). Absorptive Capacity theory (Cohen & Levinthal, 1990) posits that external capital is not a standalone driver of growth but requires a complementary domestic 'knowledge stock' to be productive. In this context, institutional quality serves as the critical absorptive mechanism; as North, (1990) argues, institutions reduce transaction costs and uncertainty. Therefore, the theoretical transmission mechanism proposed here is that strong institutions act as a 'filter,' channeling volatile foreign capital into productive long-term investments rather than rent-seeking activities, thereby unlocking their growth potential.

Empirically, Naeher and Narayana, (2022) revealed that low-income countries, such as SSA, with poor capacity to attract foreign capital inflows, operate on or close to the efficiency frontier. This may imply that these countries can adequately utilize their limited resources. In their study, 'Efficiency of FDI Transformation in Economic Development and Intellectual Capacity', Teplova and Sokolova, (2019) demonstrated that bivariate and multivariate Granger tests indicate that FDI causes economic development and increases intellectual capital across several indicators. Using the nonparametric DEA method and the Malmquist Index, they identified countries on the efficiency frontier based on the quality of FDI management. Konara et al., (2017) examined the impact of FDI on three internal measures of efficiency, i.e., technical, managerial, and cost efficiency, as well as an external measure of efficiency, i.e., revenue efficiency, in the emerging markets banking sector. They concluded that foreign banks have an advantage in technical, managerial, and scale efficiency but not in cost or revenue efficiency. Veiderpass and Andersson, (2007) examined how effectively countries use their resources through foreign aid. They investigated whether there is a correlation between a country's efficiency and resource inflows in the form of foreign aid. The findings revealed that India, Indonesia, and Pakistan had the lowest resource utilization, while China and Nigeria were among the top performers in utilizing foreign aid flows. Regarding whether efficient resource use can attract more aid into the host country, the study did not find a clear relationship

between a country's efficiency and foreign aid inflows. Labor and energy-intensive countries displayed higher efficiency than less labor and energy-intensive countries. The capital-intensive country was found to have a positive relation with country efficiency.

## 1.2 General Problem Statement

In recent decades, foreign capital inflows have been critical in financing economic development in SSA countries. The urgent need for foreign capital support for developing countries is clearly shown in the UNCTAD (2024) report, which indicates that there is a funding gap of two to three trillion US dollars (\$4 trillion) per annum, between the amount of capital needed to achieve the Sustainable Development Goals (SDGs) by 2030 and the financial resources currently available from governments and development partners. In response to this need, development finance institutions and organizations continuously channel their resources to mobilize and leverage private capital inflows in developing countries, especially those from SSA (World Bank, 20). The level of capital inflows to the sub-region has been increasing recently. For instance, the volume of foreign financial inflows to SSA expanded from \$20 billion in 1990 to approximately \$120 billion in 2012, driven primarily by private capital flows and remittances (Sy & Rakotondrazaka, 2015). FDIs to Africa more than doubled in 2020, when COVID-19 hit the continent to a record \$83 billion in 2021, and inflows from ODAs amounted to 17% of global aid in 2020.

Although foreign capital inflows, in their most common forms (FDI, ODA, and remittances) in SSA, have been increasing over the past decades, the socio-economic outcomes in this region remain unmatched by the levels of these inflows (Calderon et al., 2019). For instance, the African Economic Outlook(AEO), (2024) report by the African Development Bank highlights the stagnation of Total Factor Productivity (TFP) in Africa despite consistent capital inflows. One critical question is whether SSA countries efficiently utilize the growing inflows of foreign capital. This implies that the benefits of foreign capital inflows may not depend solely on their volume but also on other factors, such as the efficiency with which they are utilized for economic development.

Therefore, the question arises: What promotes or inhibits the effect of foreign capital inflows, and under what circumstances would foreign capital inflows provide the maximal favorable consequences for economic development? Specifically, it is essential to understand whether

these inflows have been efficiently utilized to support the required economic growth. Understanding the process by which foreign capital inflows are utilized will help identify sources of efficiency and/or inefficiency in these economies, thereby informing appropriate policy directions.

The empirical study by Teplova and Sokolova, (2019) in using data envelopment analysis (DEA) and the Malmquist Productivity Index found that the institutional quality of the host country influences the efficiency translation of FDI in economic growth and Intellectual capacity. Similarly, Wang and Le, (2019) show that FDI efficiency is critical for unlocking its full benefits and reducing associated risks. Arcelus and Sharma, (2005) found evidence that developing countries are not efficient in translating foreign capital inflows (FCIs) into the Human Development dimensions, while Alfaro et al., (2009) found that countries with developed financial markets benefit significantly from FDI efficiency and improved technological changes.

Efficiency is conceived as a 'black box' between inputs and outputs. It helps explain why two countries with the same amount of foreign capital can end up with different development outcomes, making output a function of both inputs and efficiency (Çilingirtürk & Turanlı, 2014). However, what governs this 'black box' of efficiency? Some argue that a country's capacity to attract and use foreign capital effectively depends on the strength of its institutions (see North, 1990; Le & Dang, 2022; Athari & Adaoglu, 2017). Adegboye and Okorie, (2023) examine the roles of institutional quality and political stability in attracting foreign capital into the region and in making it beneficial to investors and to the economic development of host countries.

The importance of institutional quality is emphasized by Nxumalo and Makoni, (2021), who postulate that strengthening institutions can control institutional weaknesses and prevent developing countries from the effects of capital inflow volatility. The increasing significance of the institutions-foreign capital nexus has attracted interest among researchers, policymakers, and practitioners, leading to various categories of empirical studies. One category of studies looked at the direct link between institutions and foreign capital inflows (Nxumalo & Makoni, 2023; Challe et al., 2019; Oliva et al., 2002; Al Sayed et al., 2023; Rapih et al., 2021; Alfaro et al., 2007; Ullah, & Khan, 2017; Siddica & Angkur, 2017; Ariyoshi, 2013; Peres et

al., 2015). Another category focused on the effect of foreign capital inflows and economic growth (Orji et al., 2014; Inekwe, 2013; Adeniyi *et al.*, 2015; Igan *et al.*, 2016; Adeola, 2017; Sobiech, 2019), while others (Alexiou et al., 2020; Butkiewicz & Yanikkaya, 2006; Moshiri & Hayati, 2017; Nawaz et al., 2014; Nguyen et al., 2018; Zergawu et al, 2020; Nadeem et al, 2015;) examined the link between institutional quality and economic growth). Related to these categories are studies by Ndiweni & Bonga-Bonga, (2021), Aziz, (2022), Masron & Abdullah, (2010), and Magbondé & Konté, (2022), which also examined the moderating effects of institutions and foreign capital inflows on economic growth. None of these studies considered capital efficiency. Only a few studies, such as Teplovo and Sokolova, (2019) and Wang and Le, (2019, addressed the question of the efficiency of foreign capital inflows, but with a specific focus on FDI inflows, ignoring other crucial foreign capital components (ODA and remittances inflows) standard in SSA.

A critical gap in existing literature is the prevalent assumption of a monotonic linear relationship between institutional quality and foreign capital inflows. This linear perspective fails to capture the complexity of investment decisions, particularly the 'tipping point' phenomenon where institutional improvements may yield negligible returns until a specific threshold of credibility is reached. One motivation for the threshold analysis in this study is the need to identify these precise inflection points empirically. By determining the exact level of institutional quality required to switch the impact of foreign capital inflows from negative to positive, this study moves beyond generic governance advice to provide actionable, quantifiable targets for policymakers.

Notwithstanding these growing efforts, the extant literature notes that most empirical studies focus on foreign capital levels or their volatility, offering little insight for policymakers to determine whether the economic development effect of foreign capital inflows could vary with the efficiency with which they are utilized. Moreover, a large body of the existing literature relied more on inflow or country-specific studies, with less attention paid to the different forms of foreign capital inflows. The heterogeneous effects of other foreign capital inflows have been overlooked, with many studies on foreign capital inflows skewed toward FDI (Igan et al., 2020). While some few attempts have been made to address the efficiency dimension of foreign capital, the focus has been on FDI-specific inflows (Kong et al., 2021; Aydin & Zortuk, 2014; Hagen & Zhang, 2010; Mastromarco, 2008; Bhanumurthy & Sinha, 2014; Barrios et al., 2014; Barrios et al, 2004). Remittances, foreign direct investment (FDI), and official development

assistance may have distinct effects on economic growth, as they operate through different modalities and pursue distinct goals.

Meanwhile, the different forms of foreign capital inflows (foreign direct investment (FDI), official development assistance (ODA), and personal remittances) may have distinct effects on economic development, as they operate through different modalities and pursue distinct goals. Foreign Direct Investment (FDI) represents a crucial source of external financing for SSA economies, primarily driven by the profit motive and characterized by direct investment in productive assets by foreign entities (Okafor et al., 2015). The impact of FDI on growth and efficiency operates through several key channels. First, FDI is a vital conduit for technology transfer, bringing advanced production techniques, modern equipment, and sophisticated management practices to host countries (Osano et al., 2016). This technological diffusion extends beyond the immediate recipient firms, creating positive economic spillover effects (Usman et al., 2024). Foreign firms often introduce state-of-the-art technologies and operational methods, forcing local companies to upgrade their processes and adopt more efficient practices to remain competitive. FDI also leads to knowledge transfers through formal training programs, on-the-job learning, and employee mobility between foreign and domestic firms (Alalshiekh, 2018). As trained employees move to local companies or start businesses, they carry valuable skills and expertise, contributing to broader economic development.

Official Development Assistance (ODA) is another significant source of foreign inflows to SSA, but its impact on growth and efficiency differs markedly from that of FDI. ODA primarily consists of government-to-government transfers and support from multilateral institutions to promote economic development and welfare (Świerczyńska & Kliber, 2019). The effectiveness of ODA largely depends on recipient countries' institutional capacity and the quality of policy implementation (Ogbaro et al., 2023). They indicated that when ODA is appropriately managed, it can play a crucial role in developing essential infrastructure, including transportation networks, energy systems, and communication infrastructure, which are fundamental for economic growth and human development.

Remittances constitute the third major component of foreign inflows to SSA, representing private transfers from migrant workers to their home countries. These flows have unique characteristics that distinguish them from both FDI and ODA. Remittances are notably more stable and resilient to economic cycles, often increasing during economic downturns when

recipient countries most need external support (Sirkeci et al., 2012). They flow directly to households, providing a reliable source of income that helps smooth consumption and reduce poverty. Many recipient families use remittances to invest in education and healthcare, contributing to human capital development.

The impact of remittances on economic efficiency and growth operates through several channels. At the household level, remittances can provide capital for the creation of small businesses and for investment in productive assets. They also contribute to financial sector development by increasing the pool of loanable funds and promoting financial inclusion (Olanipekun, 2024). Unlike FDI, remittances do not directly transfer technology or business practices, though they can indirectly support productivity improvements through human capital investment (Javid et al., 2012).

The policy implications of these different foreign inflows are significant and require careful consideration. Maximizing the benefits of FDI requires an attractive business environment, including reliable infrastructure, a skilled workforce, and strong legal frameworks. For ODA, effective use demands robust institutional capacity, transparent public financial management systems, and muscular coordination mechanisms among donors and government agencies. Regarding remittances, policies should focus on reducing transfer costs, promoting financial inclusion, and creating opportunities for productive investment of these funds. Therefore, while all three foreign inflows are essential for SSA's development, their impacts on growth and efficiency may differ substantially. The distinct effects of these inflows suggest their complementary nature. FDI drives efficiency through market mechanisms and innovation; ODA underpins long-term development by addressing infrastructure and social sector gaps; remittances enhance household welfare and human capital development. A balanced policy approach that leverages these inflows can maximize their collective contributions to SSA's sustainable growth.

The motivation for this study stems from the limited empirical research on the effects of different forms of foreign capital inflows, their efficiencies, and institutions on economic development in SSA countries. Appreciating how well a country's foreign capital inflows are efficiently utilized in its citizenry's economic growth and human development is essential. Understanding how well SSA countries utilize the different forms of foreign capital inflows will provide insight into a pragmatic policy direction that will help achieve balanced, less

wasteful use of scarce resources and optimized economic development. Our study departs from the existing literature by not only examining the different forms of foreign capital inflows but also considering their efficiency, as well as the quality and quantity (economic growth and human development) aspects of economic development.

### 1.3 Contributions and Significance of the Study

While an extensive study has been conducted on the effect of foreign capital inflows on economic growth (Inekwe, 2013; Adeniyi *et al.*, 2015; Igan *et al.*, 2016; Adeola, 2017; Sobiech, 2019.), foreign capital inflows and institutional quality (Alfaro *et al.*, 2007; Ullah, & Khan, 2017; Siddica & Angkor, 2017; Ariyoshi, 2013; Peres *et al.*, 2015), and foreign capital inflow and financial development (Ajilore & Ikhide, 2012; Shah, 2016; Bayar and Gavriletea; 2018), the efficiency with which foreign capital inflows are utilized has been ignored.

We contribute to the existing literature by examining the efficiency of foreign capital inflows in economic development in SSA countries. A few studies examine the efficiency of foreign capital inflows (see Teplovo and Sokolova, 2019; Wang & Le, 2019; Veiderpass & Andersson, 2007; Naeher & Narayana, 2022), but these studies focus primarily on country-specific inflows or on global analyses. Specifically, Teplovo and Sokolova, (2019) and Wang and Le, (2019) established the efficiency of FDI inflows. However, these studies were based on a global sample and did not address the specific characteristics of the sub-Saharan African experience. Moreover, their studies are limited to FDI inflows, ignoring equally crucial components of foreign capital, such as ODA and remittances. The literature has yet to address the scholarly work on the efficiency of the three typical forms of foreign capital inflows in SSA (FDI, ODA, and remittances) for economic growth and human development. Each inflow may affect efficiency performance differently, as the rationale or the motive for each inflow differs. Moreover, none of the existing literature considered evaluating the efficiency of capital inflows along economic and human development growth paths. Studies by Teplovo and Sokolova, (201) and Wang and Le, (2019) provided only limited insights into FDI-specific efficiency from a global perspective. Calderon *et al.* (2019) opine that global characteristics and structure differ significantly from the context of sub-Saharan Africa. Therefore, examining the efficiency with which FDI, ODA, and remittances are used in SSA countries will help policymakers understand how effectively they are utilized to improve economic growth and the quality of human life.

Examining the efficiency of these three typical forms of foreign capital inflows will help identify inefficiencies in their use. This will guide policymakers in implementing policy directions to address inefficiencies in each capital inflow and promote economic development.

The gaps above will be addressed in objective one by evaluating and comparing the efficiencies of FDI, ODA, and remittances inflows along economic growth and human development dimensions using the Human Development Index. Through this accession, our study contributes to the literature on the extent to which foreign capital flows are utilized in terms of quantity and quality.

In objective two, our study contributes to the existing literature by identifying and comparing the institutional and macrocosmic determinants of foreign capital efficiency evaluated in objective one. A plethora of research has examined the determinants of efficiency. However, a chunk of these studies focused on bank efficiency (Jiménez-Hernandez et al., 2019; Pancheva, 2013; Delis & Papanikolaou, 2009; Garza-García, 2012; Anto et al., 2021), with few on government efficiency (Afonso & Aubyn, 2006; Afonso et al, 2006; Hauner, 2008; Hauner & Kyobe, 2010) or energy efficiency. The institutional and macrocosmic determinants of foreign capital inflows are scanty. Moreover, the determinants of typical foreign capital inflows in SSA (FDI, ODA, and remittances) are nonexistent. The only work closest to this study is Teplova and Sokolova, (2019) and Wang and Le, (2019). However, none considered all three foreign capital inflows- FDI, ODA, and remittances. They focused only on FDI-specific efficiency, ignoring the other two essential capital inflows (ODA and remittances) for SSA. The literature on the role of institutional and macroeconomic factors in determining the efficiency of foreign capital inflows across economic and human development growth paths is limited. Moreover, the literature is silent on the determinants of foreign capital inflows evaluated in the human development growth path. Given the critical role of the efficiency of foreign capital inflows in the economic development of SSA, this study aims to explain the efficiency of foreign capital inflows across countries using institutional and macroeconomic contextual factors. Specifically, we aim to provide deeper insights into the roles of the institutional and macroeconomic environments in efficiently utilizing foreign capital inflows for steady economic growth and HDI-based growth.

Understanding the institutional and macroeconomic factors influencing the efficient use of foreign capital inflows in SSA will help policymakers implement policy measures that enhance efficiency, thereby maximizing economic growth and improving human development. By analyzing how institutional, governance and economic factors influence investment outcomes, we aim to provide valuable insights for policymakers and investors to ensure the maximal benefits of the foreign capital inflows in the region. Improving the efficiency of foreign capital can lead to more sustainable economic growth, significant development impacts, and improved quality of life across the region.

In objective three, we examined the threshold effect of institutional quality in attracting foreign capital inflows in SSA. Notwithstanding many push and pull factors, including trade liberalization, macroeconomic indicators, and financial development, institutional quality indicators are important determinants of foreign capital inflows into host countries. Therefore, institutional development is critical to attracting and utilizing foreign capital inflows in the host economy (Kurul, 2017; Agbloyor et al., 2014; Fratzscher, 2012; Makoni, 2018). Ghosh et al. (2014) and Fratzscher, (2012) revealed that, despite global factors, institutional indicators of a country significantly account for the differences and allocation of capital flows in emerging economies. The relationship between institutional quality and foreign capital inflows and the impact of the former on the latter has been established by extant literature (see Igbinedion & Obayagbona, 2022; Ullah & Khan, 2017; Challe et al., 2019; Peres et al., 2018; Le & KIM, 2021; Baek & Yang, 2010; Atiq-ur-Rehman et al., 2021). Despite the extensive literature on the subject, empirical work on the threshold effects of institutional quality on attracting different types of foreign capital inflows common in SSA countries (FDI, ODA, and remittances) is lacking. Few studies (Kurul, 2017) and Slesman et al., (2015) have provided evidence on the threshold effects of institutional quality on foreign capital inflows, the former focusing on the institutional threshold on FDI-specific inflow, while the latter concentrated on FDI, portfolio equity, and portfolio debt. In comparison, there is little research on the impact of institutional quality on ODA and remittances inflows. Moreover, we found no research on the institutional-quality thresholds of the three typical forms of foreign capital inflows in sub-Saharan Africa. Nxamalu and Makoni, (2021) recommended further studies to go beyond the work of Kurul (2017), who investigated the threshold effect of institutional quality on FDI inflows using global data, including other inflows such as ODA, remittances, and portfolio investments. Our study complements the works of Kurul (2017) and Slesman et al. (2015) by assessing whether

the impact of institutional quality on FDI, ODA, and remittances is threshold-specific. The threshold analysis of institutional quality could help formulate and shape existing policies to attract and allocate foreign capital inflows, maximizing their benefits while curtailing or mitigating their costs.

In the final objective, we contribute to the existing literature by examining the moderating role of foreign capital efficiency in the relationship between foreign capital inflows and economic growth. A large body of studies establishes a significant relationship between foreign capital inflows and economic growth (Clark & Kentor, 2022; Rao et al., 2023; Inekwe, 2013; Adeniyi et al., 2015; Igan et al., 2016; Adeola, 2017; Sobiech, 2019; Prasad, Rajan & Subramanian, 2007; Nkoro & Furo, 2012). Related studies, including (Ndiweni & Bonga-Bonga, 2021; Musibau et al., 2017; Igan et al., 2022; Brahim & Rachdi, 2014; Duodu & Baidoo, 2022; Slesman & Baharumshah, 2015) also examined the moderating effects of institutional quality and foreign capital inflows on economic growth, while studies by (Osei & Kim, 2020; Acheampong, 2019; Adeniyi et al., 2015; Baharumshah & Slesman, 2017; Shahbaz & Rahman, 2010; Adeniyi, 2012; Acquah & Ibrahim, 2019) focused on the interactive effects of financial development and foreign capital inflows on growth. Studies considering the role of efficiency in the relationship between foreign capital inflows and economic growth are scanty, if not nonexistent, especially in SSA. Therefore, our specific contribution is the marginal effect of efficiency that this study provides in the relationship between foreign capital inflows and economic growth.

Beyond academic insights, this research holds important practical implications for national economic planning. By evaluating the efficiency of foreign capital inflows, the resulting scores provide a useful benchmarking tool for Ministries of Finance and Central Banks across Sub-Saharan Africa. This is especially relevant for the African Peer Review Programme, which can use these benchmarks to recommend improvements for less efficient countries in the region. For instance, countries labeled as inefficient at turning ODA into human development can compare their aid strategies with those of efficient peers such as Sierra Leone or Botswana. Moreover, identifying specific institutional quality thresholds (0.332 for FDI and -0.142 for ODA) offers policymakers clear 'tipping points' for reform. This transforms policy advice from vague governance suggestions into concrete, measurable targets, indicating that countries below these thresholds should prioritize institutional reforms—such as contract enforcement and anti-corruption measures—before pursuing extensive capital account liberalization aimed

at achieving positive net gains. Understanding how efficiency influences the impact of foreign capital inflows will help shape policies to allocate these inflows better and promote economic growth.

Understanding the scope limitations of this study is essential for appreciating its significance. Although it examines FDI, ODA, and remittances, it excludes Foreign Portfolio Investment (FPI) and debt due to their volatility and the limited data available in many SSA frontier markets. This exclusion, necessary for precise econometric analysis, narrows the study's applicability to short-term 'hot money' flows. Additionally, using aggregate governance indicators (WGI) provides a macroeconomic view but may overlook micro-level informal institutions that greatly influence local investment decisions. Acknowledging these constraints underscores the importance of future research that incorporates micro-level institutional data and assesses the efficiency of debt and volatile portfolio flows as African capital markets evolve.

#### **1.4 Research Questions**

Based on the problem statement, this study's overall research question is: How do the efficiency of foreign capital inflows and institutional quality affect economic development in SSA?

Specifically, the following research questions are addressed:

1. What is the efficiency of transforming FDI, ODA, and remittances inflows in SSA's economic and human development growth paths?
2. What are the institutional and macroeconomic determinants of FDI, ODA, and remittance efficiencies in SSA?
3. Is the impact of institutional quality on foreign capital inflows threshold specific in SSA?
4. What is the moderating role of foreign capital efficiency on the impact of foreign capital inflows on economic growth in SSA?

#### **1.5 Research Objectives**

This thesis examines the relationships between foreign capital efficiency, institutional quality, and economic development in light of the above research question.

The specific objectives are:

1. To evaluate the efficiency of foreign capital inflow transformation in macroeconomic growth and human development in SSA.
2. To identify the institutional and macroeconomic determinants of foreign capital efficiency in SSA
3. To determine whether the impact of institutional quality on foreign capital inflows is threshold-specific
4. To investigate the moderating role of efficiency in the relationship between foreign capital inflows and economic growth.

### **1.6 Organization of the Thesis**

The entire thesis is organized in line with the specific objectives: Chapter two measures the efficiency of foreign capital inflows along economic and human development growth paths. The chapter will evaluate the efficiency of FDI, ODA, and remittances in macroeconomic and human development, and account for changes in efficiency over the period of the study. This study will inform policy by proposing regional benchmarks to improve economic development in SSA. Chapter three identifies the institutional and macroeconomic determinants of foreign capital utilization efficiency in SSA. Knowledge of the institutional and macroeconomic factors will help shape policy directives to improve the efficiency of foreign inflows. In contrast, Chapter Three will test whether the impact of institutional quality on foreign capital inflows is threshold-specific. This will support policymakers in understanding the nuances of foreign capital and institutional quality, and whether the relationship can be linear. Chapter five examines the role of foreign capital efficiency and the effects of foreign capital inflows on economic growth. This is important because it will help settle the debate over the mixed outcomes of the relationship between foreign capital inflows and economic growth. Finally, Chapter Six will summarize key findings, conclusions, and thesis recommendations.



## CHAPTER TWO

# EFFICIENCY OF FOREIGN CAPITAL INFLOWS (FCIs), ECONOMIC GROWTH, AND HUMAN DEVELOPMENT

### 2.1 Introduction

Neoclassical economists consider capital to be fundamental to economic development in any country. This implies that capital is necessary for economic growth irrespective of its origin. Consequently, to accomplish rapid economic development, capital-deficient countries primarily rely on external financing in the form of foreign capital inflows to spur economic development. FCIs offer opportunities to accelerate growth by closing the domestic savings gap in many low-income developing countries (Tyson & Beck, 2018). The role of foreign capital in host economies has become a more crucial question in the period following the Global Financial Crisis of 2008–2009. Due to the conditions of commodity price volatility in 2014 – 2016, the 2011–2012 European debt crisis that mainly affected sub-Saharan Africa (SSA), and the lowering of GDP growth of developing countries, the interest of researchers and practitioners is a search for steady investment growth patterns that influences the attraction and benefitting from the inflow of foreign capital as well as minimizing its risk. The efficiency of foreign capital inflows is significant for this, and strengthening it will further enhance the host country's economic development (Teplovo and Sokolova, (2021). The Economic Commission for Africa Affairs maintains that Africa needs more foreign capital inflows than any other region to support its development initiatives (ECA, 2016). UNCTAD, (2024) corroborated this in its report, which projected a funding gap of \$4 trillion per year between the capital needed to achieve the SDGs by 2030 and the financial resources currently available from governments and development banks.

Historically, the composition and drivers of these inflows have undergone significant structural shifts. In the 1980s and 1990s, Sub-Saharan Africa's external financing was predominantly characterized by Official Development Assistance (ODA) and debt, driven by post-independence development needs and subsequent structural adjustment programs. However, the dawn of the millennium marked a turning point. The implementation of the Heavily Indebted Poor Countries (HIPC) initiative in the early 2000s, coupled with the commodity super-cycle, substantially improved sovereign balance sheets, thereby attracting a surge in

Foreign Direct Investment (FDI) targeting extractive industries. Post-2008, the landscape evolved further; while FDI plateaued, personal remittances surged, becoming a resilient counter-cyclical buffer for households. Concurrently, the search for yield in global markets allowed many SSA nations to access international capital markets (Eurobonds), diversifying the region's exposure but also introducing new vulnerabilities to global financial conditions. Calderon et al. (2015) indicate that the primary forms of foreign capital inflows into SSA countries are FDI, ODA, and remittances. For instance, FDI accounted for an average of 3.4 percent of gross domestic product (GDP) between 2000 and 2017, whereas foreign aid and remittances constituted 3.3 and 2.3 percent of GDP, respectively (Calderon et al., 2019). The volume of foreign financial flows to SSA expanded from \$20 billion in 1990 to approximately \$120 billion in 2012, driven primarily by private capital flows and remittances (Sy & Rakotondrazaka, 2015). FDIs to Africa more than doubled in 2020, when COVID-19 hit the continent, reaching a record \$83 billion in 2021, and inflows from ODAs amounted to 17% of global aid in 2020. Net ODA received in the sub-region was US\$ 193.24 billion in 2020 (up from US\$ 55.27 billion in 2000 and US\$ 202.11 billion in 2021). Although portfolio investment in the sub-region increased from the early 1990s, it has never been stable (WBG, 2022; WIR, 2022). Despite the importance of these inflows, the economies of countries in Sub-Saharan Africa remain stagnant compared to those of their global counterparts. Except for ODA and remittances, countries in Sub-Saharan Africa still received the lowest FDI inflows compared to their counterparts in other developing economies such as Latin America and Asia. For instance, though FDI flows to SSA increased to 5.2% from 4.1% in 2020, they accounted for only 5.1% of global flows (WIR, 2022).

The comparative trends of FDI, ODA, and remittances inflows in SSA and its international counterparts are presented in Table 2.1 below. The figures in the table are averaged over five years for clarity of the presentation. It is clear from Table 2.1 that, in terms of ODA inflows, countries in SSA received the highest, followed by East Asia and then Latin America. In terms of FDI inflows, Table 2.1 shows that East Asia received the highest, while SSA attracted the lowest. Similar to FDI inflows, SSA received the least in terms of the absolute Dollar amount of remittance inflows during the period. Overall, SSA countries attract aid only from bilateral and multilateral sources, but are the least successful at attracting FDI and remittance inflows.

Table 2.1: Comparative trends of average foreign capital inflows among SSA, East Asia and Latin America

Time	ODA (USD Billion)			FDI (USD Billion)			Remittance (USD Billion)		
	East Asia	Latin America	SSA	East Asia	Latin America	SSA	East Asia	Latin America	SSA
1990-1994	9.18	5.314	18.288	46.266	16.224	2.258	10.426	8.168	2.736
1995-1999	8.92	5.778	15.52	104.144	68.456	5.786	16.436	14.458	3.602
2000-2004	7.14	5.502	19.554	148.184	78.734	11.96	25.896	30.136	5.368
2005-2009	8.12	7.436	36.128	309.66	152.702	28.18	49.184	58.1	25.202
2010-2014	9.44	9.968	46.522	559.402	289.52	41.06	83.074	62.006	36.638
2015-2019	8.02	9.758	48.524	567.996	230.388	32.34	107.16	83.278	44.526

Source: Author's computations based on data from WDI data

Similar trends are illustrated in figures 2.1 to 2.3 below, using foreign capital inflows as a percentage of GDP for FDI and remittances inflows. Except for remittance inflows, the graphs in Figure ODA and FDI are similar to Table 2.

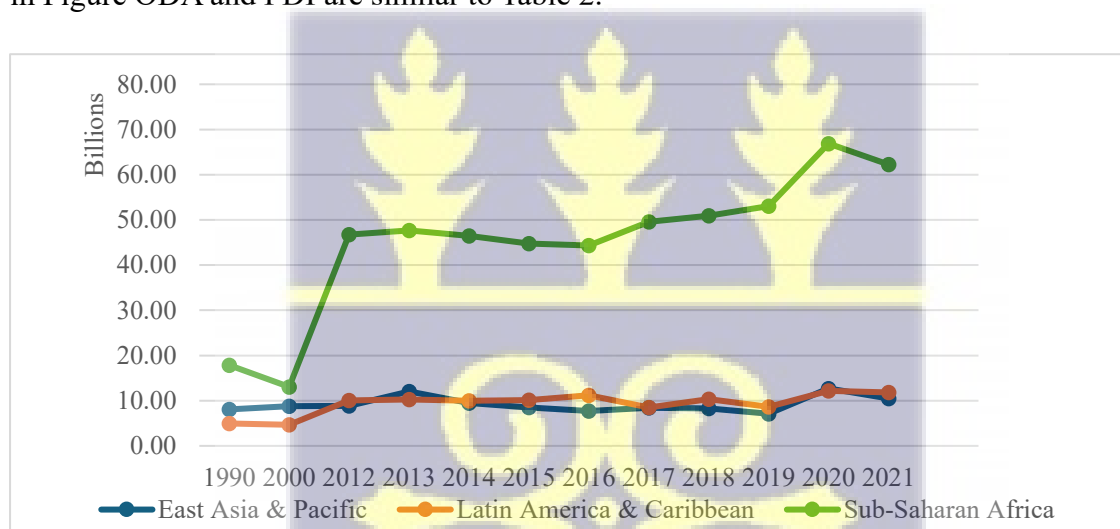


Figure 2.1: Net Official Development Assistance and Official Aid Received (Current US\$)

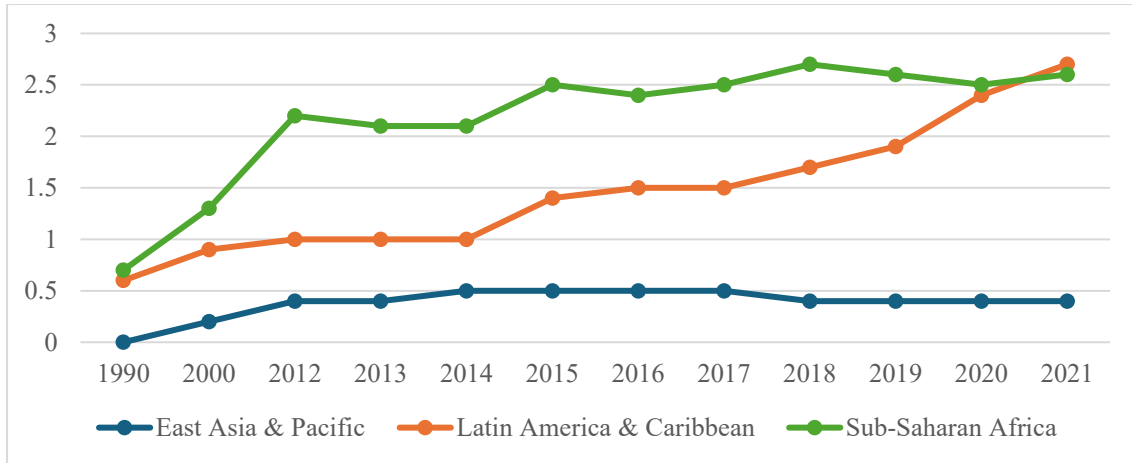


Figure 2.2: Personal Remittances Received (% of GDP)

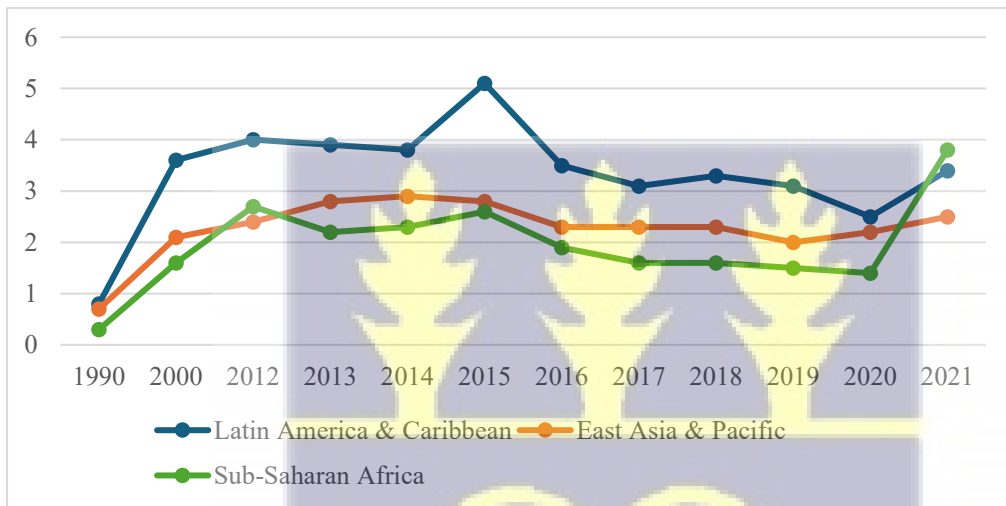


Figure 2.3: Foreign Direct Investment, Net Inflows (% of GDP)

Figures 2.1 and 2.3 represent trends of ODA and remittances, respectively. The graphs clearly show that SSA received the highest remittances and official assistance, while in Figure 2.3, the SSA region received the lowest FDI inflows compared to its global counterparts. Given the strategic importance of FDI, this trend is most worrying to governments in SSA, leading to varying efforts to attract more FDI.

If FCIs are low and domestic capital accumulation is insufficient, there is a growing need for their efficient management. The utilization efficiency of foreign capital inflows is critical to ensuring that inflows are managed to produce the maximum positive effects on economic development (Teplovo & Sokolova, 2019). Pragmatic domestic policies matter for the full benefits of foreign capital inflows. Foreign investors are driven by three main factors:

profitability, the ease with which foreign investors' operations integrate with their global strategy, and, most importantly, the quality of the domestic country's enabling environment (OECD, 2002). Therefore, while FCIs may be owned and controlled by foreigners and brought into host countries for different reasons, the countries are responsible for initiating pragmatic policies that can influence the allocation and use of these resources to benefit the host economy in a win-win situation. For instance, the OECD (2002) report asserts that the economic benefits of FDI are real, but with a caveat that these benefits are not automatic since the maximum benefit of FCIs is to create a healthy enabling environment for businesses that encourage domestic and foreign investment, provide the motivation for innovation, improve skills, and contribute to a competitive corporate atmosphere. This implies that host countries are responsible for creating an enabling environment through prudential policy initiatives that will ensure the efficient utilization of foreign capital inflows to maximize their benefits.

Economic development includes quantitative and qualitative measures in this paper's context. Economic growth is a key predictor of human well-being. As a result, one of the primary goals of policymakers worldwide has been to achieve long-term, strong economic growth. However, while it is essential for human advancement, economic growth is insufficient and is limited in measuring human development in general (Korhan et al., 2018). Thus, relying just on GDP to measure well-being may be deceptive (Krugman, 1995). Given the shortcomings of GDP, a broader analytical methodology that encompasses all aspects and dimensions of human well-being (welfare) is required to develop the human condition optimally. Economic growth can be quantified using GDP, but it is a one-dimensional measure among the numerous dimensions of genuine progress. Moreover, Broadberry and Gardner (2015), recognizing that the human development index (HDI) is a broader indicator that provides appropriate ways of assessing welfare, still argue that GDP per capita remains a more relevant measure of development potential by focusing on the production-possibility sustainability of consumption. OECD (2002) shows that foreign capital inflows, such as FDI, affect macroeconomic growth, human welfare-enhancing processes, and other channels through which these benefits occur.

Based on both arguments, we focus on how foreign capital inflows are efficiently utilized for economic growth and human development, reflecting quantitative and qualitative measures of economic development. The Human Development Index (HDI), developed by the United Nations Development Programme UNDP (1999), goes beyond just the quantitative measures

of economic well-being to include qualitative measures, such as the standard of living and serves as a valuable tool for comparing nations in terms of several indicators, including education, literacy, average life expectancy (LE), and life quality. An enabling environment that attracts foreign capital inflows for efficient use will go a long way toward improving economic development in host countries, especially in developing countries such as SSA.

Therefore, the critical question is what promotes or inhibits capital utilization and how efficiently capital inflows are used in economic development. Understanding the level of foreign capital efficiency will help inform policies that create the most favorable conditions for economic growth and Human Development. In other words, it is essential to understand whether these inflows have been efficiently utilized to support economic growth and whether SSA countries are improving or declining in line with the quality and productivity of capital inflow management.

The role of foreign capital inflows in economies has triggered various empirical investigations. One strand of studies examined the link between foreign capital inflows and economic growth (Inekwe, 2013; Adeniyi et al., 2015; Igan et al., 2016; Adeola, 2017; Sobiech, 2019; Mallick & Moore, 2008; Debbiche, 2020; Siddiqui, 2014). Another category focuses on the nexus between foreign capital inflows and financial development (Ajilore & Ikhida, 2012; Shah, 2016; Bayar Gavriletea, 2018; Horn & Naritta, 2021; Ali & Iness, 2020). Empirical investigations into how efficiently foreign capital inflows are utilized for steady economic growth and human development are yet to be explored, especially in sub-Saharan Africa, whose development agenda is more sensitive to the availability of such inflows than the rest of the world.

The extant literature has conducted several studies on foreign capital and efficiency. For instance, Arcelus et al. (2005) examined the impact of foreign capital efficiency on human development dimensions. They revealed that foreign capital inflows affect HDI dimensions (life expectancy, education attainment, and wealth) differently. These differences reflect the efficiency with which each country transforms the FCI into the levels of the three HDI dimensions. Wang and Le (2019) evaluated the efficiency of FDI on economic growth in developing countries. The findings from the Malmquist index and the frontier effect revealed that few countries in the developing world have experienced significant improvements in productivity and technological progression. They also concluded that the efficiency of FDI utilization and corporate social responsibility (CSR) spending contribute to countries' productivity and technological progress. Our study goes beyond FDI to include ODA and

remittance inflow efficiency. Also, unlike Wang and Lee (2019), who focus on FDI and CSR, our study focused on human development as well as FDI, ODA, and remittances. Veiderpass & Andersson (2007) evaluated the efficiency of foreign aid in a production theory context across 60 countries worldwide and found that China and Nigeria displayed the highest relative efficiency, while India, Indonesia, and Pakistan recorded the lowest. They did not find a significant relationship between the two in linking efficiency and aid. In comparing the financing utilization efficiency of state-owned, private, and FDI enterprises, ZhaWang, (2014) found that the capital-profit ratio of the state-owned industrial enterprises was lower than that of the private and FDI enterprises, showing that state-owned entities are relatively less efficient in utilizing their financing resources compared to private and FDI enterprises. Naeher and Narayana (2022) assessed the efficiency with which countries attract foreign private capital inflows. They found that low-income countries exhibit higher efficiency in attracting foreign private capital.

Notwithstanding all these empirical studies on capital efficiency and economic growth, none has considered the efficiency of foreign capital inflows across two growth paths: economic growth and human development. The closest to our study are the ones by (Arcelus et al. 2005; Teplovo & Sokolova, 2019; Veiderpass & Andersson, 2007 and Wang & Le, 2019). However, Arcelus et al., 2005 focused on capital inflows and human development dimensions only without considering the importance of the key macroeconomic factors. More closely related is the work of Teplovo and Sokolova, (2019), which focused on the efficiency of FDI transformation on economic growth and intellectual capital (IC) factors. Our work differs from this because we go beyond FDI to include other components of foreign capital inflows, such as ODA and remittances, as common forms of foreign capital inflows in SSA countries. Besides, unlike their work, this paper focuses on macroeconomic factors (primarily economic growth) and the human development dimension of economic development as a measure of both the quantity and quality of economic development in the SSA region. Wang & Le, (2019) focused on FDI-specific inflows and the efficiency of CSR spending in economic growth. They use FDI and CSR as input variables against GDP growth and GDP per capita growth as output measures. Our work differs from this by using FDI, ODA, and remittances as input measures, and GDP growth and HDI as output variables. Veiderpass and Andersson (2007) are concerned about aid efficiency in developing countries. It is clear from the above that the question of how well countries in SSA utilized their foreign capital inflows for economic growth and human development has not been addressed in the extant literature. Moreover, studies investigating

foreign capital efficiency and how it changes over time have not been given sufficient attention in the existing literature, especially in SSA. Empirical studies on how well foreign capital inflows are efficiently utilized for steady economic growth and Human Development are scanty, if not nonexistent, especially in SSA.

First, this study aims to construct an efficiency index for sub-Saharan African countries and rank them by foreign capital inflows (FCIs) efficiency in economic and human development growth paths. Secondly, we examine the changes in foreign capital efficiency from 1990 to 2021 using the DEA Malmquist Productivity Index (MPI). Therefore, we formulated the following task: First, we establish the causal relationships among foreign capital inflows, human development, and macroeconomic factors. This will enable us to identify appropriate input and output variables to evaluate efficiency. Secondly, we use the DEA method to estimate the efficiency of foreign capital, controlling for macroeconomic factors and human development. Third, we assess the changes in efficiency or productivity from 1990 to 2021.

## **2.2 Review of Literature**

### **2.2.1 Theoretical review**

This study is grounded in theoretical underpinnings. First, the neoclassical growth theory by Solow and Swan, (1956) postulates that economic growth is a function of capital accumulation, labor, and technological progress. This theory indicates that capital is a crucial growth factor, implying that a country's economic development also depends on how well capital is utilized to achieve economic development outcomes. Given SSA's low savings rates and limited capital accumulation, foreign capital is sought to supplement domestic savings for investment and economic development. Related to the neo-classical growth theory is the endogenous growth theory by Romer, (1986), which emphasizes that internally generated processes influence economic growth. This means that a country's internal decisions, policies, and processes determine its growth outcomes. In other words, a country's economic growth depends on enhancing human capital through efficient and effective production processes. Schumpeter's (1911) theory notes that investment in innovation drives economic change in the developmental process. This theory supports the argument that innovation will lead to new methods and ways of doing things, thereby improving efficiency and economic growth. Therefore, innovative countries are expected to achieve greater economic development efficiency than less efficient ones.

In his Dynamic Efficiency theory, Peter Diamond, (1965) argues that an economy is dynamically inefficient when it consistently invests more than its earnings. However, where the economy invests less than its returns, it is said to be dynamically efficient. In other words, capital accumulation in an economy is dynamically inefficient and requires Pareto improvements. Therefore, excess investment over earnings in an economy indicates over-accumulation of capital. Phelps, (1961) describes this saturation as the capital stock exceeding its golden rule level.

Abel et al. (1989; AMSZ hereafter) established the cash flow efficiency criterion in which the judgment of efficiency is based on the comparison between return on capital and capital investment, unlike the comparison between interest rates and economic growth in the rate-of-return criterion theory by Samuelson, (1958) and Diamond, (1965), which indicates that the level of efficiency in an economy depends on the order of magnitude between interest rates and economic growth. The AMSZ, (1989) criterion is fundamentally similar to the conventional rate-of-return criterion, except that the AMSZ criterion compares the return on capital with capital invested, a question of the outcome of dynamic efficiency. Instead of comparing interest rates and economic growth, which emphasizes the essence of dynamic efficiency. Under the AMSZ efficiency criterion, an economy is dynamically efficient if gross capital gains exceed capital investments. Equally, an economy is deemed dynamically inefficient if capital investment exceeds gains in capital accumulation.

This study uses a triangulation of these three theoretical approaches to build a strong paradigm for assessing foreign capital efficiency. Although the Neoclassical Growth Theory (Solow-Swan model) provides a basis for foreign capital inflows (FDI, ODA, and Remittances) to fill a country's savings and investment gap, this theory remains incomplete because technology is treated as exogenous. To achieve our goal of assessing utilization efficiency, we propose combining Romer's Endogenous Growth Theory, which posits that capital conversion efficiency depends on endogenous factors such as human capital and institutional policies. Finally, because our manuscript uses a concept of innovation for justification of our chosen methodology based on the Malmquist Productivity Index (MPI), we rely on Schumpeter's Theory of Innovation because this approach explains our separation of productivity changes for a 'catch-up phenomenon' (efficiency of management) and 'technological innovation'. The

AMSZ, (1989) dynamic efficiency and neoclassical endogenous growth theories, which emphasized the role of capital accumulation and technological progress in economic growth and development, provided the theoretical foundation for this study.

### 2.2.2 Empirical Literature

Numerous empirical studies have examined the efficiency of foreign capital flows. For instance, Wang and Le, (2019) applied the multi-criteria decision-making model and GM (1,1) theory to evaluate the efficiency of FDI on economic growth in developing countries. The Malmquist productivity index and the efficiency frontier results indicate that only a few developing countries have experienced improved productivity and technological progress. Therefore, the decision-makers must adopt those countries' models concerning the nation's sustainable development. Moreover, Teplova and Sokolova, (2019) used the data envelopment analysis (DEA), Granger causality, and the Malquist Productivity Index to build an efficiency index of FDI transformation into economic growth and Intellectual capital. The findings revealed that FDI causes economic development; again, China and Germany dominated the efficiency frontier along the economic growth path, while the US dominated the intellectual capacity path.

In a related study, Veiderpass and Andersson, (2007) found that foreign aid, economic growth, and economic development placed China and Nigeria at the top of the efficiency frontier, while India, Pakistan, and Indonesia were at the bottom. This means that China and Nigeria are regarded as countries that use foreign aid efficiently, unlike India, Indonesia, and Pakistan, which are considered pretty wasteful in their use of foreign aid for economic growth. ZahaWang, (2014) employed the non-parametric DEA methodology to compare financing utilization FDI Efficiency among state-owned, private, and FDI Enterprises in China. The results revealed that the capital-profit ratio of the state-owned industrial enterprises was lower than that of the private and FDI enterprises. Suggesting a higher efficiency for private and FDI firms than the state-owned enterprises. In a related study, Zemplerova and Benacek, (1997) analyze the impact of FDI on the efficiency of the manufacturing sector in the Czech Republic. The study finds that foreign-owned firms tend to be more efficient than their domestic counterparts, highlighting the potential for FDI to enhance the productivity and efficiency of the host country's industrial base.

Aizenman and Spiegel, (2006) examine the impact of institutional efficiency and monitoring costs on the investment share of FDI. The study finds that higher institutional efficiency and lower monitoring costs are associated with a larger share of FDI in total investment. This suggests that the efficiency of the institutional environment is a crucial factor in determining a country's attractiveness to foreign investors. Awodumi, (2021) investigates the relationship between FDI and environmental efficiency in the Economic Community of West African States (ECOWAS). The study finds that FDI positively impacts environmental efficiency, suggesting that FDI can contribute to sustainable development by promoting the efficient use of environmental resources. This highlights the potential for FDI to generate "green" efficiency gains. Based on the fuzzy data envelopment analysis, Aydin and Zortuk, (2014) evaluated the efficiency of selected transition economies across the globe. They concluded that FDI efficiency varies considerably across countries, with some economies exhibiting high levels of efficiency while others lag, suggesting that FDI efficiency is context-dependent and influenced by institutional quality and absorptive capacity factors. Barrios et al. (2004) examine the presence of efficiency spillovers from FDI in the EU periphery, specifically in Greece, Ireland, and Spain. The authors find evidence of positive spillovers from FDI to domestic firms, but note that their magnitude and significance vary across countries. Therefore, the efficiency-enhancing impact of FDI is influenced by country-specific factors, such as local firms' absorptive capacity and the institutional environment. Relying on the two-stage least squares (2SLS), Bhanumurthy and Sinha, (2014) found a strong negative correlation between FDI inflows and efficiency, indicating that the more efficient states receive less FDI inflows, potentially due to non-economic forces influencing FDI and regional development. In addition, Cheng et al., (2020) examined the impact of a firm's outward FDI on the efficiency loss due to factor price distortions in China from 2000 to 2007 using a stochastic frontier analysis. They found that outward FDI significantly negatively affects the efficiency loss caused by factor price distortion. This negative effect is more pronounced among firms with greater outward FDI and in more competitive industries. In examining the effects of FDI on green innovation efficiency across 30 Chinese provinces, China Song and Han (2022) concluded that FDI has a positive direct effect on green innovation efficiency and, simultaneously, a negative indirect effect through its impact on energy consumption. Therefore, the net effect depends on the relative strength of these two channels, highlighting the importance of considering the environmental implications of FDI. Deng et al., (2011) found that foreign banks in China have a positive and significant effect on the efficiency of domestic banks through FDI spillovers. This means that FDI can bring efficiency spillovers to the host country's financial sector.

Dimelis and Louri, (2001) also examined the relationship between FDI and efficiency benefits in Greek manufacturing firms. Using a conditional quantile regression approach, the authors find that the impact of FDI on efficiency is heterogeneous, with larger efficiency gains observed for firms in the upper quantiles of the efficiency distribution. This suggests that FDI may have a more pronounced effect on the most efficient firms. Duran and Zehir (2011) used the data envelopment analysis (DEA) and the Malmquist total factor productivity to do a sectoral analysis of the contribution of foreign portfolio investments (FPI) to the technical efficiency of 45 small and medium-sized enterprises (SMEs) in Turkey. They found that the stationery and machinery sectors were the most efficient, while the electricity sector appeared the most extraordinary in terms of technical efficiency. The authors also noted that, while technical efficiency levels across all sectors increased until 2008, they suddenly declined in 2009 due to the late effects of the global economic crisis. Elleer et al., (2006) contend that the positive relationship between FDI and economic growth is driven by the financial system's efficiency level, suggesting the efficiency channel's pivotal role in transmitting the growth-enhancing effects of FDI. Feng et al. (2018) examined the effects of environmental regulation and two-way (inward and outward) FDI on green innovation efficiency in China's manufacturing industry from 2006 to 2015, using a stochastic frontier analysis. They found that stricter environmental regulation has a positive effect on green innovation efficiency, inward FDI has a positive effect, while outward FDI has a negative effect. The interaction between environmental regulation and inward FDI positively affected green innovation efficiency, whereas the interaction with outward FDI negatively affected it. Gnanngnon and Iyer, (2022) examine the effect of Aid for Trade (Aft) inflows and FDI inflows on the utilization of unilateral trade preferences offered by the QUAD countries (United et al.). The study finds that Aft and FDI inflows positively and significantly impact the utilization of these trade preferences, suggesting that these forms of foreign capital can help developing countries better take advantage of trade opportunities. In assessing the impact of natural resource abundance and FDI on regional eco-efficiency in China from 2005 -2019, using the spatial Durbin model, Gong, (2023) found that natural resource abundance has a negative direct effect on regional eco-efficiency but a positive spatial spillover effect, while FDI has a positive direct effect on regional eco-efficiency and a positive spatial spillover effect. The interaction between natural resource abundance and FDI also positively affected regional eco-efficiency. Based on the stochastic frontier production function, Iheke et al. (2013) studied the effect of migrant remittances on the technical efficiency of arable crop farm households in South-Eastern Nigeria. They found that non-remittance-receiving households were more technically efficient

in using farm resources than remittance-receiving households. In addition, Iyer et al. (2008) evaluated the efficiency externalities of trade and different forms of foreign investment, including FDI, portfolio investment, and licensing, in OECD countries. The authors find that the efficiency-enhancing effects vary across these channels, with FDI and licensing exhibiting stronger spillover effects than portfolio investment.

Kong et al., (2021) observed no "productivity paradox" in China's OFDI decision-making process. However, there may be an investment productivity paradox for foreign-funded enterprises, coastal-area enterprises, and large-scale enterprises when evaluating the resource misallocation, production efficiency, and outward foreign direct investment (OFDI) decisions of Chinese enterprises using a Heckman two-stage selection model. Kumaran et al., (2020) analyzed the efficiency of China's outward FDI in ASEAN countries from 2003 to 2017 using data envelopment analysis. They found that China's outward FDI in ASEAN has been relatively efficient, with efficiency influenced by factors such as host-country market size, economic stability, and institutional quality. Li et al., (2018) found that FDI positively affects regional innovation efficiency. However, this effect is influenced by the level of financial development and human capital in the host region. The study highlights the importance of complementary factors in mediating the efficiency-enhancing effects of FDI. Using panel data analysis, Lien and Thanh, (2016) analyzed whether FDI enterprises in Vietnam were more efficient than domestic ones from 2000 to 2010. They found that FDI enterprises are more technically efficient than their domestic counterparts.

Luo and Cheng, (2013) examined the influence of FDI on energy efficiency in China using a DEA method. The empirical results show that FDI improved China's average energy utilization efficiency through technical and structural effect channels, but FDI in the Western region reduced energy efficiency. Related to this, Ma and Cao, (2022) assessed the spatial heterogeneity impacts of bilateral FDI on green energy efficiency in China from 2003 to 2019 using spatial econometric models, and like Luo and Cheng, (2013), the results showed that bilateral FDI significant positive spatial spillover effects on green energy efficiency and that the effects are more pronounced in regions with higher levels of economic development. Mastromarco, (2008) showed that foreign capital positively and significantly affects the technical efficiency of firms in developing countries.

Mastromarco and Ghosh, (2009) examined the relationship between developing countries' foreign capital, human capital, and efficiency. Employing a stochastic frontier analysis, the authors found that foreign and human capital positively impact technical efficiency. However, the efficiency-enhancing effect of foreign capital depends on the level of human capital in the host country, underscoring the importance of complementarities between the two types of capital. Moreover, Minh et al., (2014) examined the impact of foreign direct investment (FDI) on firm-level efficiency convergence in Vietnam from 2000 to 2011 using panel data analysis. They found that FDI contributes to the efficiency convergence of domestic firms towards the industry frontier. It is also reported in the study of Nourzad, (2008), who applied the stochastic frontier analysis to examine the relationship between openness and FDI efficiency and found that trade openness enhances the efficiency of FDI inflows. Nyamekye and Ze (2024) measured the efficiency of China's FDI in Ghana using panel data from 2005 to 2020. They found that Chinese FDI in Ghana has been generally efficient, with efficiency varying across sectors and influenced by factors such as infrastructure development and institutional quality. Moreover, Ofori et al. (2023) explore the relationship between FDI, energy efficiency, and inclusive green growth in Africa. The study finds that the impact of FDI on inclusive green growth is contingent on the level of energy efficiency, with higher levels amplifying the positive effects of FDI.

Özkan et al., (2024) examined the relationship between foreign direct investment (FDI) and ecological efficiency in Pakistan using panel data from 1990 to 2019. They found that FDI hurts ecological efficiency in Pakistan, supporting the pollution haven hypothesis. In a related study, Perkins and Neumayer, (2012) investigate the impact of recipient country characteristics on international spillovers of CO<sub>2</sub> efficiency through trade and FDI. The study finds that the efficiency-enhancing effects of these channels are influenced by factors such as a country's level of development, environmental policy stringency, and absorptive capacity. Pan et al. (2022), in Non-linear Effects of Outward FDI on total factor energy efficiency in China, found that FDI in China can improve total factor energy efficiency,

Rämö (2014) analyzed the poverty-efficient allocation of Official Development Assistance in Finland, finding that a third of Finland's bilateral aid was not poverty-efficient. Sayari, (2019) investigates the impact of institutional efficiency on attracting FDI to developing countries. The results indicate that higher levels of institutional efficiency, as measured by factors such as political stability, the rule of law, and control of corruption, are associated with larger FDI inflows. This underscores the importance of institutional quality in shaping foreign firms'

investment decisions. Suyanto and Salim, (2013) examined the impact of FDI spillovers on the technical efficiency of firms in the Indonesian pharmaceutical industry from 1990 to 2000 using a stochastic frontier analysis. They found that horizontal FDI spillovers have a positive and significant effect on the technical efficiency of domestic firms and that vertical FDI spillovers (backward and forward linkages) also have a positive and significant impact on technical efficiency, with larger effects for smaller, younger, and less productive firms. Based on the stochastic frontier methodology, Svedin and Stage (2016) estimated the impact of FDI on efficiency in the Swedish manufacturing industry from 1990 to 2002. They found that FDI has a positive and significant effect on the technical efficiency of Swedish manufacturing firms, with the positive impact being more critical for firms with higher levels of foreign ownership.

Tao, (2004) studied the utilization of foreign capital and its impact on economic growth in China using time-series data from 1979 to 2001; the author finds that foreign capital, including FDI and foreign loans, has had a positive and significant effect on China's economic growth. The study suggests that the efficient utilization of foreign capital has been a key driver of China's rapid economic development. Tong et al., (2021) examined the effects of FDI on the eco-efficiency of Chinese cities from 2003 to 2017, using multi-source data and panel smooth transition regression models. They found that the impact of FDI on eco-efficiency exhibits nonlinear characteristics, with the effect varying at different stages of economic development. Zhang et al. (2023) investigated the effect of the coordinated development of two-way FDI (inward and outward FDI) on the efficiency of coal resource utilization in China. Using a spatial econometric analysis, the authors find that coordinated two-way FDI positively affects coal resource utilization efficiency, highlighting the potential for FDI to support sustainable use of natural resources. Vu, (2016) examined the technical efficiency of FDI firms in the Vietnamese manufacturing sector from 2000 to 2010 using a stochastic frontier approach. The results indicated that FDI firms are more technically efficient than domestic firms, and that factors such as firm size, export orientation, and technological intensity contribute to their efficiency. Wadhwa and Reddy, (2011) investigate the determinants of FDI inflows into developing Asian countries, focusing on market-seeking and efficiency-seeking factors. The results indicate that both types of motivations are essential drivers of FDI, highlighting the potential for FDI to improve efficiency and productivity in the host countries. Wang and Shao, (2023) investigated the impact of FDI on China's carbon emission efficiency, considering the mediating roles of energy intensity and the low-carbon city pilot policy. Using panel data from 2005 to 2019, they

found that FDI positively affects carbon-emission efficiency. This effect is strengthened by the low-carbon city pilot policy and mitigated by energy intensity. Wang and Wong, (2016) investigate the impact of FDI on the technical efficiency of Chinese manufacturing firms. Using a stochastic frontier analysis, the authors find that FDI positively and significantly impacts firm-level technical efficiency. This suggests that the presence of foreign-owned firms can generate positive spillovers that improve the productivity and efficiency of domestic firms.

Wang and Zhang, (2022) explore the relationship between FDI and carbon emission efficiency. The study finds that FDI has a positive direct effect on carbon emission efficiency and an adverse indirect effect through its impact on energy consumption. The authors conclude that the net effect of FDI on carbon emission efficiency depends on the relative strengths of these two channels. Wu and Zhang, (2021) found similar results when they examined the effect of urbanization and FDI on emission efficiency in urban clusters in China. In addition, Widyandana and Sari, (2021) looked at the impact of FDI spillover on the level of technical efficiency in the large and medium manufacturing industry in East Java, Indonesia, from 2011 to 2015. They found that FDI spillover has a positive and significant effect on the technical efficiency of domestic firms. Yang and Li, (2019) examined the relationships among FDI, exports, and industrial environmental efficiency in China. The results indicate that both FDI and export positively affect industrial environmental efficiency. This means that these two channels can contribute to the sustainable development of the industrial sector. Yang et al. (2013) analyzed the relationship between outward foreign direct investment (OFDI) and the technical efficiency of Taiwan's manufacturing firms using propensity score matching and a meta-frontier framework. Their results reveal that the technical efficiency of Taiwan's manufacturing firms increased over the sample period and that technological advances and technical efficiency are positively correlated with OFDI activity.

Ye and Rasoulinezhad, (2023) used the fully modified ordinary least squares (FMOLS) approach. To assess the impact of issuing green bonds on renewable energy utilization efficiency in Asia. They revealed that issued green bonds have positive and statistically significant impacts on renewable natural resource utilization efficiency in both the short-term and long term. Yu and Liu (2024) examined the relationship between foreign direct investment (FDI), environmental regulation, and urban green development efficiency in China over the period 2005-2019 using a spatial Durbin model and data envelopment analysis (DEA). They found that FDI positively affects urban green development efficiency, but has an adverse indirect (spatial spillover) effect. In contrast, stricter environmental regulation has a positive

direct effect on the efficiency of urban green development. The interaction between FDI and environmental regulation also positively affected the efficiency of urban green development. Zheng et al., (2022) examined how environmental regulation moderates the relationship between foreign direct investment (FDI) and the efficiency of the marine green economy in China's coastal areas. Panel data from 2005 to 2019 found that FDI directly affects the efficiency of the marine green economy, and that environmental regulation strengthens this positive relationship. Zhou (2014) examined the relationship between foreign direct investment (FDI) and technical efficiency in manufacturing firms using a stochastic frontier approach. The study found that FDI positively impacts the technical efficiency of manufacturing firms.

### **2.2.2.1 The 'Poly-Crisis' and New Dynamics of Global Finance**

Recent studies have shifted the focus to the 'poly-crisis' era- a period marked by the COVID-19 aftermath, geopolitical unrest, and aggressive monetary tightening in developed countries— and how these factors affect capital efficiency in developing regions. The IMF, (2023) highlights that interest rate normalization in the U.S. and Eurozone has triggered a 'flight to safety,' sharply decreasing portfolio inflows to Sub-Saharan Africa and increasing external borrowing costs. Data from the World Bank, (2024) shows a structural change where official development assistance (ODA) is increasingly directed toward humanitarian relief instead of infrastructure development, which may weaken its long-term growth multiplier. Additionally, recent empirical studies by Ehigiamusoe et al., (2024) and Beirne and Panthi, (2024) suggest that, amid volatility, the focus should be on how efficiently resources are used rather than just the amount of inflows, as 'hot money' flows tend to become more pro-cyclical and destabilizing.

## **2.3 Methodology**

The methodological design of this study is firmly rooted in the established traditions of efficiency analysis in development economics. While early literature predominantly used parametric Stochastic Frontier Analysis (SFA), which requires stringent functional form assumptions (Aigner et al., 1977), recent advances have shifted towards nonparametric approaches to better capture the complexity of macroeconomic data. Specifically, the choice of Data Envelopment Analysis (DEA) aligns with contemporary studies such as Teplova and Sokolova (2019) and Wang and Le (2019), which demonstrate that DEA is superior for handling multiple heterogeneous inputs (FDI, ODA, Remittances) and outputs (Growth, HDI)

without imposing arbitrary production functions. Furthermore, the use of the Malmquist Productivity Index to measure dynamic efficiency changes over time is consistent with the standard methodological framework established by Färe et al. (1994) and widely applied in recent regional efficiency studies (e.g., Nnyanzi et al., 2022), ensuring this study's results are comparable with global best practices

Given that various components of foreign capital inflows are characterized differently. A disaggregate study will help capture the different facets of the phenomenon of foreign capital efficiency. As indicated by Calderon et al. (2019), the most common capital inflows into SSA are FDI, ODA, and remittances; hence, the focus of this study. In this paper, we intend to achieve our objectives at three levels. The first level will focus on the causal relationships between foreign capital inflows and macroeconomic factors on the one hand, and human development on the other. This level aims to identify positively correlated input-output variables to estimate foreign capital utilization efficiency using the Data Envelopment Analysis (DEA) methodology in the second stage of the paper. A positive nexus between input and output variables is required for the DEA-based efficiency. In the second stage, we compute foreign capital inflow utilization efficiency using the nonparametric DEA approach and rank countries by technical efficiency. Lastly, we assess changes in foreign capital efficiency year by year over the entire study period from 1990 to 2021.

### **2.3.1 Level 1: Causality among net FDI, net ODA, remittances received, macroeconomic, and Human Development Factors**

To establish the causal relationship between net foreign capital inflows and macro-economic factors in stage one, we use the bivariate Granger Causality method by Granger (1969) and the extended bivariate causality by Dumitrescu and Hurling (DH) (2012) to test the following hypothesis.

H1: There is a causal relationship between foreign capital inflows on the one hand and macroeconomic indicators and human development on the other hand. By so doing, we estimate the following bivariate model in equation 1.

For the causality of FCIs, HDI, and macroeconomic indicators, the extended bivariate Granger causality test proposed by Dumitrescu and Hurling, (2012) is applied. This approach extends the conventional Granger, (1969) method and is better suited for conducting a bivariate panel causality test. The Dumitrescu & Hurling Granger causality has the advantage of addressing

heterogeneity and, most importantly, the Cross-Sectional Dependence (CD) issue in panel data. There are two types of causality, depending on whether homogeneous coefficients across cross-sections are assumed. The conventional type treats panel data as a single static dataset and estimates standard Granger causality, assuming constant coefficients across all cross-sections. However, in panel data models, the issue of heterogeneity across cross-sections arises. The DH (2012) method allows for heterogeneity of coefficients across cross-sections. Therefore, to account for heterogeneity across cross-sections, the Dumitrescu-Hurlin, (2012) approach is applied in the study under the null hypothesis of homogeneous bi-causality from x to y and from y to x, as modeled in equation 1 below.

$$y_{it} = \alpha_{0,i} + \alpha_1 y_{it-1} + \dots + \alpha_p y_{it-p} + \beta_1 x_{i-1} + \dots + \beta_p x_{i-p} + \lambda_t + \varepsilon_{it}$$

$$x_{it} = \gamma_{0,i} + \gamma_1 x_{it-1} + \dots + \gamma_p x_{it-p} + \delta_1 y_{i-1} + \dots + \delta_p y_{i-p} + \lambda_t + \varepsilon_{it} \quad \text{Eq. (1)}$$

where  $t$  is the time dimension of the panel structure, and  $i$  represents the cross-section dimension. Unlike the classical Granger causality testing, the DH causality approach makes an extreme assumption by allowing coefficients to vary across cross-sections.

Following Teplovo and Sokolava, (2019), a multivariate causality was conducted to check the robustness of the DH bivariate Granger test. We rely on the lag selection criteria of the original paper by Peseran, (2007), where the ‘User’ option has a 1-year lag. Using 1-year lags limits the loss of a significant number of observations, unlike higher lags. Given a 1-year lag, we estimate a multivariate model in equation 2 as follows.

$$y_{1,it} = \alpha_1 + \sum(\beta_{11} y_{1,it-1} + \beta_{12} \cdot y_{2,it-1} + \beta_{13} \cdot y_{3,it-1}) + \sum(\delta_1 \cdot FCI_{it-1} + \mu_i + \varepsilon_{it})$$

$$y_{2,it} = \alpha_2 + \sum(\beta_{21} \cdot y_{1,it-1} + \beta_{22} \cdot y_{2,it-1} + \beta_{23} \cdot y_{3,it-1}) + \sum(\delta_2 \cdot FCI_{it-1} + \phi_i + e_{it})$$

$$y_{3,it} = \alpha_3 + \sum(\beta_{31} \cdot y_{1,it-1} + \beta_{32} \cdot y_{2,it-1} + \beta_{33} \cdot y_{3,it-1}) + \sum(\delta_3 \cdot FCI_{it-1} + \lambda_i + \epsilon_{it})$$

$$y_{n,it} = \alpha_n + \sum(\beta_n \cdot y_{1,it-1} + \beta_n \cdot y_{2,it-1} + \beta_n \cdot y_{3,it-1}) + \delta_n \cdot \sum(FCI_{it-1} + \lambda_i + \epsilon_{it}) \quad \text{Eq. (2)}$$

where  $i$  and  $t$  are indices of countries and periods, respectively.  $FCI_{it}$ , represent foreign capital inflows in the country  $i$  at time  $t$ .  $FCI_{it}$  = net FDI, net ODA, and remittances inflows.  $y_1$ ,  $y_2$ , and  $y_3$  are the macroeconomic and HDI indicators.  $\mu_i$ ,  $\phi_i$ , and  $\lambda_i$  are country-specific indicators and  $\varepsilon_{it}$ ,  $e_{it}$  and  $\epsilon_{it}$  are disturbances terms, while  $\alpha_j$ ,  $\beta_j$  and  $\delta_j$  are the estimated coefficients. Series stationarity is an essential requirement of the DH causality test.

The system in Eq.2 is an expansion from Eq. 1. For instance,  $y_j \{ y_1, y_2, y_3 \dots y_n \}$  represent a collection of all the macroeconomic and HDI variables (e.g., GDP growth, GDP per capita growth, HDI, financial development, and inflation, respectively), including  $y$  and  $x$ , in Eq.1. (Rather than considering only  $y$  and  $x$ , the multivariate model in Eq. 2 examines interactions among all  $N$  variables in the system with  $y$  and  $x$  in eq. 1 inclusive. For instance,

- i.  $y_1$  could be  $y$  in Eq. 1
- ii.  $y_2$  could be  $x$  in Eq.1
- iii.  $y_3$  representing additional variables beyond  $y$  and  $x$  in Eq.1, introduced to the system.

The extension to  $y_3$  and beyond allows the examination of direct and indirect causality among the multiple variables. It incorporates the potential effects within a more comprehensive structure. The main drawback of bivariate analysis is that it might find a relationship between  $x$  and  $y$  that comes through an omitted third variable (like  $y_3$ ). The multivariate approach helps avoid this by controlling for other relevant variables. Therefore, the Multivariate model is related to the Bivariate one in eq.1, mapping  $y$  and  $x$  in Eq. 1 to the multivariate variables as follows;

In the multivariate system,  $y$  is labeled as  $y_1$ , and  $x$  is  $y_2$ . The third variable,  $y_3$  and up to  $y_n$ , represents additional factors that could influence  $y$  ( $y_1$ ) and  $x$  ( $y_2$ ). Therefore, whereas  $y$  depends only on its lag and the lags of, in the multivariate model,  $y_1$  (representing  $y$ ) depends on its own lags ( $Y_{1,it-k}$ ) and lags of all other variables ( $Y_{2,it-k}, Y_{3,it-k} \dots Y_{n,it-k}$ ). At the same time,  $y_2$  (representing  $x$  Eq. 1) depends on its lags ( $Y_{2,it-k}$ ) and the lags of all other variables ( $Y_{1,it-k}, Y_{3,it-k}, \dots Y_{n,it-k}$ ).

The key idea is that the multivariate model in Eq. 2 nests the bivariate model. If  $n = 2$ , the multivariate model reduces to the bivariate model. By introducing  $n > 2$ , the multivariate model accounts for additional dynamics and provides a more robust framework for analyzing the interactions among multiple variables, including  $y$  and  $x$  in eq. 1. This is particularly important when other variables may influence  $y$  and  $x$  or mediate their relationship.

The Granger causality test requires that the series be stationary. Unit root tests for stationarity can be obtained from First-generation and Second-generation unit root testing. The choice between the two depends on whether cross-sectional dependence (CD) is present in the panel data. A cross-sectional dependence test is conducted, and evidence of cross-sectional

dependence (CD) presence is revealed at a 1% level from all three types of tests, including the Breusch-Pagan Lagrange Multiplier (LM), the Pesaran Scaled LM test, and the Pesaran Cross-sectional Dependence (CD) test. Given the presence of cross-sectional dependence, we test for stationarity using second-generation unit root tests by Pesaran's CADF (2003) and CIPS (2007). We follow the lag selection criteria of the original paper by Pesaran, (2007) for second-generation unit root testing, which applied the 'User' option with lag 1. Another reason for using lag 1 is that we are using annual data, and a longer lag selection will lead to a significant loss of observations. Therefore, we consider one lag and make different macroeconomic and HDI factor compositions in the bivariate and multivariate analysis. Based on the bivariate and multivariate causality analysis, we include variables with significant relationships between foreign capital inflows and macroeconomic and HDI factors to construct the efficiency indices of FDI, ODA, and remittance inflows using the Data Envelopment Analysis (DEA) at the second stage of the paper. Causality links between foreign capital inflows (FDI, ODA, and remittances) and macroeconomic growth and HDI factors are tested. The primary macroeconomic variable (real rate of growth) is considered because of findings from (Debbiche & Rahmouni, 2015; Debbiche, 2009; Adusah-Poku, 2016; Baharumshah & Slesman, 2017; Doudo & Baidoo, 2022; Alley, 2015). Results from (Busse et al., 2010; Asiedu & Lien, 2004; Trade et al., 2004; Demirhan & Masca, 2008; Trade, Noorbakhsh et al., 2001; Bosworth & Collins, 1999; Bailiu, 2000; Tobin and Rose-Acekerman, 2011) also revealed that foreign capital inflows increase GDP growth, inflation, trade openness, exchange rate, and financial development (domestic credit). Based on this, we consider domestic credit, inflation, trade openness, real GDP, and GDP per capita growth in our bivariate and multivariate causality analysis. Foreign capital inflows can increase domestic savings and investments, affecting the host country's exports and imports. Hence, the study includes trade openness, imports, and exports. Foreign capital in the form of FDI can contribute to trade and enhance the business environment (OECD, 2002). The influx of foreign capital, through its influence on the country's current account balance, can affect the exchange rate; hence, it is included in macroeconomic indicators. Foreign capital inflows may lead to financial development by increasing the financial system's depth, access, and efficiency, hence their inclusion in our macroeconomic factors.

Several empirical findings from the existing literature guide the choice of HDI. For instance, Arcelus et al., (2005) showed that various types of foreign capital inflows affect the three HDI dimensions (life expectancy, education, and wealth) differently, reflecting the efficiency with

which countries convert these inflows into HDI dimensions. Moreover, Ali et al. (2022) reached a similar conclusion, finding that FDI and FPI negatively affect per capita income and secondary school enrollment, whereas remittances positively affect all HDI dimensions. Korhan et al. (2022) corroborate these findings, suggesting that foreign capital, in the form of FDI, significantly affects Nigeria's HDI.

### **2.3.2 Level 2: Evaluating foreign capital inflow efficiency in the Macroeconomic and Human Development Index (HDI) path.**

In the second stage of the study, we rely on the results from the bivariate and multivariate causality tests to identify appropriate input-output variables for evaluating the efficiency of foreign capital inflows in SSA along two paths of economic development- the economic growth and HDI dimensions. The non-parametric data envelopment analysis (DEA) methodology is applied to measure the efficiency of FDI, ODA, and remittances using Equation 3 below.

### **2. 3.3 The Data Envelopment Analysis (DEA) Model**

There are two principal approaches to measuring the efficiency of decision-making units (in this case, sub-Saharan African countries). The parametric and non-parametric approaches. The Data Envelopment Analysis (DEA) efficiency measure is a nonparametric representation of the production process that does not require any assumptions about the functional form of the data (Charnes et al., 1978). The DEA approach establishes a nonparametric frontier (hull) that can serve as a standard for efficiency evaluations. The most efficient decision units lie on the efficiency frontier, based solely on actual observations of the different production units. DEA has two models: the Charnes, Cooper, and Rhodes (CCR, henceforth) model and the Bankers, Charnes, and Cooper (BCC, henceforth) model. The calculation of efficiency in DEA originated with the work of Charles, Cooper, and Rhodes, (1978) to evaluate the performance of non-profit public organizations, culminating in the CCR model. The CCR model calculates the efficiency of production units as the maximum ratio of the weighted sum of multiple outputs to the weighted sum of various inputs. The model assumes constant returns to scale (CRS), meaning that the lower the input used to produce a given output, the more efficient the decision-making unit (DMU) is. In other words, the CCR model focuses on limiting the number of input variables while keeping the output constant. The CCR model presupposes that no critical relationship exists between the scale of operations and efficiency. The assumption of the CCR

model is more suitable when all DMUs are operating at an optimal scale. The CCR model was later extended by Bankers, Charnes, and Coopers (1984), known as the BCC model. The BCC model relaxes the assumption of CRS and assumes a variable return to scale (VRS). The VRS assumption makes room for measuring pure technical efficiency (managerial efficiency), which segregates between technical and scale efficiency. The efficiency calculation is based on two approaches: the input approach and the output approach. The input approaches seek to minimize a production unit's inputs at a given output level. The output approach maximizes the unit's output at a given input level. To estimate the utilization efficiency of the FCI inflows into the indicators of economic and HDI growth paths, we solve the following optimization problem in equations (1)– (2) on the assumption of variable return to scale (VRS) and output-oriented approach as follows

Consider 'n' DMUs (countries); each utilizes 'm' inputs (FCIs) to produce 's' outputs.  $p_{ij}$ , represent 'ith' input of the jth DMU and  $q_{rj}$  is the 'rth' output of the 'jth' DMU at time t. The efficiency of the jth DMU is determined as follows;

$$\begin{aligned}
 & \text{Maximize } \theta && \text{Eq. (3)} \\
 & \theta, \lambda \\
 \text{Subject to} & \sum_{j=1}^n p_{io}^t \geq \lambda_j p_{ij}^t && i = 1,2,3, \dots, m \\
 & \sum_{j=1}^n \theta q_{ro}^t \leq \lambda_j q_{rj}^t && r = 1,2,3, \dots, S \\
 & \sum_{j=1}^n \lambda_j = 1 && \text{for VRS only} \\
 & \lambda_j \geq 0, j = 1,2,3, \dots, n && \text{Eq. (4)}
 \end{aligned}$$

where  $\theta$  is the efficiency scaler where it is maximized to scale up the rth output of the targeted DMU(o), against the right-hand side efficiency frontier characterized by output weights.  $\lambda$  is an  $N \times 1$  vector of weights that are automatically generated by the optimization problem solved by the linear mathematical programming method. By relaxing the assumption of the CRS linear model to account for variable returns to scale (VRS), the CRS model can be transformed by adding a convexity constraint  $\sum_{j=1}^n \lambda_j = 1$  implies that the sum of the lamder weights equals 1. Under this constraint, pure technical efficiency (PTE) scores can be calculated with values greater than or equal to those obtained using the CRS model, and a convex hull can be constructed. When the technical efficiency scores differ between the CRS and VRS models, the DMU has a scale inefficiency. This means that the scale inefficiency is calculated from the

difference between the TE scores from the VRS and CRS models. This study assumes an output-oriented VRS because countries operate in varying macroeconomic environments and seek to maximize macroeconomic indicators for the well-being of their people. Besides, they are independent and differ significantly in size and in their receipt of foreign capital inflows. An efficiency score of 1 or 100% indicates that the country is fully efficient and operating along the efficiency frontier. A score below 1 indicates inefficiency or operating below the efficiency frontier.

### 2.3.4 Level 3: Changes in Foreign Capital Efficiency from 1990 to 2021 in SSA.

The third level concerns how the efficiency of foreign capital inflows varies from year to year. Efficiency scores from the VRS model for various years are not directly comparable (Teplova & Sokolova, 2019). Meanwhile, the efficiency frontier can vary from year to year, and a country's FCI efficiency score is not absolute, as it may differ from that of high-performing countries. This means that, in each year, the input-output combination may vary, and the benchmark countries may also change; hence, it is necessary to account for changes in the frontier from year to year. Therefore, at level 3, we determine the FCI efficiency changes for each country from 1990 to 2021 using the Malmquist Total Productivity Index methodology (Malmquist, 1953). The Malmquist Index (MI) is applied as a productivity measure by combining DEA input and output data. It is used across various disciplines to measure changes in DMU productivity over time. It is a binary comprising a DMU at different points in time or comprising different DMUs at the same point in time (Wang & Le, 2019).

Suppose the analyzed country in period  $t$  has an efficiency score,  $D_o^t(x_o^t, y_o^t)$  Calculated relative to the efficiency of leading countries at the frontier of the same period. In the next period,  $t+1$ , of the same country will have an efficiency of  $D_o^{t+1}(x_o^{t+1}, y_o^{t+1})$ , due to a change of input-output parameters and that of the frontier in period  $t+1$ . It is also possible to have cross-period efficiency.  $D_o^{t+1}(x_o^t, y_o^t)$  of a DMU,  $(x_o^t, y_o^t)$  is compared to the frontier in period  $t+1$  or the efficiency of  $D_o^t(x_o^{t+1}, y_o^{t+1})$  compared to the frontier in period  $t$ .

Therefore, the Malmquist productivity index can be calculated as follows;

$$MI = = \left[ \frac{D_o^t(x_o^{t+1}, y_o^{t+1})}{D_o^t(x_o^t, y_o^t)} \frac{D_o^{t+1}(x_o^{t+1}, y_o^{t+1})}{D_o^{t+1}(x_o^t, y_o^t)} \right]^{1/2} \quad (5)$$

where MI is the Malmquist Index, which measures the change in total factor productivity (TFP) from period  $t$  to  $t+1$ . An index score of more than one ( $MI > 1$ ) shows improved or an enhancement of productivity. A score of less than one ( $MI < 1$ ) indicates a decline in productivity, and when  $MI = 1$ , it means a stagnant productivity level. The Malmquist Index can be decoupled into efficiency change and technical change as shown below;

$$MPI = \frac{D_o^{t+1}(x_o^{t+1}, y_o^{t+1})}{D_o^t(x_o^t, y_o^t)} \left[ \frac{D_o^t(x_o^{t+1}, y_o^{t+1})}{D_o^{t+1}(x_o^{t+1}, y_o^{t+1})} \frac{D_o^t(x_o^t, y_o^t)}{D_o^{t+1}(x_o^t, y_o^t)} \right]^{1/2} = \text{Efficiency change} * \text{Technical change} \quad (6)$$

We will decompose the Malmquist index to estimate changes in total factor productivity (TFP) and the sources of those changes from one period to another.

### 2.3.5 Data

The study analyses the efficiency of FDI, ODA, and remittance inflows for 34 Sub-Saharan African countries, using data from 1990 to 2021 for all the models. The total current USD GDP of the 34 selected countries accounted for 90% of Sub-Saharan Africa's aggregate current USD GDP, making it an adequate sample for the investigation. The number of observations may vary depending on data availability or missing values in some years within the periods. All data are annual.

In this study, FDI inflows, obtained from the World Development Indicators (WDI) of the World Bank, are the net inflows of investment to acquire a lasting management interest in a host country. It represents the new investment of inflows less disinvestment in the reporting economy from foreign investors, divided by GDP. We used net personal remittance inflows scaled to GDP. The data are obtained from the IMF Balance of Payments database and the World Bank. It comprises personal transfers and employee compensation. Personal transfers consist of all current transfers in cash or in kind made or received by resident households to or from nonresident households. Personal transfers thus include all current transfers between resident and nonresident individuals. Compensation of employees refers to the income of border, seasonal, and other short-term workers employed in an economy where they are not residents, as well as the income of residents employed by nonresident entities. This variable is, therefore, the sum of the two, personal transfers and employees' compensation, as defined in the IMF balance of payments manual.

For ODA, we used the log of net ODA inflows in current US dollars from WDI. Net official development assistance (ODA) consists of disbursements of loans made on concessional terms

(net of principal repayments) and grants by official agencies of the members of the Development Assistance Committee (DAC). Net official development assistance (ODA) consists of disbursements of loans made on concessional terms (net of principal repayments) and grants by official agencies of the members of the Development Assistance Committee (DAC). Data on personal remittances received are also sourced from the World Bank's WDI. We used the net remittances inflow measured as a percentage of GDP.

Regarding GDP, we used the annual percentage growth rate at market prices, based on constant local currency. GDP is the sum of gross value added by all resident producers in the economy, plus any product taxes, and minus any subsidies not included in the value of products. We used the United Nations Development Programme (UNDP) Human Development Index (HDI) for human development variables. The complete list of variables, the data description, and their sources are presented in Table 2.2 below.

*Table 2.2: List of Variables, Descriptions, and Sources*

Variable	Description	Source of Data
Real GDP growth rate	Real GDP growth (%)	World Development Indicator(WDI)
Real GDP per capital growth	GDP per capita growth, % of GDP	WDI
Cpi (inflation	Inflation rate (CPI) % of GDP	WDI
Trade openness	Trade openness (measured as a sum of exports and imports) % of GDP	WDI
FDI	Foreign Direct investment net inflows as a percentage of GDP	WDI
ODA	Official Development Assist. as a percentage of GDP	WDI
Remittances	Remittances received as a percentage of GDP	WDI
HDI	Human Development Index	UNDP
Gross fixed capital formation	Gross fixed capital formation, % of GDP	WDI
FD (Domestic credit)	Domestic credit, % of GDP	WDI

## 2.4 Results

### 2.4.1 Descriptive Statistics

The summary statistics results are presented in Table 2.3 below. The average net FDI inflows during the study period across all countries are 3.12% of GDP, ranging from 18.9% to 56.3%.

*Table 2.3: Descriptive Statistics*

Variables	Mean	Med	Max	Min	S.D	Skew	Kurt	Obs
FDI	3.1200	1.9020	56.2640	-18.9180	5.0830	3.9510	29.0640	976
ODA	19.6820	19.8400	23.1600	10.8200	1.3650	-0.6590	4.3190	976
Remit	2.6200	1.3020	37.9390	0.0000	3.9880	3.8310	23.3760	976
GDP growth	3.8080	4.1910	35.2240	-50.2480	4.7590	-1.9820	26.0840	976
HDI	0.4960	0.4840	0.8420	0.2190	0.1160	0.5570	3.3540	805
GDP PC growth	1.3390	1.6460	60.0910	-41.5870	4.7270	0.5680	36.9260	976
Trade	65.4060	55.5150	235.8200	4.1280	34.5850	1.5870	6.1570	976
FD(domcredit)	22.3170	20.7310	79.4010	-2.4230	9.0630	1.3770	6.8320	976
Inflation	8.8130	5.3180	132.8200	-11.6860	13.8520	4.4630	30.2570	976
Gfixcapfor	22.0310	20.4740	93.5400	-2.4250	9.4310	1.4560	6.8010	976

The ODA is expressed in the natural logarithm. From Table 2.3, the average net ODA received in the period is the natural log of 19.682 (US\$353,0075 million), with a maximum natural log of 23.16 and a minimum of 10.82, recorded in Nigeria and Guinea in 2006 and 1995, respectively. Remittances received are expressed as a percentage of GDP, with an average of 2.26% over the period and a minimum of 0% and a maximum of 37.9%, respectively. Regarding GDP growth, the average real GDP growth rate is 3.8%, with a low of -50.3% during the Rwandan genocide in 1994. Interestingly, the maximum GDP growth of 35.2% occurred in the same country just the following year in 1995, showing a remarkable recovery from the dreadful civil war of the previous year. The average Human development across the sub-region over the period is 0.496. The highest human development index score is 0.842, attained by Seychelles in 1998, while the lowest is 0.219, recorded by Burkina Faso in the same year. The average financial development, trade openness, and gross fixed capital formation across the sub-region are 22.3, 65.4, and 22 (as a percentage of GDP), respectively. The country with the highest financial development was the Congo Republic in 2015, while the lowest was Sierra Leone in 1997.

### 2.4.2 Unit Root Testing and Cross-sectional Dependence

We used the bivariate Granger causality test to assess the relationship between foreign capital inflows and macroeconomic and human development variables, followed by a multivariate causality test as a robustness check. As a first step, we checked for stationarity using the second-generation unit root tests by Bai and Ng, and the Cross-sectional IPS and Cross-sectional ADF tests, to ensure that all variables are first-order unit roots. As shown in Table 2.4 below, the second-generation unit root test results indicate that all the variables are stationary at the level.

Table 2.4: Second Generation Unit Root Test

Variable	Second-Generation Panel Unit Root Test Results			Status
	Bai & Ng	CIPS	CADF	
GDP growth	7.88154***	-3.31276 ***	-4.34815***	I(0)
Gfixcapform	2.82483**	-4.244154***	-6.58721***	I(0)
FinDev.	3.00977**	-2.69726 **	--1.81792*	I(0)
Inflation	1.88787*	-2.77417**	--3.05183**	I(0)
trade	2.44055**	-2.70116 **	-0.50046	I(0)
HDI	2.12147**	-1.99229	-3.51308**	I(0)
FDI	4.69824***	-2.84604***	-3.92310**	I(0)
ODA	2.38630**	-2.89465***	-2.25533**	I(0)
Remittances	3.24975***	-2.63373***	-3.55300***	I(0)
GDPPCgrowth	4.335***	-2.923**	-2.817***	I(0)

We also tested for cross-sectional dependency (CD) to ensure that variables in the dataset are not interrelated across cross-sectional dimensions. We found that all the cross-sectional dependence tests, the Breush-Pagan LM test (812.676), the Pesaran scaled LM test (8.760), and the Pesaran CD test (10.327) confirmed the presence of cross-sectional dependence at a 1% (0.000) significance level as shown in Table 2.5 below.

Table 2.5 Cross-sectional Dependency Tests

Test	Statistics	P-Value
Breush-Pagan LM test	812.6760	0.0000
Pesaran scaled LM test	8.7600	0.0000
Pesaran CD test	10.3270	0.0000

### 2.4.3 Dumitrescu and Hurling (DH), (2012) Bivariate Causality Testing

We apply the Dumitrescu and Hurling (DH) panel causality test to examine the bivariate panel causality relationships among FDI, ODA, remittances, macroeconomic indicators, and HDI. The DH method expands the traditional Granger causality test, with the superior advantage of accounting for heterogeneity and cross-sectional dependence among the countries (Dumitrescu and Hurling, (2012). The results of the DH causality test are presented in Table 2.6 below. According to the DH causality test, the results indicate that foreign capital inflows (FDI, ODA, and Personal remittances) are the cause of economic growth rate, inflation, domestic credit, trade openness, and HDI. Moreover, there is a feedback effect between FDI and ODA on the one hand, and domestic credit, trade, and HDI on the other.



Table 2.6: Results of DumItrescu and Hurling's (2012) Bi-Causality test

<b>Influence of FDI on the variable</b>				
Null Hypothesis	lag	W-Stat	Zbar- Stat	Prob.
FDI does not homogeneously cause GDPG	1	1.85900**	2.86421**	0.0042
GDPG does not homogeneously cause FDI	1	1.2248	0.54157	0.5881
FDI does not homogeneously cause GDPPCAPg	1	2.00475**	3.39802**	0.0007
GDPPCAPg does not homogeneously cause FDI	1	1.34365	0.97685	0.3286
FDI does not homogeneously cause GFIXFORMPC	1	2.16732***	3.99339***	0
GFCFORMPC does not homogeneously cause FDI	1	2.10599***	3.76877***	0.0002
FDI does not homogeneously cause DOMESTIC	1	1.79803**	2.64093**	0.0083
DOMESTIC does not homogeneously cause FDI	2	2.05812***	3.59346***	0.0003
FDI does not homogeneously cause INFLA	2	3.12942**	2.38214**	0.0172
INFLA does not homogeneously cause FDI	1	1.6761	-1.24193	0.2143
FDI does not homogeneously cause TRADE	1	2.34402***	4.64053	0
TRADE does not homogeneously cause FDI	1	1.63987**	2.0617	0.0392
FDI does not homogeneously cause HDI	1	2.85496**	6.51178***	0
HDI does not homogeneously cause FDI	1	2.68469***	5.88818***	0
<b>Influence of ODA on the Variable</b>				
Null Hypothesis	lag	W-Stat	Zbar- Stat	Prob.
ODA does not homogeneously cause GDPgrowth	2	2.96618**	1.97606**	0.0481
GDPgrowth does not homogeneously cause ODA	2	2.2738	0.24915	0.8032
ODA does not homogeneously cause GDPPC growth	1	1.67062**	2.17430**	0.0297
GDPPCGrowth does not homogeneously cause ODA	1	1.22199	0.53129	0.5952
ODA does not homogeneously cause gfixfopc	1	0.94295	-0.49065	0.6237
ODA does not homogeneously cause domestic	1	1.86699	2.89349**	0.0038
Domestic does not homogeneously cause ODA	1	1.65481	2.11642**	0.0343
ODA does not homogeneously cause INFLA	8	16.1595	2.48449**	0.013
INFLA does not homogeneously cause LODAID	8	14.6672	1.73346*	0.083
ODA does not homogeneously cause trade	1	2.21011	4.15011***	0
TRADE does not homogeneously cause ODA	1	1.87263	2.91415**	0.0036
ODA does not homogeneously cause HDI	1	5.03683	14.5025***	0.001
HDI does not homogeneously cause ODA	1	3.46007***	8.72787***	0.000
<b>Influence of Remittances on the Variable</b>				
Null Hypothesis	lag	W-Stat	Zbar- Stat	Prob.
REM does not homogeneously cause growth	1	1.29737	0.80736	0.4195
GDPgrow does not homogeneously cause REM	1	1.33114	0.93102	0.3518
REM does not homogeneously causeGDPCAGR	1	1.32503	0.90865	0.3635
GDPCPGR does not homogeneously cause REM	1	1.45485	1.38408	0.1663
REM does not homogeneously causeGCAPFOR	1	2.13835***	3.88732***	0.0001
GCAPFOR does not homogeneously cause REM	1	1.4878	1.50476	0.1324
ODA does not homogeneously cause DOMEST	2	3.22213**	2.61447**	0.0089
DOMES does not homogeneously cause ODA	2	3.09122**	2.28795**	0.0221
REM does not homogeneously cause Infla	1	1.66605**	2.15695**	0.031
Infla does not homogeneously cause REM	1	1.43981	1.32849	0.184
REM does not homogeneously cause TRADE	1	2.41020***	4.88292***	0.000
TRADE does not homogeneously cause REM	1	2.15631***	3.95308***	0.000
REM_GDP does not homogeneously cause HDI	1	4.0462	10.8745	0.198
HDI does not homogeneously cause REM_GDP	1	2.23801	10.8745	0..142

However, economic growth does not appear to cause FDI, ODA, and remittance. This means causality runs from foreign capital inflows to economic growth, but economic growth does not cause foreign capital.

Our results on the positive relationship between FCIs (FDI ODA and remittances) on one hand and economic growth are supported by findings in the extant literature (see Sawalha et al., 2016; Mallick & Moore, 2008; Awad, 2021; Anetor, 2018). In addition, our results that FCIs granger cause HDI are supported by (Yogo, 2017; Yiheyis & Woldemariam, 2020; Asongu & Tchamyu, 2019; Henok & Kaulihowa, 2021). The relationships among the FCIs and the macroeconomic factors, including economic growth, satisfy the DEA requirements of a significant relationship between inputs (FCIs in this case) and outputs variables.

#### 2.4.4 Multivariate Causality Testing

To provide robustness evidence, we also conducted a multivariate Granger causality test to strictly confirm our input variables between foreign inflow and macroeconomic and human development indicators. The results of the multivariate causality are presented in Table 2.7 below.

Table 2. 7: Results of Multivariate Causality Test

Results of Dynamic Panel VAR Estimation					
Impact of the First Leg of FDI, ODA, and Remittances					
VARIABLE	GDPGRO	GDPPCAPGR	HDI	DOMESTIC	INFLA
GDPGRO (-1)	0.064373 (0.33374)	-0.719448** (0.13334)	0.000481 (0.00071)	-0.080246 (0.14142)	17.86674 (20.8218)
GDP PCG (-1)	0.060357 (0.14164)	0.811508** (0.14122)	-0.000483 (0.00075)	0.171620 (0.14977)	-4014162* (22.0514)
HDI (-1)	-2.8467* (1.62628)	3.136111** (1.62144)	0.925136** (0.00862)	2.428397 (1.71963)	-21.90729 (25.3190)
DOMESTIC CR (-1)	0.021980 (0.01632)	0.020819 (0.01627)	-8.4E-05 (8.7E-05)	0.828982** (0.01726)	-6705152** (2.54116)
INFLA (-1)	-0.000234 (0.00019)	-0.000265* (0.00019)	-7.92E07 (1.0E0-6)	1.57E05 (0.00020)	0.107845*** (0.03015)
FDI (-1)	-0.597228** (0.24914)	-0.607756** (0.248440)	0.005836** (0.00132)	0.115449 (0.26344)	56.89055 (38.7875)
ODAaid (-1)	0.827061*** (0.15133)	0.799217*** (0.15088)	-0.003577*** (0.00080)	0.229803 (0.16002)	-22.01194 (23.5404)
Remittance (-1)	0.006678 (0.01205)	0.010015 (0.01201)	-7.18E05 (6.4E05)	0.002594 (0.01274)	0.844751 (1.87581)

From the table above, the results of the multivariate causality show that FDI and ODA only affect GDP growth, GDP per capita growth, and HDI. For instance, FDI and ODA positively

Granger cause GDP growth and GDP per capita growth at 5% and 1%, respectively, while Granger causes HDI negatively at 5%. However, remittances do not have a significant relationship with any macroeconomic and human development outcomes in both the DH and multivariate models.

The results coincide with the DH Granger causality results. This shows that, in both the bivariate and multivariate results in Tables 2.6 and 2.7, we have demonstrated that FDI and ODA significantly Granger-cause GDP growth, GDP per capita growth, and HDI. FDI and ODA cause GDP growth, GDP per capita growth, and HDI, with unidirectional effects of 5%, 5%, and 1%, respectively, in the bivariate DH causality. We observed the same results in the multivariate results in Table 2.7: FDI affects GDP growth, GDP per capita growth, and HDI at 5%, while ODA affects GDP growth, GDP per capita growth, and HDI at 1%, respectively. Similarly, remittance inflows have a significant relationship with the macroeconomic and HDI indicators in both the bivariate and multivariate results.

Our choice of input-output variables is based on the consistency of the relationship between foreign capital inflows and macroeconomic variables, as inferred from both bivariate and multivariate causality tests. The variables that give us a consistent relationship are the three foreign capital inflows (FDI, ODA, and remittances) on the one hand and GDP growth, GDP per capita growth, and HDI on the other. However, based on the bivariate and multivariate results, only FDI and ODA inflows are associated with GDP growth, GDP per capita growth, and HDI. We can confirm that the DEA requirement of a significant correlation between input and output variables is met.

Therefore, by combining the two levels of the causality test, GDP growth and GDP per capita growth from the macroeconomic growth path and HDI from the human development growth path are appropriate and hence selected as our output variables. At the same time, FDI, ODA, and remittances are used as input variables in the second-stage analysis; GDP growth and GDP per capita are appropriate as output variables. However, given the strong correlation between GDP growth and GDP per capita growth, we selected GDP growth as the primary output variable for the second stage of the DEA analysis. Iddrisu et al., (2014) maintain that while there should be a significant relationship between input and output variables, the variables within outputs and inputs should not have a significant correlation. The input-output variables used for the evaluation of foreign capital efficiency are summarized below;

**Input variables:** FDI, ODA, and remittances for both the macroeconomic and HDI growth paths

**Output variables:** GDP growth for the macroeconomic growth path and HDI for the human development growth path.

The inclusion of remittances as an input variable is firmly grounded in empirical work by Meyer and others (Shera, 2017; Sobiech, 2019; Abduvaliev & Bustillo, 2020; Ahortor & Adenutsi, 2008; Javid et al., 2012), who found positive and significant effects of remittances on economic growth.

#### **2.4.5 Results of the Evaluation of Foreign Capital Efficiency in Economic and Human Development Growth Paths.**

The results for foreign capital efficiency in both the macroeconomic and HDI growth paths are presented in Tables 2.8 and 2.9 below, with the efficiency rankings further illustrated in Figures 2.4 and 2.5, respectively. We estimated the foreign capital efficiency using FDI, ODA, and remittances because these are the typical foreign capital inflows in SSA Calderon et al., (2019). Consequently, we estimated the efficiency of FDI, ODA, and remittances in macroeconomic and human development growth paths. Table 2.8 below presents the average efficiency scores for the macroeconomic growth path.

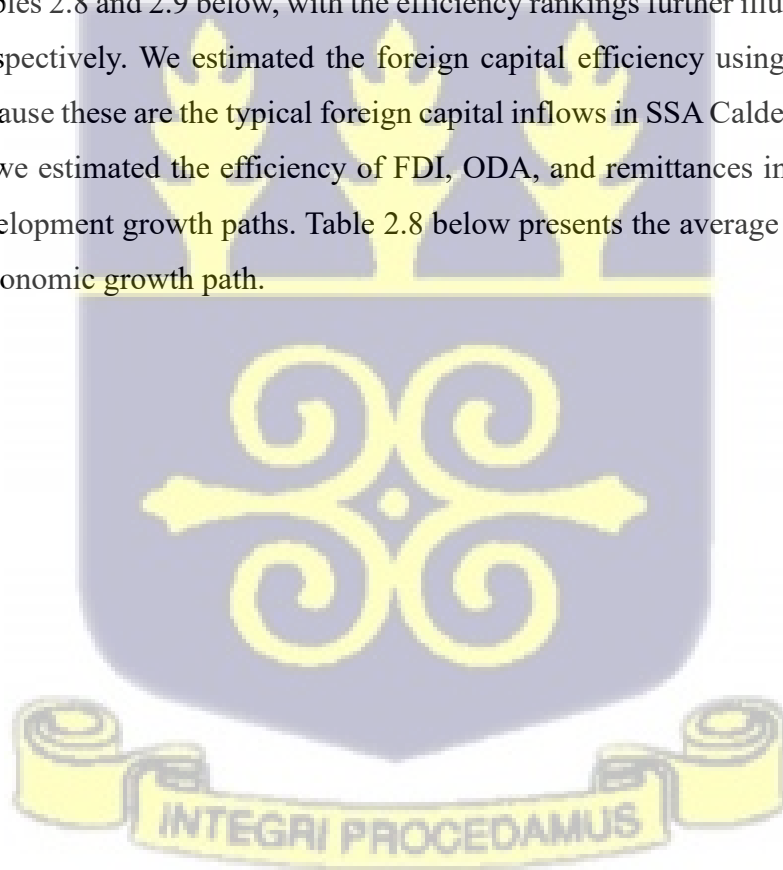


Table 2.8: Results of the Technical Efficiency of Foreign Capital Inflows – Macroeconomic Growth Path

FDI Efficiency		ODA Efficiency		Remittance Efficiency		Rank
Benin	0.477	Gabon	0.518	Burki Faso	0.545	1
Ethiopia	0.472	Ethiopia	0.478	Togo	0.505	2
Mali	0.459	Burki Faso	0.46	Guinea-Bissau	0.502	3
Guinea	0.451	Niger	0.452	Mali	0.48	4
Seychelles	0.447	Mozambiq	0.448	Namibia	0.475	5
Togo	0.444	Guinea-Bissau	0.446	Guinea	0.473	6
Niger	0.442	Uganda	0.442	Cameroon	0.471	7
Mauritania	0.44	Tanzania	0.439	Mauritania	0.458	8
Mauritius	0.435	Cameroon	0.434	Ethiopia	0.457	9
Gabon	0.428	Guinea	0.433	Tanzania	0.456	10
Tanzania	0.428	Mali	0.428	Congo, Rep.	0.452	11
Burki Faso	0.427	Mauritius	0.42	Seychelles	0.45	12
Congo, Rep.	0.425	Mauritania	0.416	Cote d'Ivoire	0.446	13
Madagascar	0.421	Togo	0.416	Ghana	0.441	14
South Africa	0.419	Nigeria	0.413	Mozambique	0.44	15
Namibia	0.415	Seychelles	0.411	Gabon	0.437	16
Lesotho	0.413	Namibia	0.41	Gambia	0.437	17
Guinea-Bissau	0.411	Madagascar	0.403	South Africa	0.435	18
Uganda	0.408	Sierra Leone	0.402	Benin	0.434	19
Comoros	0.404	Benin	0.4	Rwanda	0.431	20
Cote d'Ivoire	0.404	Malawi	0.4	Nigeria	0.428	21
Eswatini	0.401	Gambia	0.399	Eswatini	0.424	22
Cameroon	0.399	Comoros	0.398	Niger	0.415	23
Ghana	0.397	Ghana	0.398	Botswana	0.413	24
Congo, Dem. Rep.	0.39	Congo, Rep.	0.394	Senegal	0.409	25
Gambia	0.388	Lesotho	0.394	Mauritius	0.406	26
Mozambique	0.388	South Africa	0.391	Sierra Leone	0.405	27
Nigeria	0.388	Cote d'Ivoire	0.389	Malawi	0.404	28
Rwanda	0.387	Botswana	0.387	Comoros	0.403	29
Sierra Leone	0.377	Rwanda	0.374	Uganda	0.403	30
Malawi	0.37	Kenya	0.365	Madagascar	0.4	31
Kenya	0.356	Senegal	0.365	Lesotho	0.398	32
Botswana	0.352	Eswatini	0.349	Congo, Dem. Rep.	0.389	33
Senegal	0.318	Congo, Dem. Rep.	0.348	Kenya	0.388	34
Sudan	0.293	Sudan	0.304	Sudan	0.333	35
<b>Mean</b>	<b>40.7%</b>		<b>40.9%</b>		<b>43.6%</b>	

Efficiencies are measured as the mean score for each type of capital flow, reflecting their contribution to macroeconomic growth for the macroeconomic growth path and to human development for the human development path. The efficiencies of these flows vary significantly across countries, indicating that their impact on growth is context-dependent and may be shaped by factors such as governance, institutional strength, and infrastructure development.

The overall results in Table 8 showed that the efficiency with which SSA countries utilize the foreign capital inflows into macroeconomic growth is very low. The average FDI efficiency across all countries in SSA is 40.7%, indicating an input waste of 59.3%. This means that this

region could do more to leverage FDI inflows to improve economic growth by 59.3%. This level of inefficiency might be due to capital flight, disinvestment, or a poor institutional environment for enforcing or regulating the activities of foreign investors.

Notwithstanding the low levels of FDI efficiency, the relative efficiencies vary across the region. For the macroeconomic growth path, FDI Efficiency scores range from the highest average of 0.477 (47.7%) in Benin to the lowest average of 0.293 in Sudan, with countries including Ethiopia, Togo, and Mali also ranking next to Benin, with average FDI efficiencies of 0.472, 0.444, and 0.459, respectively. The relative average FDI efficiency suggests that foreign investment has driven SSA's economic growth more effectively than its peers. This is likely due to favourable business environments and sound policy frameworks. On the other hand, countries like Botswana and South Africa show lower FDI efficiency scores at 0.352 and 0.419, respectively.

Concerning ODA efficiency, the overall average for the study period across all the countries is also low at 40.9%, suggesting an inefficiency of 59.1% in the utilization of ODA inflows in the region. This result is consistent with the aid-effectiveness literature, which finds that foreign aid is generally not used effectively due to problems of rent-seeking, corruption, and poor institutional development (IMF, 1998; Bethencourt & Perera-Tallo, 2024). ODA efficiency for the growth path shows that Gabon, Ethiopia, and Burkina Faso ranked among the top three countries, with efficiency scores of 0.518, 0.478, and 0.460, respectively. Specifically, the 0.518 efficiency score for Gabon suggests a 51.8% rate of translating development aid into growth. In contrast, Sudan and South Africa are ranked the bottom two countries, with efficiency scores of 0.304 and 0.391, respectively, suggesting lower ODA utilization efficiency, potentially due to challenges in governance or in effectively absorbing and utilizing aid within a conducive policy environment. These variations suggest that ODA's effectiveness in promoting economic growth is not uniform and depends on the recipient country's capacity to manage and allocate aid resources effectively.

Remittance efficiency tends to be higher than FDI and ODA efficiency, with an overall average of 43.6% across the period from 1990 to 2021. This implies that, on average, inefficiency in converting remittance inflows into economic growth is 56.4%. This notwithstanding, Burkina Faso, Guinea-Bissau, and Togo are the top three countries in SSA in terms of remittance inflow efficiency, with scores of 0.545, 0.502, and 0.505, respectively. This trend indicates that remittances are crucial in boosting economic growth, especially in countries with weaker financial systems, where migrant funds directly support household consumption and small-

scale investment. The higher efficiency of remittances may also reflect their ability to bypass bureaucratic processes, delivering resources directly to those who need them most. `

At the country level, Ethiopia demonstrates balanced efficiency across all three capital flows, suggesting that its economy benefits from a broad range of foreign capital sources. In contrast, Sudan shows low efficiency across all categories, indicating structural issues such as political instability and poor governance that hinder the effective use of foreign capital. Meanwhile, countries like Benin, Togo, and Burkina Faso show higher efficiency in specific capital inflows, reflecting their ability to leverage these flows effectively.



Table 2.9: Results of the Technical Efficiency of Foreign Capital – Human Development Path

FDI Efficiency		ODA Efficiency		Remittance Efficiency		Rank
Sierra Leone	0.753	Gabon	0.709	Sierra Leone	0.719	1
Eswatini	0.735	Sierra Leone	0.703	Gabon	0.71	2
Botswana	0.729	Botswana	0.667	Burki Faso	0.699	3
Gabon	0.729	Sudan	0.663	Botswana	0.694	4
Senegal	0.726	Cameroon	0.662	Senegal	0.688	5
Cameroon	0.72	Senegal	0.656	Cameroon	0.685	6
Sudan	0.718	Guinea-Bissau	0.655	Guinea-Bissau	0.673	7
Burki Faso	0.716	Nigeria	0.652	Nigeria	0.673	8
Ethiopia	0.713	Burki Faso	0.651	Sudan	0.672	9
Uganda	0.712	Tanzania	0.648	Tanzania	0.669	10
Congo, Rep.	0.71	Congo, Rep.	0.647	Congo, Rep.	0.661	11
Mali	0.709	Comoros	0.645	Mozambique	0.659	12
Guinea-Bissau	0.708	Cote d'Ivoire	0.633	Eswatini	0.658	13
Benin	0.707	Ethiopia	0.632	Malawi	0.656	14
Nigeria	0.702	Malawi	0.632	Mauritania	0.656	15
Tanzania	0.696	Ghana	0.629	Comoros	0.655	16
Mozambique	0.693	Niger	0.629	Cote d'Ivoire	0.653	17
Comoros	0.692	Eswatini	0.624	Mali	0.652	18
Guinea	0.692	Guinea	0.621	Ghana	0.651	19
Seychelles	0.692	Mali	0.62	Niger	0.647	20
Lesotho	0.691	Uganda	0.619	Kenya	0.638	21
Ghana	0.69	Mozambique	0.613	Uganda	0.636	22
Malawi	0.688	Lesotho	0.61	Ethiopia	0.633	23
Mauritania	0.688	Benin	0.608	Togo	0.633	24
Niger	0.688	Congo, Dem.	0.607	Lesotho	0.628	25
Togo	0.682	Mauritania	0.606	Guinea	0.623	26
Cote d'Ivoire	0.679	Rwanda	0.603	Benin	0.622	27
Mauritius	0.679	Namibia	0.601	Rwanda	0.621	28
Congo, Dem.	0.674	Kenya	0.596	Namibia	0.62	29
Kenya	0.663	Seychelles	0.594	Congo, Dem.	0.616	30
Namibia	0.656	Togo	0.594	Seychelles	0.616	31
Rwanda	0.652	Madagascar	0.586	Gambia	0.613	32
Madagascar	0.65	Gambia	0.581	Madagascar	0.594	33
South Africa	0.634	Mauritius	0.576	Mauritius	0.592	34
Gambia	0.628	South Africa	0.562	South Africa	0.582	35
Mean	69%		63%		65%	

Table 2.9 presents the technical efficiency of Foreign Direct Investment (FDI), Official Development Assistance (ODA), and Remittances with respect to human development outcomes across various African countries. In this direction, the efficiency scores reflect how

well these foreign capital inflows contribute to improvement in key human development indicators such as education, health, and living standards. Similar to economic growth, the efficiency of these capital flows varies across countries, suggesting that the impact of foreign capital on human development depends on macroeconomic and institutional factors, such as good governance, institutional quality, and socio-economic policies.

Compared with the macroeconomic growth path, sub-Saharan African countries exhibit higher performance in terms of foreign capital efficiency on the human development path. To illustrate, the overall FDI efficiency for the human development path is 69.4%, higher than the 40.7% FDI efficiency on the economic growth path. Similarly, the overall average efficiencies of ODA and remittances inflows are 62.7% and 64.8%, respectively, against 40.9% and 43.6% for ODA and remittances in the growth path. Unlike the macroeconomic growth path, where remittances recorded the highest efficiency utilization, for the human development growth path, FDI efficiency is the highest, followed by remittance efficiency. This means that SSA countries use more FDI, ODA, and remittance inflows to improve human development, such as investment in education, healthcare, and living standards, than they do in enhancing economic growth.

FDI efficiency in promoting human development shows relatively high scores across most countries, with Sierra Leone displaying the highest efficiency (75.3%). Other notable performers include ESwatini (73.5%), Botswana (72.9%), Gabon (72.9%), and Senegal (72.6%). These scores suggest that in these countries, FDI has been effectively utilized to improve human development outcomes, potentially through investments in education, healthcare, and infrastructure. Countries such as The Gambia (0.628) and Madagascar (0.650), on the other hand, show lower FDI efficiency, which may reflect challenges in translating foreign investments into tangible improvements in human development.

The overall average of ODA efficiency across the region for the entire period is 62.7%. This implies a 37.3% inefficiency in the utilization of ODA inflows. ODA efficiency scores are slightly lower than FDI scores but remain significant across most countries. High-ranked countries close to the frontier include Gabon, which has an efficiency score of 70.9% and 29.1% inefficiency in ODA inflows. Sierra Leone has 70.3% (29.7% level of inefficiency), and Botswana has 66.7% ODA efficiency. This implies that these countries' development aid is effectively channeled toward enhancing human development outcomes. This might be due to well-designed aid programs, effective partnerships between governments and donors, and

strong governance structures that ensure aid reaches the intended beneficiaries. In contrast, countries like Mauritius have an efficiency of 57.6% and an input waste rate of 42.4%. South Africa is ranked at the bottom of the human development path, with 56.2% efficiency and the highest inefficiency level of 43.8%, indicating lower ODA efficiency and suggesting that challenges such as weak governance or poor targeting of aid may reduce the impact of ODA on human development.

The mean remittance efficiency over the entire period for all countries is 64.8%, with 35.2% due to input waste. As in the case of FDI efficiency, Sierra Leone is again ranked first in remittance efficiency at 71.9%, implying an inefficiency of 28.1%. The second-ranked country is Gabon, with a 71% remittance efficiency level, suggesting a 19% inefficiency in remittance management for human development. The effectiveness of remittances in these countries may stem from their use for immediate social needs, including education and healthcare, thereby directly contributing to improvements in human development. Conversely, Mauritius and South Africa are ranked at the bottom two with 59.2% and 58.2% respectively. Like the ODA and FDI efficiencies, South Africa has the highest inefficiency in harnessing remittances received for human development at 41.8%. The low ranking may be due to remittances being used more for consumption than for investment in education, healthcare, and human development.

At the country level, Sierra Leone stands out as a top performer across the efficiency of all three capital inflows, with FDI efficiency of 75.3%, ODA efficiency of 70.3%, and remittances efficiency of 71.9%, all indicating a high level of efficiency in driving human development. This suggests that foreign capital in Sierra Leone is being effectively utilized across multiple fronts to improve living standards. Gabon also exhibits a strong remittance efficiency of 71% and FDI and ODA efficiency of 72.9% and 70.9%, respectively, reflecting a well-rounded ability to leverage foreign capital for human development. Interestingly, South Africa recorded the lowest efficiency across all three capital flows, with FDI, ODA, and remittances efficiencies of 63.4%, 56.2%, and 58.2%, respectively, showing less contribution to human development in South Africa. This could indicate that South Africa's relatively developed economy derives less marginal benefit from foreign capital flows, or that structural issues prevent the full utilization of these resources to improve human development outcomes.

The findings suggest that the utilization of foreign capital inflows into human development is not uniform and depends on how effectively countries can leverage these resources. Countries

with strong institutions, good governance, and efficient social policies tend to have higher efficiency scores, as seen in Sierra Leone, Gabon, and Senegal. These countries have been able to channel FDI, ODA, and remittances into sectors that directly enhance human development, such as education, healthcare, and infrastructure. On the contrary, countries with lower efficiency scores, such as South Africa and Mauritius, may face challenges in directing foreign capital toward human development goals. These challenges could include poor governance, misallocation of resources, or structural inefficiencies in public service delivery. Additionally, countries with high FDI or ODA efficiency but lower remittance efficiency, such as The Gambia and Cameroon, may need to create stronger frameworks to harness remittances for human development, such as promoting financial inclusion or offering incentives for investment in education and healthcare.



**2.4.5 Comparative Analysis of the Country Rankings of Efficiency for the Macroeconomic Growth Path.**

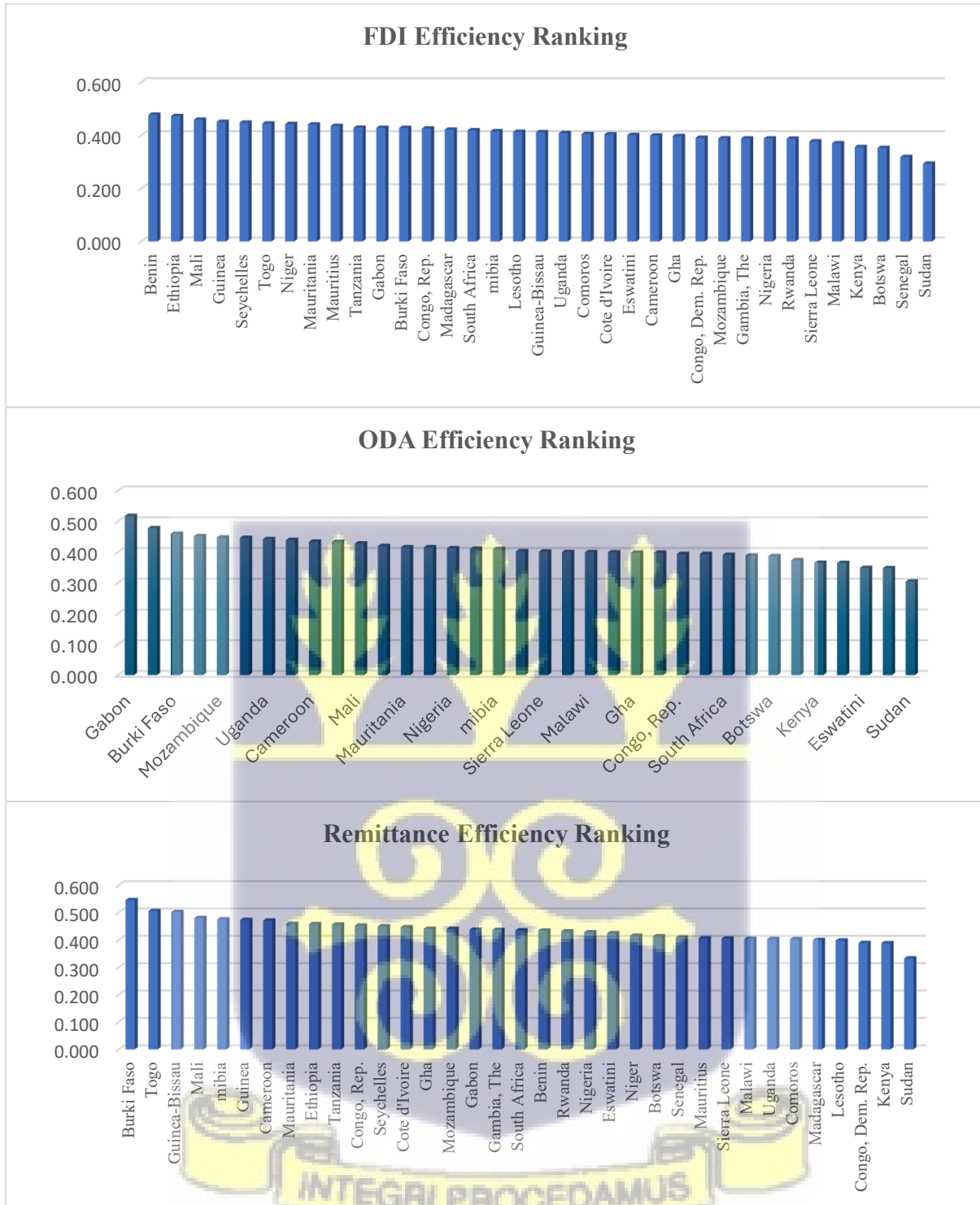


Figure 2. 4: Efficiency Rankings of Sub-Saharan African Countries in Macroeconomic Growth

Figure 2.4 shows the results of the ranking of countries by their technical efficiency in utilizing FDI, ODA, and Remittance inflows for economic growth. The varying levels of efficiency across countries across different capital flow types reveal critical insights into how effectively these nations harness external financial resources to drive growth.

While the levels of foreign capital efficiencies are generally low across all the inflows used in this chapter (below 50%) for the growth path, the relative efficiency rankings for the growth path show that Benin is ranked 1st in terms of FDI efficiency with a mean of 0.477, demonstrating a relatively more substantial capacity to channel foreign direct investments into productive economic activities compared to its counterparts in the sub-region. However, its efficiency in utilizing ODA and remittances is significantly lower, ranking 20th and 19th respectively. This disparity suggests that while Benin excels in attracting and using FDI, it may face challenges in effectively deploying other forms of foreign capital. In contrast, Burkina Faso presents a more balanced and highly efficient utilization of ODA and remittances inflows and an above-average level of effective use of FDI. Therefore, with a slightly lower ranking in FDI inflows, the country has performed relatively well in all three capital flows, ranking 1st in remittances efficiency, 3rd in ODA efficiency, and 12th in FDI. This well-rounded performance indicates that Burkina Faso has developed robust systems for converting foreign capital inflows, especially remittances, into economic growth.

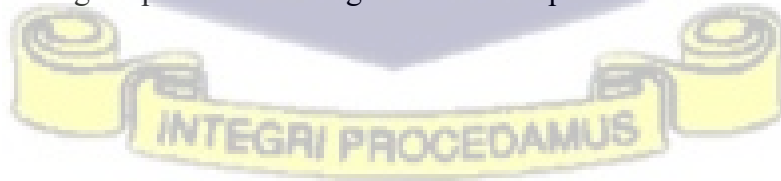
Regarding ODA efficiency, Gabon is ranked at the first position with an average efficiency of 51.8%, and this suggests that it may have an effective institutional framework for managing foreign aid. However, its FDI efficiency ranked 11<sup>th</sup> and remittance efficiency ranked (16<sup>th</sup>) are comparatively lower, pointing to potential challenges in private investment climates and diaspora engagement. Similarly, Ethiopia shows high efficiency across all forms of capital, ranking 2nd for both FDI and ODA and 9th for remittances. Countries like Mali which is ranked 3rd in FDI, 11th in ODA, and 4th in remittances) and Guinea-Bissau (18th in FDI, 6th in ODA, and 3rd in remittances) are other notable examples of countries that efficiently utilize

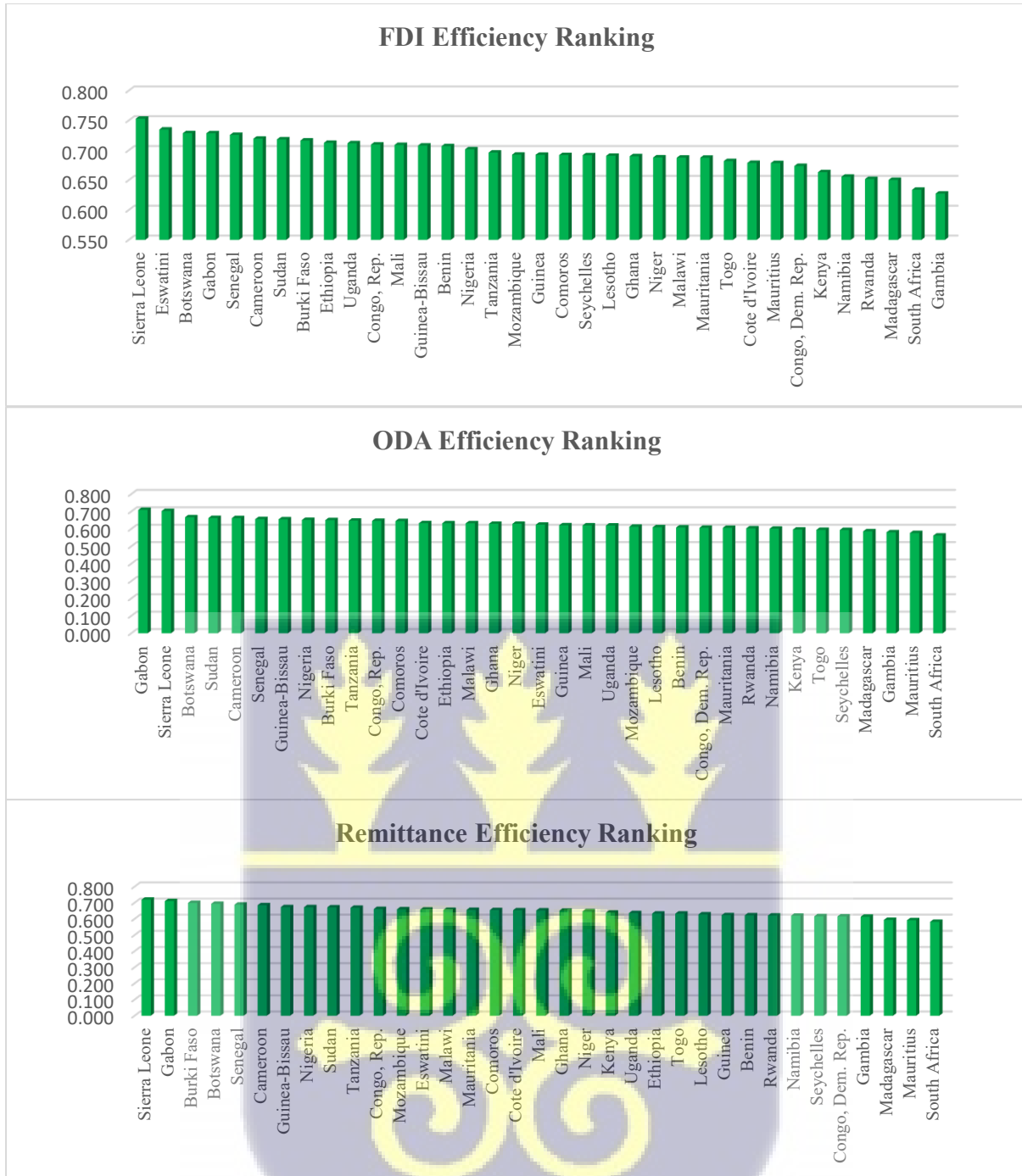
At the bottom of the efficiency spectrum, Sudan consistently ranks 35th, making it the bottom-ranked country across all three foreign capital efficiencies and exhibiting significant inefficiencies in converting foreign capital into tangible economic growth. Similarly, Senegal and Kenya consistently rank at the lower half of the efficiency scale, suggesting systemic challenges in optimizing foreign capital into economic growth, possibly due to regulatory

inefficiencies, misalignment between capital inflows and development needs, or underdeveloped financial markets.

#### **2.4.6 Comparative Analysis of the Rankings of Foreign Capital Efficiency across countries for the Human Development Growth path.**

Figure 2.5 below presents the results of the technical efficiency rankings of countries in utilizing the various forms of foreign capital flows- FDI, ODA, and Remittance efficiencies in human development growth path. This section measures efficiency as the ratio of the human development index (HDI) and foreign capital inflows (FDI, ODA, or remittance). The results show that Sierra Leone has the highest overall efficiency in all three categories: ranked 1st in FDI and remittances efficiencies and 2nd in ODA efficiency. This indicates that, unlike the macroeconomic growth path, Sierra Leone has consistently established a highly effective system to convert foreign capital inflows into human development outcomes. This also reveals that Sierra Leone focuses more on achieving human development outcomes than macroeconomic successes. The following country with a consistent efficiency performance is Botswana, ranked third in both FDI and ODA efficiencies and 4th in remittance efficiency, demonstrating strong technical efficiency in foreign capital utilization for human development after Sierra Leone. Similarly, Senegal is ranked 5th in both FDI and remittance efficiencies and sixth in ODA efficiency; it also demonstrates a balanced capacity to maximize foreign capital for human development. Burkina Faso, Cameroon, and Sudan also display high efficiency across all three categories. Burkina Faso ranks 8th in FDI, 9th in ODA, and 3rd in remittances, effectively managing diverse capital flows to improve social indicators. Despite its ongoing political and economic challenges, Sudan's efficiency rankings (7th in FDI, 4th in ODA, 9th in remittances) reflect a more substantial commitment to public sector coordination in focusing the utilization of foreign capital in achieving human development than macroeconomic growth efforts.





Figures 2.5: Efficiency Rankings of Sub-Saharan African Countries in terms of Human Development

Focusing on the lower end of the efficiency rankings for the human development ambit, South Africa and Mauritius are poorly ranked in all three categories of foreign capital efficiencies, suggesting inefficiencies in converting foreign capital into efficient investments in human development outcomes. For instance, South Africa is ranked 34th in FDI, 35th in ODA, and 35th in remittances, indicating the lowest-ranked country regarding the efficiency of foreign capital inflows into human development. This means the country faces significant challenges

in aligning external resources with human development goals, likely due to complex socio-economic disparities. Similarly, Mauritius struggles with ODA and remittances, ranked 34 out of 35 countries in our study. Indicating a disconnect between capital inflows and developmental progress.

Notably, Ethiopia (9th in FDI, 14th in ODA, 23rd in remittances) and Uganda (10th in FDI, 21st in ODA, 22nd in remittances) perform moderately well, especially regarding FDI efficiency. These rankings reflect their growing capacity to channel foreign direct investments into sectors like education and healthcare, albeit with room for improvement in managing remittances and aid.

Interestingly, it is observed that highly ranked countries for the macroeconomic growth path where efficiency is measured as a weighted average of the macroeconomic factors (real economic growth rate) used as output variables and foreign capital inflows (FDI, ODA, and remittances inflows), are ranked the lowest for the human development growth path. For instance, while Sierra Leone, Botswana, and Gabon are ranked in the top four across all three foreign capital efficiencies regarding the human development pathway, they are found at the bottom for the macroeconomic path. This implies that these countries focus on using foreign capital inflows to enhance human development outcomes than they do on achieving macroeconomic outcomes. Similarly, countries like Benin and Ethiopia, which are top-ranked for the macroeconomic growth path, are ranked in the lower half for the human development growth path, suggesting that contrary to Sierra Leone, Botswana, and Gabon, Benin, Ethiopia, and Burkina Faso are more focused in achieving macroeconomic outcomes than human development indicators.

The results of the two growth paths also revealed that the countries are far more efficient in utilizing foreign capital inflows to improve human development than macroeconomic growth outcomes. While the average efficiency across FDI, ODA, and remittance inflows for economic growth is low, at 40.7%, 40.9%, and 43.6%, respectively, the averages across human development growth, on the other hand, are 69.5%, 62.7%, and 64.8% for FDI, ODA, and remittance efficiencies, respectively.

#### **2.4.7 Changes in the efficiency of foreign capital inflows for Sub-Saharan African Countries from by year, from 1990 to 2021.**

This section presents the results of the changes in efficiency for Sub-Saharan Africa throughout the study using the Malmquist total factor productivity approach (TFP). Efficiency scores are static within specific given periods. However, understanding how efficiency changes over time is critical for policymakers to ensure a sustained effort toward economic development. The Malmquist Total Factor Productivity index, proposed by Malmquist, (1953) based on the DEA method, measures the overall productivity improvements or decline in each decision-making unit(DMU), considering changes in inputs and output quantities. Based on this, we evaluate changes in efficiency for each country from 1990 to 2020. Four efficiency indices influence the Malmquist index. They include efficiency change, technological change, pure technical change, and scale efficiency changes. The Malmquist results for changes in the efficiency of foreign capital inflows for the economic growth and human development paths are presented in Tables 2.10 and 2.11 below



**Table 2.10: Malmquist Results of Economic Growth Path by Year**

Year	EFFCH			TECHCH			PECH			SECH			TFPCH		
	FDI	ODA	REM	FDI	ODA	REM	FDI	ODA	REM	FDI	ODA	REM	FDI	ODA	REM
1991	0.187	0.225	1.082	1.366	1.127	1.023	0.267	0.230	0.240	0.700	0.976	0.464	<b>0.755</b>	<b>0.653</b>	<b>0.732</b>
1992	1.904	1.790	0.980	0.910	0.983	0.602	1.350	1.701	1.750	1.410	1.053	1.456	<b>1.733</b>	<b>1.759</b>	<b>1.208</b>
1993	0.998	1.003	0.956	1.008	1.019	0.784	1.077	1.141	1.002	0.927	0.879	0.954	<b>1.006</b>	<b>1.022</b>	<b>1.105</b>
1994	0.127	0.136	0.617	0.719	0.665	0.438	0.139	0.122	0.134	0.914	1.110	0.483	<b>0.791</b>	<b>0.910</b>	<b>0.712</b>
1995	7.401	6.173	2.042	1.030	1.263	0.273	5.857	6.486	5.295	1.264	0.952	0.457	<b>1.622</b>	<b>1.800</b>	<b>1.305</b>
1996	0.169	0.174	0.453	1.343	1.229	1.096	0.081	0.077	0.099	0.853	0.969	0.987	<b>0.693</b>	<b>0.991</b>	<b>0.912</b>
1997	12.993	11.101	0.987	1.880	2.174	1.994	13.114	10.997	5.470	0.991	1.009	1.190	<b>1.422</b>	<b>1.832</b>	<b>1.178</b>
1998	0.863	0.954	1.076	0.645	0.582	1.202	0.965	1.172	0.544	0.894	0.813	0.542	<b>0.556</b>	<b>0.555</b>	<b>0.588</b>
1999	0.611	0.698	0.342	0.846	0.741	0.983	0.552	0.538	0.940	1.106	1.297	1.034	<b>0.516</b>	<b>0.578</b>	<b>0.657</b>
2000	1.431	1.392	5.379	0.707	0.726	1.124	1.366	1.374	1.140	1.048	1.013	4.717	<b>1.012</b>	<b>1.011</b>	<b>1.386</b>
2001	3.074	3.000	6.076	1.677	1.694	3.975	3.074	3.668	2.516	1.000	0.818	3.482	<b>1.155</b>	<b>1.282</b>	<b>1.109</b>
2002	0.769	0.785	0.262	0.910	0.912	4.242	0.749	0.671	0.989	1.026	1.170	0.264	<b>0.700</b>	<b>0.816</b>	<b>0.876</b>
2003	0.361	0.393	0.323	0.696	0.639	0.972	0.370	0.376	0.405	0.976	1.046	0.955	<b>0.851</b>	<b>0.951</b>	<b>1.001</b>
2004	3.459	3.051	1.058	0.947	1.052	0.431	3.293	2.935	2.512	1.050	1.039	1.135	<b>1.275</b>	<b>1.210</b>	<b>1.023</b>
2005	0.220	0.196	0.551	1.205	1.377	1.023	0.224	0.217	0.211	0.983	0.902	0.671	<b>0.565</b>	<b>0.769</b>	<b>0.971</b>
2006	0.993	1.013	1.313	1.677	1.641	1.103	1.005	1.034	2.368	0.987	0.980	1.105	<b>1.665</b>	<b>1.662</b>	<b>0.857</b>
2007	2.160	1.758	0.985	0.857	1.049	0.243	2.333	1.812	1.045	0.926	0.970	1.035	<b>1.452</b>	<b>1.544</b>	<b>1.126</b>
2008	0.204	0.242	5.001	1.261	1.064	1.098	0.200	0.287	0.258	1.021	0.843	0.359	<b>0.858</b>	<b>0.658</b>	<b>0.569</b>
2009	14.189	14.857	0.786	0.415	0.397	1.083	11.893	10.922	3.784	1.193	1.360	1.001	<b>1.089</b>	<b>1.091</b>	<b>1.074</b>
2010	0.175	0.180	0.155	1.579	1.544	1.255	0.203	0.192	0.219	0.863	0.940	0.813	<b>0.577</b>	<b>0.778</b>	<b>0.483</b>
2011	2.340	2.468	1.072	1.055	0.991	0.876	2.252	2.423	3.082	1.039	1.019	0.548	<b>1.899</b>	<b>1.445</b>	<b>1.667</b>
2012	0.545	0.566	0.496	1.082	1.048	0.903	0.583	0.602	0.526	0.934	0.940	1.198	<b>0.589</b>	<b>0.793</b>	<b>0.920</b>
2013	0.240	0.267	0.809	3.268	2.898	1.143	0.249	0.282	0.663	0.961	0.948	1.457	<b>0.783</b>	<b>0.775</b>	<b>0.841</b>
2014	10.056	7.370	1.094	0.277	0.384	0.891	8.144	6.538	2.558	1.235	1.127	1.356	<b>1.787</b>	<b>1.834</b>	<b>1.916</b>
2015	0.467	0.564	1.034	1.035	0.886	0.893	0.526	0.647	0.564	0.888	0.872	1.993	<b>0.784</b>	<b>0.528</b>	<b>0.525</b>
2016	0.165	0.126	0.983	1.806	2.289	0.484	0.199	0.154	0.832	0.829	0.823	1.056	<b>0.898</b>	<b>0.889</b>	<b>0.764</b>
2017	2.477	3.051	2.082	0.904	0.705	1.203	2.333	2.807	2.820	1.062	1.087	1.001	<b>1.240</b>	<b>1.085</b>	<b>0.983</b>
2018	1.103	1.136	0.717	0.992	0.981	1.113	1.031	0.938	2.019	1.070	1.211	0.998	<b>1.094</b>	<b>1.115</b>	<b>0.894</b>
2019	4.010	4.256	5.065	0.417	0.388	1.209	3.631	3.831	2.219	1.104	1.111	2.547	<b>1.670</b>	<b>1.650</b>	<b>1.488</b>
2020	0.203	0.182	1.004	1.784	2.048	1.745	0.272	0.192	0.346	0.749	0.948	0.982	<b>0.863</b>	<b>0.773</b>	<b>1.039</b>
2021	10.055	12.125	1.035	0.872	0.715	0.715	8.203	12.086	6.899	1.226	1.003	1.458	<b>1.770</b>	<b>1.675</b>	<b>1.212</b>
<b>Mean</b>	<b>0.995</b>	<b>1.002</b>	<b>1.000</b>	<b>1.012</b>	<b>1.005</b>	<b>0.973</b>	<b>0.998</b>	<b>1.002</b>	<b>1.001</b>	<b>0.997</b>	<b>0.999</b>	<b>0.999</b>	<b>1.007</b>	<b>1.007</b>	<b>0.973</b>



The results of the Malmquist analysis of the changes in the various forms of foreign capital flows, including foreign direct investment (FDI), Official Development Assistance (ODA), and remittances, in Table 2.10 present a detailed picture of how these foreign capital inflows are utilized in macroeconomic growth. The analysis provides insights into the changes in efficiency, technology, and productivity over time, revealing how each type of foreign capital contributes to the economic growth trajectory of recipient economies.

Efficiency change (EFFCH) measures how healthy resources are utilized over time. The mean values for FDI, ODA, and REM are 0.995, 1.002, and 1.000, respectively, indicating minimal improvement in ODA efficiency and a decline in FDI and remittance efficiencies. However, there are extreme variations in specific years, particularly in FDI and ODA, with extreme values such as 7.401 and 6.173 respectively in 1995, 12.993 and 11.101 in 1997, and 14.189 and 14.857 respectively in 2009. These spikes suggest that sub-Saharan African countries experienced substantial efficiency improvements during these years, possibly due to economic reforms, policy shifts, or better management of foreign capital inflows. On the other hand, there are periods of significant decline, particularly in the 1990s and mid-2000s. For example, in 1996, FDI and ODA showed a low-efficiency score of 0.169 and 0.174, respectively, reflecting poor resource utilization in the initial years of the study. This suggests that the region struggled to use financial inflows effectively in specific periods. Such volatility highlights the region's susceptibility to external shocks and internal inefficiencies, underlining the importance of consistent institutional and policy support to maintain stable growth.

The Technical Change (TECHCH) index reflects technological progress over time. The results suggest relatively stable technological advancements, with an overall mean slightly above 1, indicating gradual progress. The mean values for technical change show moderate growth with means of 1.012 for FDI, 1.005 for ODA, and 0.973 for REM, indicating some technological progress, especially in the FDI and ODA efficiencies. However, the variability across the years is notable. For instance, in 2001, the TECHCH values for FDI, ODA, and Remittances were 1.677, 1.694, and 3.975, respectively, indicating robust technological advancements early on, while in 2014, the values for both FDI (0.786), ODA (0.415) and Remittance (0.397) show declines, highlighting periods where technological stagnation or regression occurred. In 2013, there was a noticeable improvement in technical change, with values for FDI reaching 3.268 and ODA reaching 2.898, possibly reflecting significant technological investments during that period. However, in 2014, there was a sharp decline in FDI (0.277) and ODA (0.384),

suggesting periods of technological setbacks, likely due to political instability, economic crises, or slow adoption of technological innovations.

Pure Efficiency, also known as management efficiency Change, measures resource use efficiency due to managerial decision-making and skills. The mean values for FDI, ODA, and remittances are 0.998, 1.002, and 1.001, respectively. There are significant variations across the period, particularly in FDI, where it reached 13.114 in 1997, indicating remarkable improvements in resource allocation efficiency during that year. Remittances show substantial variability, with a value of 5.379 in 2000, demonstrating that remittances contributed to efficiency improvements in some periods. However, in 1994, FDI and ODA had low values of 0.139 and 0.122, respectively, indicating inefficiencies in the use of resources. These fluctuations reflect structural weaknesses in specific years, highlighting the ongoing challenge of improving the allocation of financial inflows for maximum productivity.

Scale Efficiency Change (SECH) assesses improvements in productivity related to economies of scale or size of the countries involved. The average SECH values for FDI, ODA, and REM are 0.997, 0.999, and 0.999, respectively, indicating minimal declines over time. The mean values for SECH are near 1 for FDI and ODA, indicating no changes in productivity due to scale effects. However, remittances show greater variability, with significant scale efficiency improvements observed in 2000, 2001, and 2019, with SECH values of 4.717, 3.482, and 2.547, respectively. This suggests that remittances improved economies of scale during this period.

In contrast, lower SECH values from 2015 to 2017 indicate periods where economies of scale were not realized or more extensive operations became less efficient. These declines may have been caused by unfavourable economic conditions or mismanagement of financial resources, signalling a need for better economic planning and policy consistency to leverage economies of scale more effectively.

Turning to the changes in the efficiency of foreign capital inflows from 1990 to 2021, this section discusses the total factor productivity changes (TFPCH), which combines technical efficiency change and technological progress. It provides an overall measure of productivity over time, in this case, the changes in efficiency from 1990 to 2021. From Table 7, the average total factor productivity change for FDI, ODA, and REM for the entire period from 1990 to 2021 are 1.007, 1.007, and 0.973, respectively, indicating modest overall productivity

improvement at 0.7% for both FDI and ODA efficiencies and a decline in the productivity change for remittance efficiency. The productivity improvements in the FDI efficiency changes are not due to improvements in technical efficiency but are mainly driven by technological change at 1.2%. This means the improvement in total factor productivity in FDI usage is mainly a result of the adoption of technology and not because of efficient use of the FDI inflows. This result is consistent with the broadly held view that the impact of FDI on a country's economic growth results from technological and knowledge transfer from the host to the recipient economy (Liu, 2008; Keller, 2010; Salim et al., 2017). The marginal improvement in the ODA efficiency, on the other hand, is driven by 0.2% efficiency change, 0.5% technical change, and 0.2% managerial change. Concerning remittances, total factor productivity declined to 0.973 over the period.

For all three capital inflows, highly significant TFPCH improvements are observed in years like 2010- 2011, 2013-2014, and 2019-2020. Specifically, between 2010 and 2011, FDI efficiency increased by 89.9%, 44.5% for ODA, and 66.7% for remittance efficiency. Similarly, FDI efficiency improved by 78.7%, 83.4% for ODA, and 91.6% for remittance efficiency in 2014. This pattern was also observed in 2019 when FDI efficiency improved by 67%, 65% for ODA, and 48.8% for remittance efficiency. Another period that recorded spikes in the three capital flow efficiencies was 2007. This year, FDI efficiency increased by 45.2%, ODA by 54.4%, and an improvement of remittances by 12.6%. Interestingly, the periods of these large spikes in foreign efficiencies coincided and preceded the major global financial and economic shocks. The global financial crisis in 2007, the Eurozone or European Sovereign debt crisis in 2011 – 2012, the 2014 global commodity price plunge, and the COVID-19 pandemic in 2019. These increases are primarily due to technological adoption rather than efficiency across all the capital inflows. This observation leads to an important question of whether countries in SSA are more efficient in utilizing their financial resources, especially foreign capital inflows, during global economic and financial crises. The possible explanation may be that, knowing the looming difficulties associated with the global crisis, especially regarding foreign capital inflows, SSA countries have become more cautious and have ensured prudent management of scarce resources to avoid the consequences of global shocks. This notwithstanding notable declines in all the three foreign capital inflows in some years, including 1998, 2009, 2010, and 2015. For instance, the total factor productivity in 2015 is 0.784, 0.528, and 0.525 for FDI, ODA, and remittance efficiencies, respectively, indicating a decline in efficiency in those

periods. Generally, 50% of the entire period had an improvement in efficiency, and the same was true for a decline in efficiency throughout the study. Details of the trend in capital inflow efficiency changes and their discussions are shown in Fig. 2.7.

The Malmquist results of changes in foreign capital efficiency on the human development path are presented in Table 2.11 below. The results indicate changes in total factor productivity for study in FDI, ODA, and remittance efficiencies and the associated sources of total factor productivity, including technical efficiency (EFFCH), technological change (TECHCH), pure efficiency change (PECH), and scale efficiency change (SECH). The analysis reveals important trends in countries' ability to convert foreign capital into improvements in human development.

The overall mean of the total factor productivity change (TFPCH), covering the entire period from 1990 to 2021 across the 35 SSA countries for FDI, ODA, and remittances, shows that efficiency is declining over the period because they all have TFPCH of less than one. FDI and ODA efficiency have the same TFPCH at 0.996, while remittances have a TFPCH of 0.964. This indicates that the efficiency of foreign capital inflows into human development in SSA for study has been declining. This notwithstanding, the year-on-year efficiency changes are highly volatile, with considerable fluctuations. Unlike efficiency changes for the macroeconomic growth path, the few improvements in efficiency for the human development growth path are generally minimal. The only notable improvement in efficiency changes was observed in 1993, with TFPCHs of 32.5% and 43.7% for FDI and ODA efficiencies. Also, in 2002, FDI and remittance efficiencies increased by 15.3% and 19.1%, respectively. Another important observation is the increases in all three capital flow efficiencies in 2019, coinciding with the COVID-19 pandemic. This trend may suggest that during periods of global crisis, SSA countries tend to be more efficient in utilizing their foreign capital resource to mitigate the effects of global shocks. These efficiency increases over time are primarily due to technological changes coming from technology adoption rather than pure scale or efficiency changes.

Notably, periods like 2009-2012 and 2015-2018 stand out for ODA and FDI, showing significant jumps in total factor productivity change. This suggests that countries experienced substantial growth in their capacity to translate foreign capital inflows into human development gains. This could reflect improvements in governance, economic stability, or technological

capabilities. Conversely, 2001-2004 and 2010-2013 show relatively low or negative TFPCH, indicating stagnation or regression in capital efficiency during these periods.



Table 2.11: Malmquist Results of Changes in Efficiency for Human Development Path by Year

Year	EFFCH			TECHCH			PECH			SECH			TFPCH		
	FDI	ODA	REM	FDI	ODA	REM	FDI	ODA	REM	FDI	ODA	REM	FDI	ODA	REM
1991	1.047	0.413	1.04	0.932	0.741	0.93	1.128	1.067	1.077	0.928	0.387	0.966	<b>0.975</b>	<b>0.967</b>	<b>1.133</b>
1992	0.83	0.108	0.869	0.93	2.024	0.901	0.79	0.865	0.811	1.05	0.125	1.072	<b>0.772</b>	<b>0.783</b>	<b>0.806</b>
1993	1.332	1.956	1.221	0.995	0.387	1.103	1.384	1.216	1.268	0.962	1.609	0.964	<b>1.325</b>	<b>1.347</b>	<b>1.058</b>
1994	0.918	0.178	0.651	1.137	0.756	1.585	0.867	1.001	0.982	1.059	0.178	0.663	<b>1.044</b>	<b>1.032</b>	<b>0.935</b>
1995	1.045	0.747	1.358	0.852	4.213	0.672	1.042	0.961	0.933	1.003	0.778	1.455	<b>0.891</b>	<b>0.912</b>	<b>1.148</b>
1996	0.927	6.573	1.03	1.118	0.002	0.989	0.985	0.978	1.037	0.941	3.103	0.994	<b>1.036</b>	<b>1.018</b>	<b>1.125</b>
1997	1.144	0.001	1.078	0.792	4.345	0.831	1.128	1.023	1.033	1.014	0.001	1.044	<b>0.906</b>	<b>0.895</b>	<b>0.834</b>
1998	1.028	0.864	0.865	1.018	1.282	1.208	0.941	0.934	0.876	1.092	0.926	0.987	<b>1.047</b>	<b>1.045</b>	<b>1.108</b>
1999	0.895	1.987	1.128	1.128	0.01	0.896	1.006	1.068	1.137	0.89	1.146	0.992	<b>1.009</b>	<b>1.011</b>	<b>1.079</b>
2000	1.079	5.359	1.177	0.968	0.074	0.886	1.031	1.102	1.104	1.047	4.862	1.066	<b>1.045</b>	<b>1.043</b>	<b>0.998</b>
2001	0.901	1.884	1.183	1.072	0.108	0.805	1.002	1.079	1.116	0.899	1.746	1.061	<b>0.966</b>	<b>0.952</b>	<b>0.904</b>
2002	0.889	0.318	0.627	1.129	4.688	1.637	0.924	0.781	0.747	0.962	0.407	0.84	<b>1.153</b>	<b>1.027</b>	<b>1.191</b>
2003	1.153	0.151	1.101	0.892	2.668	0.934	0.942	1.057	1.049	1.224	0.143	1.049	<b>1.029</b>	<b>1.029</b>	<b>1.063</b>
2004	1	0.005	0.987	0.963	1.542	0.956	1.018	0.956	0.938	0.983	0.86	1.052	<b>0.963</b>	<b>0.944</b>	<b>0.995</b>
2005	1.141	4.389	0.978	0.853	0.82	1.01	1.11	1.004	0.995	1.027	2.19	0.983	<b>0.973</b>	<b>0.988</b>	<b>0.991</b>
2006	1.061	1.065	1.574	0.999	0.051	0.672	1.143	1.44	1.492	0.928	7.398	1.055	<b>1.06</b>	<b>1.059</b>	<b>0.946</b>
2007	0.826	0.001	0.619	1.197	6.211	1.591	0.81	0.746	0.698	1.019	0.001	0.886	<b>0.989</b>	<b>0.984</b>	<b>1.169</b>
2008	0.98	1.812	1.092	0.994	0.02	0.893	1.055	0.948	1.001	0.929	1.572	1.09	<b>0.974</b>	<b>0.974</b>	<b>0.937</b>
2009	0.969	1.52	1.019	1.068	0.026	1.018	0.974	1.159	1.054	0.995	1.407	0.967	<b>1.035</b>	<b>1.037</b>	<b>0.91</b>
2010	0.895	0.258	0.946	1.084	2.488	1.032	0.863	0.864	0.935	1.037	0.298	1.012	<b>0.97</b>	<b>0.976</b>	<b>0.941</b>
2011	1.17	0.508	0.966	0.873	1.359	1.048	1.095	0.995	0.982	1.069	0.51	0.984	<b>1.022</b>	<b>1.013</b>	<b>0.99</b>
2012	1.037	0.016	1.067	0.989	3.338	0.968	1.081	1.087	1.103	0.959	0.015	0.967	<b>1.027</b>	<b>1.033</b>	<b>1.038</b>
2013	0.973	4.945	1.112	0.935	0.789	0.809	0.948	1.073	1.045	1.026	1.986	1.064	<b>0.91</b>	<b>0.900</b>	<b>0.848</b>
2014	1.012	0.822	1	1.048	0.894	1.078	1.073	0.951	0.989	0.943	0.002	1.011	<b>1.06</b>	<b>1.078</b>	<b>1.122</b>
2015	0.918	3.516	0.898	1.188	0.004	1.252	0.925	0.95	0.944	0.992	1.135	0.951	<b>1.09</b>	<b>1.125</b>	<b>1.198</b>
2016	1.277	0.001	1.272	0.728	5.963	0.709	1.163	1.152	1.18	1.098	0.001	1.078	<b>0.929</b>	<b>0.901</b>	<b>0.9</b>
2017	0.761	0.496	0.677	1.171	1.094	1.263	0.782	0.769	0.728	0.973	0.646	0.93	<b>0.891</b>	<b>0.855</b>	<b>0.843</b>
2018	0.947	6.133	1.007	1.057	0.678	1.012	0.975	0.962	0.981	0.971	3.592	1.026	<b>1.001</b>	<b>1.020</b>	<b>0.951</b>
2019	1.097	4.021	0.996	1.022	0.955	1.111	1.088	1.18	1.105	1.009	3.407	0.902	<b>1.121</b>	<b>1.107</b>	<b>1.187</b>
2020	0.968	0.001	1.102	1.025	0.853	0.925	1.023	0.957	1.04	0.947	0.001	1.06	<b>0.992</b>	<b>1.019</b>	<b>1.211</b>
2021	1.04	4.834	0.944	0.911	0.812	0.993	0.938	0.955	0.931	1.109	1.196	1.014	<b>0.948</b>	<b>0.938</b>	<b>0.803</b>
<b>Mean</b>	<b>1.001</b>	<b>0.998</b>	<b>1.035</b>	<b>0.995</b>	<b>0.998</b>	<b>0.931</b>	<b>1.000</b>	<b>0.999</b>	<b>1.000</b>	<b>1.000</b>	<b>0.999</b>	<b>1.035</b>	<b>0.996</b>	<b>0.996</b>	<b>0.964</b>



#### 2.4.8 Analysis of changes in foreign capital efficiency by country from 1990 to 2021

This section presents changes in foreign capital efficiency for the entire period by country. The Malmquist results of the county-by-country changes in FDI ODA and remittance efficiencies for the macroeconomic growth path are presented in Table 2.12 below. Efficiency Change (EFFCH), Technological Change (TECHCH), Pure Efficiency Change (PECH), Scale Efficiency Change (SECH), and Total Factor Productivity Change (TFPCH). These metrics provide insight into how effectively countries use foreign capital to stimulate long-term economic growth.

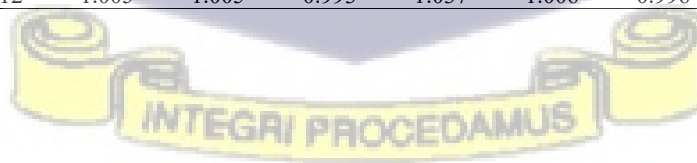
The last column of Table 2.12 presents the total factor productivity change (TFPch), indicating whether efficiency changes increase or decline over time. Columns 2 to 4 indicate efficiency, technological, pure, and scale efficiency changes, respectively, and serve as the sources of each country's total factor productivity changes.

While changes in foreign capital efficiency are generally minimal, the results revealed that, for the macroeconomic growth path, 22 out of the 35 countries, representing 63%, experienced improvement in average total factor productivity regarding FDI efficiency. For ODA and remittance efficiencies, 19 and 9 countries, respectively, out of the 35 countries, have marginal improvements in efficiency over time. This means that, in terms of changes in efficiency over time, most countries experience improvements in FDI efficiency followed by ODA efficiency for the macroeconomic growth path. Based on Table 9, changes in efficiency are mainly due to technical efficiency, scale, and managerial efficiencies rather than technological adoption. For instance, in Table 2.12, Comoros's average total factor productivity is 1.029, 1.027, and 1.052 for FDI, ODA, and remittance efficiencies, respectively. The increase in average FDI efficiency in Comoros is due to a 1.6% and 2.1% improvement in efficiency and managerial changes, respectively. Similarly, the increase in ODA efficiency results from 2.4% improvements in managerial and operational efficiency. Thirdly, improvements in remittance efficiency are due to 8.1%, 2.5%, and 5.4% improvements in technical efficiency change and managerial and scale efficiencies, respectively.

For the macroeconomic growth path, Kenya, followed by Mali, is the country with the highest increase or improvement in productivity change, recording efficiency improvements of 6.1%, 5.1%, and 19% for FDI, ODA, and remittance, respectively. Meanwhile, Cote d'Ivoire, Guinea Bissau, and Ghana only experienced marginal improvements in FDI and ODA efficiencies.

Table 2.12: Malmquist Index Analysis of Foreign Capital Efficiency Changes for Economic Growth by Country

Firm	EFFCH			TECHCH			PECH			SECH			TFPCH		
	FDI	ODA	REM	FDI	ODA	REM	FDI	ODA	REM	FDI	ODA	REM	FDI	ODA	REM
Benin	0.969	0.974	1.022	0.976	1.000	0.958	0.976	0.976	0.984	0.992	0.998	1.038	<b>0.981</b>	<b>0.979</b>	<b>0.994</b>
Botswana	0.964	0.971	1.002	1.000	0.999	1.000	0.964	0.974	0.972	1.000	0.997	1.031	<b>0.976</b>	<b>0.976</b>	<b>0.975</b>
Burki Faso	1.010	1.014	1.066	1.012	1.005	1.007	1.011	1.012	1.015	1.000	1.002	1.050	<b>1.023</b>	<b>1.019</b>	<b>1.037</b>
Cameroon	0.994	0.995	0.880	1.011	1.000	1.005	0.995	0.992	0.992	0.999	1.003	0.887	<b>1.006</b>	<b>1.000</b>	<b>0.856</b>
Comoros	1.016	1.024	1.081	1.000	1.000	1.000	1.021	1.024	1.025	0.995	1.000	1.054	<b>1.029</b>	<b>1.029</b>	<b>1.052</b>
Congo, D. R.	0.968	0.976	0.983	0.943	1.000	1.000	0.971	0.979	0.974	0.997	0.997	1.009	<b>0.980</b>	<b>0.981</b>	<b>0.956</b>
Congo, Rep.	0.999	1.016	0.976	1.012	1.005	1.007	0.990	1.013	1.013	1.009	1.003	0.963	<b>1.011</b>	<b>1.022</b>	<b>0.949</b>
Cote d'Ivoire	0.995	1.001	1.004	1.009	1.005	1.003	1.012	1.013	0.997	0.983	0.988	1.007	<b>1.007</b>	<b>1.006</b>	<b>0.977</b>
Eswatini	1.023	1.028	1.057	1.000	1.002	1.009	1.023	1.027	1.027	1.000	1.001	1.029	<b>1.036</b>	<b>1.033</b>	<b>1.028</b>
Ethiopia	1.003	1.008	0.946	1.013	1.005	1.005	1.009	1.009	1.005	0.994	0.999	0.941	<b>1.016</b>	<b>1.014</b>	<b>0.920</b>
Gabon	0.981	0.990	0.987	0.966	1.005	0.928	0.988	0.988	0.988	0.994	1.002	0.999	<b>0.994</b>	<b>0.995</b>	<b>0.960</b>
Gambia	0.984	0.990	1.103	1.000	0.976	0.955	0.989	0.989	0.998	0.994	1.000	1.105	<b>0.996</b>	<b>0.995</b>	<b>1.073</b>
Ghana	1.002	1.012	1.001	1.014	1.007	1.000	1.007	1.011	1.011	0.995	1.001	0.990	<b>1.015</b>	<b>1.017</b>	<b>0.974</b>
Guinea	0.980	0.994	0.990	0.994	0.954	1.000	0.987	0.993	0.995	0.993	1.001	0.995	<b>0.992</b>	<b>0.999</b>	<b>0.963</b>
Guinea-Biss	0.998	1.003	1.013	1.011	1.003	1.005	0.997	1.001	1.003	1.001	1.002	1.010	<b>1.011</b>	<b>1.009</b>	<b>0.986</b>
Kenya	1.049	1.045	1.223	1.012	1.011	1.009	1.055	1.044	1.055	0.994	1.001	1.159	<b>1.061</b>	<b>1.051</b>	<b>1.190</b>
Lesotho	0.997	1.010	1.000	1.003	1.011	1.005	0.988	1.009	1.008	1.009	1.001	0.992	<b>1.009</b>	<b>1.015</b>	<b>0.973</b>
Madagascar	0.985	0.997	0.991	1.000	1.000	0.988	0.992	0.996	1.001	0.994	1.000	0.989	<b>0.998</b>	<b>1.002</b>	<b>0.964</b>
Malawi	0.998	1.004	1.034	1.000	1.005	1.005	1.000	1.005	1.000	0.997	1.000	1.034	<b>1.010</b>	<b>1.010</b>	<b>1.006</b>
Mali	1.039	1.041	0.988	1.060	1.005	1.007	1.042	1.042	1.041	0.996	0.999	0.949	<b>1.051</b>	<b>1.047</b>	<b>0.961</b>
Mauritania	1.034	1.037	1.017	1.020	1.001	1.002	1.037	1.037	1.038	0.997	1.000	0.980	<b>1.046</b>	<b>1.043</b>	<b>0.989</b>
Mauritius	1.014	1.027	0.988	1.001	1.005	1.005	1.024	1.027	1.027	0.991	1.000	0.962	<b>1.026</b>	<b>1.032</b>	<b>0.961</b>
Namibia	1.007	1.008	1.010	1.003	1.004	1.008	1.006	1.006	1.003	1.001	1.002	1.007	<b>1.019</b>	<b>1.014</b>	<b>0.983</b>
Mozambique	0.979	0.987	0.955	1.000	0.987	0.999	0.984	0.984	0.985	0.995	1.002	0.969	<b>0.991</b>	<b>0.992</b>	<b>0.929</b>
Niger	1.002	1.002	0.844	1.000	1.005	1.005	1.005	1.002	0.993	0.997	1.000	0.850	<b>1.014</b>	<b>1.007</b>	<b>0.821</b>
Nigeria	1.015	1.017	0.927	1.007	1.004	1.008	1.017	1.018	1.012	0.998	1.000	0.916	<b>1.028</b>	<b>1.022</b>	<b>0.902</b>
Rwanda	0.993	0.993	0.881	1.011	0.986	0.993	0.994	0.994	0.967	0.999	0.999	0.911	<b>1.005</b>	<b>0.999</b>	<b>0.857</b>
Senegal	0.980	0.989	1.001	0.934	0.991	0.992	0.989	0.989	0.995	0.992	1.000	1.006	<b>0.992</b>	<b>0.994</b>	<b>0.974</b>
Seychelles	0.977	0.982	0.942	0.944	1.000	1.000	0.984	0.982	0.983	0.993	1.001	0.958	<b>0.989</b>	<b>0.988</b>	<b>0.917</b>
Sierra Leone	0.973	0.983	0.884	0.988	0.997	0.965	0.980	0.989	0.974	0.993	0.994	0.908	<b>0.985</b>	<b>0.988</b>	<b>0.860</b>
South Africa	0.982	0.989	0.993	0.963	1.000	0.999	0.985	0.985	0.988	0.997	1.003	1.005	<b>0.994</b>	<b>0.994</b>	<b>0.966</b>
Sudan	0.991	0.991	1.006	1.005	1.000	1.000	0.988	0.988	0.995	1.003	1.003	1.011	<b>1.003</b>	<b>0.996</b>	<b>0.979</b>
Tanzania	0.991	0.994	1.099	1.012	1.000	1.000	0.990	0.991	0.997	1.001	1.003	1.103	<b>1.003</b>	<b>1.000</b>	<b>1.070</b>
Togo	0.949	0.965	1.061	0.985	0.984	0.988	0.957	0.963	0.968	0.992	1.003	1.096	<b>0.961</b>	<b>0.971</b>	<b>1.032</b>
Uganda	0.989	1.006	1.138	1.012	1.005	1.005	0.993	1.037	1.006	0.996	0.971	1.132	<b>1.001</b>	<b>1.012</b>	<b>1.107</b>



The relatively high scores suggest that Kenya and Mali have effectively leveraged foreign capital and technological advancements to drive economic growth. Similarly, Mauritania and Eswatini demonstrate strong TFPCH performance, with values above 1 in FDI, ODA, and remittances, indicating that they efficiently utilize capital inflows to boost economic outcomes.

Conversely, many countries (37%, 43%, and 74% for FDI, ODA, and remittance efficiencies, respectively) in SSA are experiencing a decline in efficiency or remain stagnant. For instance, countries such as Benin and Botswana show lower (less than 1) TFPCH scores, hovering around 0.976 and 0.981 respectively across the three capital types, suggesting a decline in translating foreign capital into economic growth. Mozambique and Togo also exhibit low TFPCH scores, particularly in FDI and remittances, indicating a lack of progress in capital utilization or technological adoption, which may slow economic growth.

Table 2.13 below presents the results of efficiency changes in individual countries for the period of the human development growth path. The number of countries experiencing improvement in efficiency changes is lower for human development than macroeconomic efficiency. Only 12 out of 35 experienced FDI efficiency, 7 out of 53 in ODA efficiency, and 11 out of 35 countries in remittance efficiency. This means that most of the countries in SSA have not made significant progress in improving efficiency in utilizing foreign capital in human development outcomes. Guinea, followed by Mali, are the two ranked countries in terms of improvement in efficiency in human development outcomes. Guinea had an average improvement of 3.5%, 0.5%, and 4.3% for FDI, ODA, and remittance efficiencies, respectively, while Mali recorded an average of 2.7%, 2.9%, and 3.2% for FDI, ODA, and remittance efficiencies, respectively. These productivity increases are mainly due to technical efficiency changes rather than technical changes. In comparison, whereas Kenya experienced the highest increases in efficiency throughout the macroeconomic growth path, Guinea is ranked at the top for the human development growth path. However, Mali has consistently tried to enhance efficiency in macroeconomic and human development growth paths.

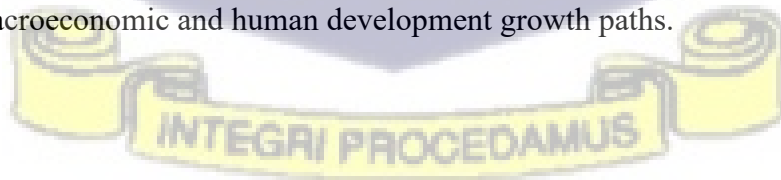
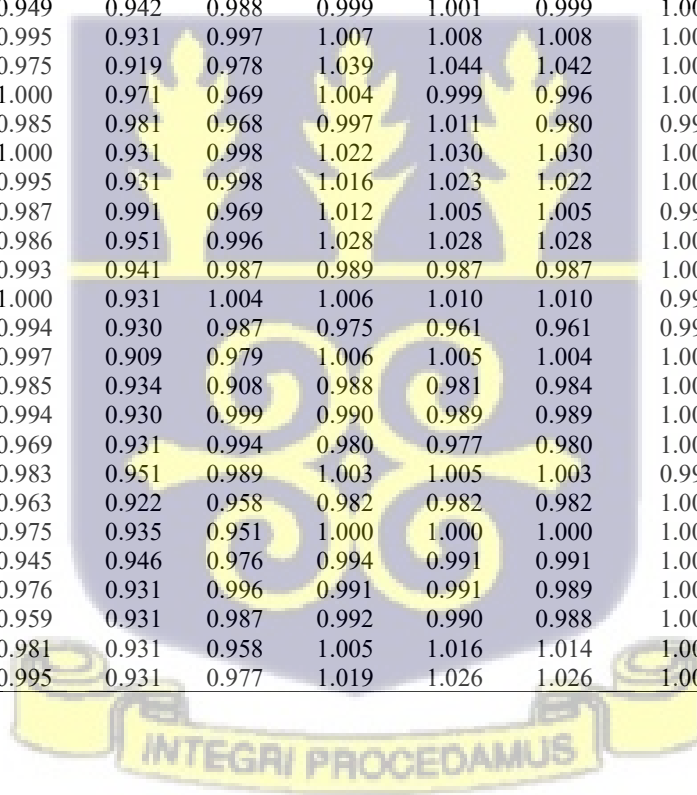


Table 2. 13: Malmquist Index Analysis of Foreign Capital Efficiency Changes Along Human Development by Country

Firm	EFFCH			TECHCH			PECH			SECH			TFPCH		
	FDI	ODA	REM	FDI	ODA	REM	FDI	ODA	REM	FDI	ODA	REM	FDI	ODA	REM
Benin	0.998	1.082	0.994	0.995	0.931	0.998	0.998	1.001	0.999	0.999	1.081	0.995	0.993	1.007	0.992
Botswana	1.011	1.080	1.008	0.959	0.913	0.999	1.004	1.006	1.004	1.007	1.073	1.004	1.007	1.005	1.007
Burki Faso	0.971	1.053	0.965	0.958	0.933	0.995	0.975	0.965	0.964	0.996	1.091	1.001	0.967	0.980	0.963
Cameroon	0.995	0.905	0.986	0.997	0.943	0.996	0.999	0.989	0.988	0.995	0.915	0.998	0.990	0.842	0.984
Comoros	0.992	1.084	0.990	0.998	0.932	0.998	0.991	0.993	0.993	1.001	1.092	0.996	0.987	1.009	0.988
Congo, Dem. Rep.	1.006	1.050	1.004	0.988	0.935	0.978	1.006	1.005	1.005	0.999	1.045	0.999	1.001	0.977	1.002
Congo, Rep.	0.988	0.992	0.995	0.937	0.912	0.977	0.983	0.995	0.995	1.005	0.997	1.000	0.983	0.923	0.994
Cote d'Ivoire	0.991	1.028	0.988	0.995	0.933	0.956	1.000	0.985	0.986	0.991	1.044	1.002	0.987	0.957	0.986
Eswatini	1.002	1.064	0.997	0.997	0.941	0.978	1.007	0.999	0.999	0.995	1.065	0.998	0.998	0.990	0.995
Ethiopia	0.998	0.967	0.993	0.994	0.951	0.966	0.997	0.996	0.996	1.001	0.970	0.996	0.993	0.900	0.991
Gabon	1.009	1.043	1.008	0.995	0.932	0.999	1.008	1.008	1.008	1.001	1.035	1.000	1.005	0.971	1.006
Gambia, The	1.000	1.152	0.996	0.949	0.942	0.988	0.999	1.001	0.999	1.001	1.151	0.998	0.995	1.073	0.994
Gha	1.007	1.034	1.007	0.995	0.931	0.997	1.007	1.008	1.008	1.000	1.026	0.999	1.003	0.963	1.005
Guinea	1.040	1.080	1.045	0.975	0.919	0.978	1.039	1.044	1.042	1.000	1.035	1.002	1.035	1.005	1.043
Guinea-Bissau	1.005	1.048	1.000	1.000	0.971	0.969	1.004	0.999	0.996	1.001	1.050	1.004	1.000	0.976	0.998
Kenya	0.990	1.187	0.977	0.985	0.981	0.968	0.997	1.011	0.980	0.993	1.174	0.997	0.986	1.105	0.976
Lesotho	1.026	1.058	1.029	1.000	0.931	0.998	1.022	1.030	1.030	1.004	1.027	0.999	1.021	0.984	1.027
Madagascar	1.018	1.052	1.020	0.995	0.931	0.998	1.016	1.023	1.022	1.002	1.028	0.998	1.014	0.979	1.018
Malawi	1.009	1.076	1.006	0.987	0.991	0.969	1.012	1.005	1.005	0.997	1.070	1.002	1.005	1.001	1.005
Mali	1.031	1.009	1.024	0.986	0.951	0.996	1.028	1.028	1.028	1.003	0.981	0.996	1.027	0.939	1.022
Mauritania	0.991	1.002	0.985	0.993	0.941	0.987	0.989	0.987	0.987	1.002	1.015	0.998	0.986	0.932	0.983
Mauritius	1.004	1.006	1.007	1.000	0.931	1.004	1.006	1.010	1.010	0.998	0.996	0.997	1.000	0.936	1.006
Namibia	0.971	1.002	0.963	0.994	0.930	0.987	0.975	0.961	0.961	0.996	1.042	1.002	0.967	0.933	0.962
Mozambique	1.006	1.008	1.003	0.997	0.909	0.979	1.006	1.005	1.004	1.000	1.003	1.000	1.001	0.938	1.002
Niger	0.989	0.856	0.979	0.985	0.934	0.908	0.988	0.981	0.984	1.001	0.873	0.995	0.984	0.797	0.978
Nigeria	0.995	0.934	0.987	0.994	0.930	0.999	0.990	0.989	0.989	1.005	0.944	0.998	0.990	0.869	0.985
Rwanda	0.985	0.898	0.976	0.969	0.931	0.994	0.980	0.977	0.980	1.006	0.920	0.997	0.981	0.836	0.974
Senegal	1.002	1.051	1.000	0.983	0.951	0.989	1.003	1.005	1.003	0.999	1.047	0.997	0.997	0.979	0.998
Seychelles	0.982	0.973	0.978	0.963	0.922	0.958	0.982	0.982	0.982	1.000	0.991	0.996	0.978	0.906	0.976
Sierra Leone	1.000	0.934	1.000	0.975	0.935	0.951	1.000	1.000	1.000	1.000	0.934	1.000	0.995	0.869	0.998
South Africa	0.994	1.034	0.991	0.945	0.946	0.976	0.994	0.991	0.991	1.000	1.043	1.000	0.990	0.962	0.989
Sudan	0.999	1.042	0.989	0.976	0.931	0.996	0.991	0.991	0.989	1.008	1.052	1.001	0.994	0.970	0.988
Tanzania	0.996	1.135	0.989	0.959	0.931	0.987	0.992	0.990	0.988	1.003	1.147	1.001	0.991	1.057	0.988
Togo	1.007	1.157	1.014	0.981	0.931	0.958	1.005	1.016	1.014	1.002	1.139	1.000	1.003	1.077	1.012
Uganda	1.021	1.265	1.029	0.995	0.931	0.977	1.019	1.026	1.026	1.002	1.233	1.003	1.017	1.178	1.027



### 2.4.9 Trend of the changes in FDI, ODA, and remittances from 1990 to 2021 for the Macroeconomic growth paths

This section presents a detailed discussion of the efficiency trend for the macroeconomic growth path from 1990 to 2021, year on year. The result is presented in Fig. 2.7 below, showing the trend of FDI, ODA, and remittance efficiency changes for the macroeconomic growth path throughout the study.

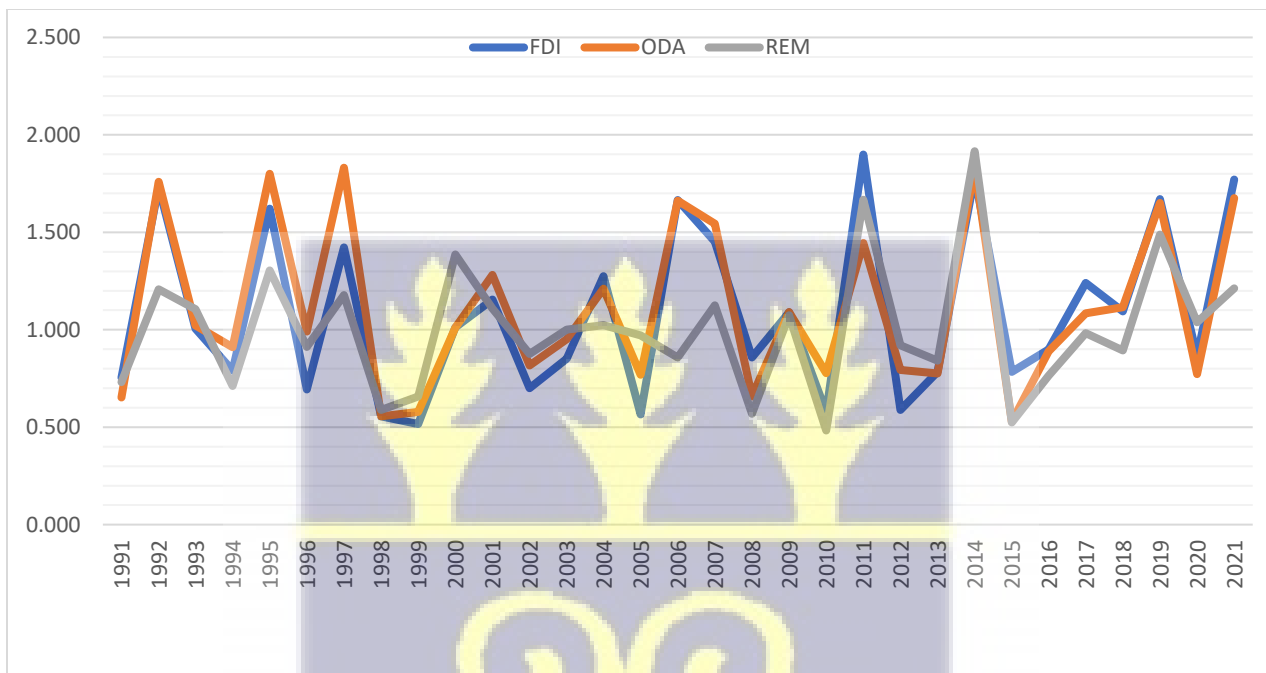


Figure 2.6: Total factor productivity of Sub-Saharan African Countries on Economic Growth for the period of 1990 to 2021

We analyze the trend of yearly efficiency changes over the entire period using Figure 2.6 above. The graph presents the changes in FDI, ODA, and remittance efficiencies from year to year, from 1990 to 2021. A productivity score of less than one means a decline in efficiency. A score of precisely one indicates no efficiency change, while a score of greater than one implies an improvement in efficiency from the previous year. For the macroeconomic growth path, remittance efficiency recorded the most significant change in 2014, with a TFP change of 1.916 between 2013 and 2014, followed by an FDI efficiency change of 1.899 in 1997. The higher ODA efficiency changes also occurred in 2014, with a score of 1.834. This means there were efficiency increases of 91.6% for remittance, 89.9% in FDI, and 83.4% in ODA efficiency in 2014, 1997, and 2014,

respectively. Fig. 2.7 above, all the foreign capital efficiency changes follow the same pattern or trend from 1990 to 2021. The results show extreme volatility in the changes in efficiency within the period. This provides evidence of a lack of consistency or deliberate productivity policy initiatives to drive efficiency gains and curb or control resource waste long-term in SSA. In addition, there is no evidence of a clear pattern or trend, on a long-term basis, about the movement of efficiency changes from the short to long-term horizon. In other words, there is neither an increasing nor a declining trend of efficiency changes throughout the study. This implies that, while countries in SSA make periodic short-term fluctuated gains in the efficiency of foreign capital in some years, they remain stagnant in enhancing resource utilization efficiency into economic growth and the quality of life in the long run. This stagnation suggests that SSA countries have not been able to optimize their use of foreign resources to scale down inefficiencies and boost productivity.

Productivity changes were particularly pronounced in the early 1990s, with all the foreign capital efficiencies showing sharp increases and declines, possibly reflecting the region's response to initial events of economic liberalization and structural adjustment policies in the region. The volatility, however, suggests that productivity in SSA countries is highly sensitive to external conditions, such as global financial trends and domestic political instability. Interestingly, the pattern in the graph of Fig. 2.7 reveals that periods of significant spikes in efficiency changes coincide with the preceding years of major global financial crises. Productivity or efficiency change spikes were observed in 1995, 1997, 2007, 2014, and 2020. These sharp increases in efficiencies in these years coincide with the Mexican Peso crisis, the Asian financial crisis, the Global Crisis of 2007–2008, the global Commodity price plunge in 2014, and the COVID-19 pandemic in 2020, respectively. Specifically, the period with the highest efficiency changes for FDI, ODA, and remittances was between 2013 – 2014, and this coincides with the period of the Global Commodity price plunge in 2014, where most commodity prices dropped significantly, leading to serious budgetary challenges across the globe. Another notable spike in 1997 coincided with the Asian financial crisis, which affected the rest of the world. Again, the sharp rise in 2007 is associated with the 2007 2008 Global Financial Crisis, leading to a global economic meltdown. Finally, the increase in 2019 is also associated with the infamous COVID-19 pandemic. Therefore, these trends suggest that SSA countries tend to be more prudent or efficient in using their foreign capital inflows whenever there is a threat or a looming global financial and economic shock. Our

research shows that sub-Saharan African countries become more productive or efficient during global crises. Based on this, we conclude that SSA nations react well to external shocks by taking prudent steps or action to avoid waste of the limited, scarce resources and to maintain efficiency to prevent the crisis's negative repercussions, particularly when the crisis finally hits hard across the globe.

Regarding the trend in efficiency along the human development growth path, the changes in FDI, ODA, and remittance efficiencies from 1990 to 2021 are illustrated in Fig. 2.8 below. The graph provides insight into the fluctuating nature of productivity change concerning these foreign capital flows and their impacts on human development. The results of changes in efficiency for the human development path are primarily similar in pattern to that of the macroeconomic growth path in Fig. 2.7, with a slightly peculiar difference. From 1990 to 2021, the region experienced significant volatility in productivity, as shown by sharp peaks and troughs of foreign capital efficiency changes for the human development path. ODA efficiency surged sharply in 1993, while FDI and remittance efficiencies followed similar patterns, with remittance efficiency peaking slightly lower. This volatility likely reflects political and economic transitions occurring at the time, such as structural adjustment programs, democratization, and broader global economic shifts. These external shocks created significant variations in the effectiveness of FDI, ODA, and REM in influencing productivity.

Like the productivity changes for the economic growth path, changes in the efficiency of the three capital inflows are highly volatile, with severe fluctuations year on year. In addition, efficiency changes over the period in question have no clear trend, either upwards or downwards. This confirms the earlier finding for the economic growth path that efficiency changes are stagnating in the SSA sub-region. Moreover, the sharp increases in the efficiencies of the three foreign capital inflows in 1993, 2007, 2014, and 2019 in Figures 2.6 and 2.7, coinciding with the preceding years of major global financial and economic crisis, is similar to that of the macroeconomic growth paths pattern, confirming our conclusion that, probably, SSA countries respond to positively to looming threats of global crisis to ensure prudent measures that will enhance the productive use of scarce resources. However, a few notable differences were observed between the two growth paths. First, whereas remittance efficiency recorded the most significant change in efficiency at 1.916, a 91.6% increase in remittance efficiency, in 2014, but with ODA and FDI efficiencies dominating year-on-year increases in efficiency for the macroeconomic growth path, ODA efficiency is the highest

at 1.347 representing 34.7% increase in efficiency, with remittance efficiency dominating the year-on-year increases in efficiency followed by ODA efficiency.

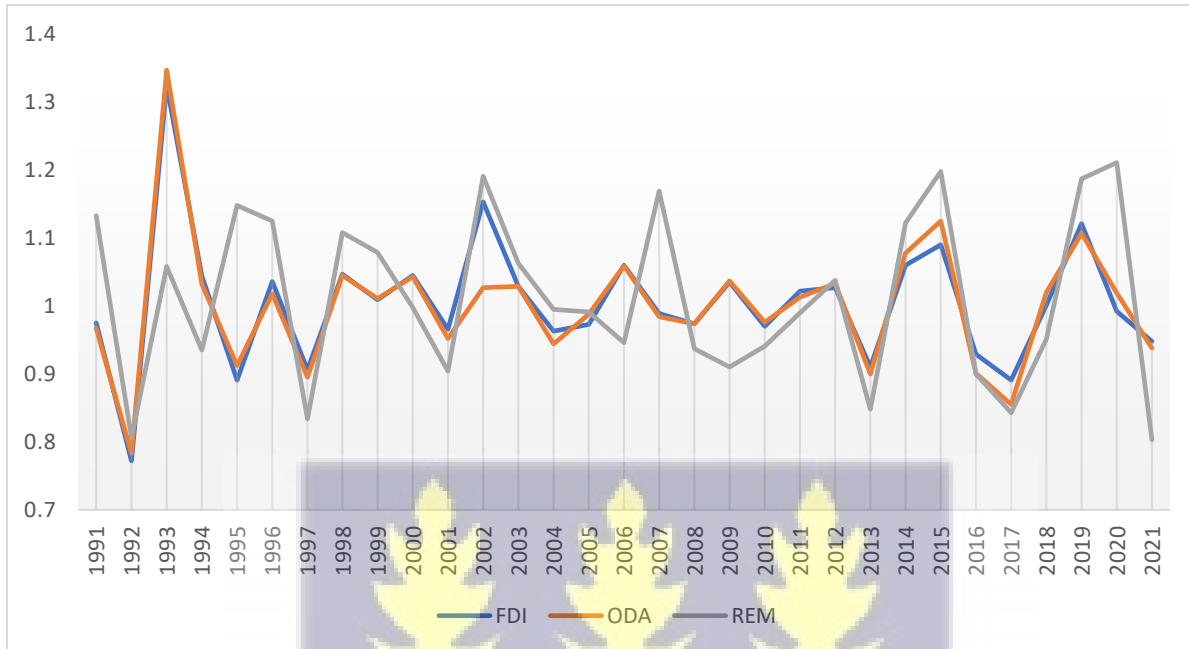


Figure 2.7: Total factor productivity of Sub-Saharan African Countries on human development from 1990 to 2021

From 2003 to 2008, increased variability is observed in TFP. Remittances begin to diverge from FDI and ODA, and increased migration flows and stronger financial linkages with the diaspora may have driven the rise in REM during the mid-2000s. While remittances contributed to household incomes, their impact on productivity was less consistent. Meanwhile, FDI and ODA maintained their steady influence, closely tracking and reinforcing their role in productivity growth, primarily through infrastructure and human capital investments. Between 2009 and 2015, TFP exhibited erratic fluctuations, particularly in REM, which showed a sharp spike in 2015. This period coincides with the aftermath of the global Commodity price plunge in 2014, which indirectly affected sub-Saharan Africa through commodity price changes and reductions in foreign aid. FDI and ODA, however, remained relatively stable during this time, helping to mitigate some of the effects of the crisis on productivity. The fluctuations suggest that while financial inflows helped buffer against external shocks, the region's productivity was still vulnerable to global economic conditions. From 2016 to 2021, volatility increased with a noticeable increase in all three inflows, especially remittance efficiency in 2019 – 2020. This sharp rise corresponds to the onset of the COVID-19 pandemic, during which international remittances and aid played a crucial role

in supporting sub-Saharan Africa's economies. The remittance surge likely reflects the increased financial assistance from the diaspora to families facing economic challenges. The 2020 increase in TFP may also indicate the region's recovery efforts, driven by external financial support and the easing of pandemic-related restrictions.

Although the results highlight notable inefficiencies in using foreign capital, it's important to consider alternative explanations and methodological constraints for a balanced view. First, Data Envelopment Analysis (DEA) is a deterministic method that considers all deviations from the frontier as inefficiency. In Sub-Saharan Africa, what seems like 'managerial inefficiency' might also stem from structural rigidities—such as severe energy shortages or transport issues—that are outside immediate management influence but limit their effect on GDP growth.

An alternative explanation for the discrepancy between low macroeconomic efficiency (40.7%) and higher human development efficiency (69%) in SSA economies relates to their structure. Much of the remittances and ODA flows go into the informal sector, directly benefiting household welfare through education and health, but these are often underrepresented in official GDP figures. As a result, the 'low' economic efficiency scores could partly reflect measurement inaccuracies concerning the informal economy's role in growth, rather than actual inefficient resource use.

## 2.5 Conclusions and Policy Discussions

This study set out to achieve two primary objectives: first, to construct an efficiency index evaluating how Sub-Saharan African countries utilize Foreign Direct Investment (FDI), Official Development Assistance (ODA), and Remittances for macroeconomic growth and human development; and second, to examine the changes in this efficiency over the period 1990 to 2021.

Regarding the first objective, the application of the Data Envelopment Analysis (DEA) revealed that efficiency in the region is generally suboptimal but varies significantly by growth path. Specifically, the findings indicate that SSA countries are relatively more efficient in transforming foreign capital into human development (with average efficiency scores of 69% for FDI, 63% for ODA, and 65% for Remittances) compared to macroeconomic growth (averaging 40.7%, 40.9%, and 43.6%, respectively). This explicitly addresses the objective by quantifying the utilization gap

and highlighting that foreign capital in SSA currently impacts welfare metrics more effectively than pure economic expansion.

Regarding the second objective, the Malmquist Productivity Index (MPI) analysis established that foreign capital efficiency has remained largely stagnant over the three-decade period, with no consistent upward trend. However, a critical finding linking to this objective is the identification of 'efficiency spikes' during global crisis periods (e.g., 2008, 2014, 2020). This suggests that external pressure acts as a discipline device, forcing temporary improvements in capital utilization, though these gains are rarely sustained in the long run

Based on the results of the Dumistrescu and Hurling (DH) (2012) bivariate causality test, foreign capital inflows Granger causes several macroeconomic factors, including real GDP growth, GDP per capita growth, HDI, inflation, gross fixed capital formation, domestic credit, and trade. However, unlike the bivariate causality result, the multivariate causality results, which serve as a robustness test, revealed that foreign capital inflows only cause real GDP growth, GDP per capita growth, and HDI. By considering both the DH bi-variate and the multivariate causality results, we identified the three significant foreign capital inflows (FDI, ODA, and remittances) as our input variables, against GDP growth and HDI as output variables for the macroeconomic and human development growth paths respectively. We used the Data Envelopment Analysis (DEA) by Chanes Coopers and Rhodes (1978) and Bankers Coopers and Chanes (1984), as well as the Malmquist Productivity Index by Malmquist (1961), to evaluate the relative efficiency of FDI, ODA, and remittances inflows and the changes for 1990 to 2021.

We have made significant theoretical and empirical contributions to the existing literature by developing efficiency indices for FDI, ODA, and remittance inflows for human development (quality of life) and in the quantity of development (economic growth), both of which constitute the economic development of a country. In terms of empirical contribution, we have added to the existing literature by ranking countries in SSA by the efficiency of foreign capital inflows, decomposed into FDI, ODA, and remittance efficiencies. In addition, we have assessed the changes in efficiency over the period from 1990 to 2021.

For the macroeconomic growth path, SSA countries' efficiency in utilizing foreign capital inflows is generally poor. The average FDI, ODA, and remittance efficiencies across all countries within the period are 40.7%, 40.9%, and 43.6%, respectively, indicating high levels of inefficiency of

more than 56% across the three foreign capital efficiencies. About ranking each country based on the three foreign capital efficiencies, Benin, Ethiopia, and Mali are ranked the top three in terms of FDI efficiency, suggesting that these economies have policy measures that enable them to take advantage of FDI inflows to enhance economic growth. On ODA efficiency, countries like Gabon, Ethiopia, and Burkina Faso are the top-ranked countries with average efficiency scores of 0.518, 0.478, and 0.46, respectively. This means these countries relatively utilize ODA in achieving economic growth compared to their peers in other countries. Regarding efficient utilization of remittance inflows, Burkina Faso, Togo, and Guinea are the countries with the highest relative performance in remittance efficiency. Across all the three foreign capital efficiencies, Burkina Faso, Ethiopia, and Mali are the only countries that are consistently among the top four SSA countries found in at least more than two efficiency lines. Conversely, Sudan consistently ranks at the bottom of the efficiency ranking of all three foreign capital efficiency rankings. Besides Sudan, Kenya, Senegal, and the Democratic Republic of Congo are also consistently ranked in the bottom four countries, not doing well in transforming aid into economic growth.

Concerning foreign capital efficiency for the human development growth path, we found that the overall average efficiency across the three efficiency lines is higher than that of average foreign capital efficiencies for the economic growth path. The overall average of FDI, ODA, and remittance efficiencies are 69%, 63%, and 65%, respectively, indicating more than 20 percentage points higher than the efficiencies for the macroeconomic growth paths in all the efficiency lines. In other words, inefficiencies are higher in transforming foreign capital inflows into economic growth (59.3%, 59.1%, and 56.4% for FDI, ODA, and remittances, respectively), compared to inefficiencies for the human development path of 31%, and 37%, and 35% for FDI, ODA, and remittances respectively. This implies that, on average, SSA countries are close to 60% wasteful or inefficient in transforming foreign capital resources into economic growth, compared with less than 40% inefficiency or wastefulness for the human development growth path. This suggests that although countries in SSA are largely inefficient in using foreign capital for economic development, they are relatively more productive in transforming foreign capital into improving human development than they do for economic growth on average.

Regarding quality of life, average FDI efficiency is the highest, unlike the economic growth path, where remittance efficiency is recorded as the highest. Concerning efficiency rankings for the human development growth path, Sierra Leone, Botswana, Gabon, Senegal, and Cameroon have

been consistently ranked in the top five countries across all three foreign capital efficiencies. This also implies that these countries have been able to leverage their foreign capital, FDI, ODA, and remittance inflows to improve the quality of life of their citizens. Specifically, Sierra Leone is ranked first in both FDI and remittance efficiencies and second in ODA efficiency, with average efficiency scores of 75.3%, 71.9%, and 70.3%, respectively. Similarly, Gabon is ranked first in ODA efficiency (70.9%), second in remittance efficiency (71%), and fourth in FDI efficiency (72.9%). Sudan, which is the worst-ranked country in the transformation of foreign capital inflows into economic growth, is ranked among the top nine countries (third in ODA efficiency, seventh in FDI efficiency, and ninth in remittance efficiency) in terms of improving human development with foreign capital inflows. The poorly ranked countries in terms of human development growth path include Togo, Lesotho, Ethiopia, DR Congo, Mauritania, and Benin Guinea, among others. These countries are among the highly ranked countries in terms of using foreign capital for economic growth, yet they are poorly rated in terms of human development growth path.

This suggests that while countries like Togo, Lesotho, Ethiopia, DR Congo Mauritania, and Benin focus on policies that facilitate the use of foreign capital to spur economic growth, other countries within the same continent, including Sierra Leone, Botswana, Gabon, Senegal, and Cameroon have a focus on policy initiatives that facilitate foreign capital towards improving the quality of life or human development for their populations.

Concerning the changes in efficiency over the period for each country for the human development growth path, Guinea experienced the highest average productivity or efficiency enhancement in terms of FDI and remittance efficiencies, while Uganda achieved the highest enhancement in efficiency in terms of ODA efficiency and second in remittance efficiency with 17.8% and 2.7% enhancement respectively, followed by Kenya with a productivity score of 1.105 (10.5% enhancement in ODS efficiency). The changes in total factor productivity for the human development growth path are mainly due to efficiency, scale, and managerial changes rather than technological adoption. This means improving efficiency in utilizing foreign capital in human development or ensuring the quality of life is influenced by operational efficiency, managerial and scale efficiency, and not technological adoption. Along the macroeconomic growth path, Kenya experienced the most significant improvement in average FDI, ODA, and remittance efficiencies,

with 6.1%, 5.1%, and 19%, respectively. Mali follows this with only 5.1% and 4.7% increases in average efficiency for FDI and ODA efficiencies for the period. Kenya is a consistent performer in her effort to improve the efficiency of foreign capital inflows for both economic growth and human development growth paths. Therefore, Kenya is an example or benchmark other countries could look up to improve their productivity or efficiency enhancement. Unlike the macroeconomic growth path, the main driving force behind productivity or efficiency changes is due to both technical change and adoption of technology efficiency changes across the sub-region.

The trend analysis of efficiency changes from 1990 to 2021, illustrated in the graphs in Figures 4.1 and 4.2 for macroeconomic and human development growth paths, respectively, show that while the year-on-year efficiency changes severely fluctuate or are highly volatile, there is no clear trend over of the changes over the period from 1990 to 2021. This suggests that countries in SSA remain stagnant in terms of improvement efficiency for both the macroeconomic and human development growth paths, indicating the inability of countries to operate efficiently and to leverage the use of technologies to improve or enhance efficiency and productivity over the given period. This might be due to the skills gap needed to leverage the technology to improve efficiency. Moreover, the results from the trend analysis also reveal that periods of the highest efficiency and productivity increases occurred in 1995, 1997, 2007, 2011, 2014, and 2020, along with the macroeconomic and in 1993, 2002, 2007, 2014 2019, and 2020 for the human development growth paths. These periods coincide with the significant financial and economic crisis of the Dot.com bubbles in 1995, the 2008/2009 Global financial crisis, the 2014 global commodity price plunge, and most recently, the COVID-19 pandemic in 2020. This is interesting because it raises the question of whether countries in SSA countries become more efficient and productive during periods of global crisis. The spikes appear to occur during one period of the crisis, so perhaps the threat of these crises prompts SSA countries to improve their commitment to adopt pragmatic and prudential policies that will help mitigate the possible adverse effect of a looming crisis on the continent. During this period, the World Bank and the IMF also begin to support vulnerable countries in the developing world to cushion them against the impact of these crises. A good example is the World Bank and IMF COVID-19 response financing during the Coronavirus pandemic in 2020.

The results of this study have some policy implications. First, the study reveals a gap between emphasis on economic growth and human development. Therefore, we propose that SSA countries' policymakers prioritize the allocation of foreign resources towards making policy initiatives that will balance the investment of the limited foreign capital inflows to enhance economic growth and improve the quality of life of their citizens. Again, based on the ranking of foreign capital efficiency, policymakers should take steps to help inefficient countries use highly efficient countries as benchmarks to improve their performance. Facilitating regional cooperation between less efficient countries and those close to the efficient frontier will enable inefficient countries to benefit from sharing the best practices of more efficient countries to improve overall efficiency. Moreover, despite the high adoption of technology, it does not translate into efficiency over the period, indicating a skills gap. Therefore, policy initiators in countries should invest in training and educating their workforce to apply new technologies better to improve overall efficiency in utilizing foreign capital inflows. Finally, given the low level of overall efficiency in economic development - macroeconomic and human development growth paths, mainly for economic growth, there is significant room for improvement, by 50% for the economic growth path and 30% for the human development growth path. Pragmatic policy measures should be initiated to address these inefficiencies.



## CHAPTER THREE

### INSTITUTIONAL AND MACROECONOMIC DETERMINANTS OF FOREIGN CAPITAL INFLOW EFFICIENCY IN SUB-SAHARAN AFRICA

#### 3.1 Introduction

This chapter evaluates the institutional and macroeconomic factors that affect variations in the efficiency of foreign capital inflows in SSA. Foreign capital inflows are critical drivers of economic growth in Sub-Saharan Africa (SSA). Due to insufficient domestic savings, the sub-region mainly relies on foreign capital inflows to stimulate economic development (Tyson & Beck, 2018). As a result, there is a growing demand for foreign capital inflows due to increased financial globalization through capital account liberation policies and incentives to foreign investors to attract substantial amounts of foreign capital. This led to a surge in foreign capital inflows across the globe. For instance, annual gross capital inflows moved from 5% of global GDP in the 1990s to about 20% in 2007, while the annual gross external liabilities increased from 60% to 180% of global GDP within the same period (OECD, 2017).

The different forms of foreign capital inflows are FDI, FPI, ODA, loans and remittances, etc. Among these inflows, the most common forms in SSA are FDI, ODA, and remittances. (Calderon et al., 2019; Mowlaei, 2018). These inflows are expected to benefit host countries through several channels. For instance, foreign capital inflows in the form of FDI provide technological benefits that help modernize host nations and promote sustainable economic growth (Alfarro, 2017). Therefore, FDI is expected to impact the development of the host country by directly increasing their capital stock, encouraging the adoption of new technologies and knowledge improvements through alternative management and organizational strategies, which in turn, directly affect labor productivity and efficiency (Elkomy & Ingham, 2016; Wang & Le, 2019). Remittances could increase the capital stock of households in the host country. Remittance inflows can increase physical and human capital, leading to long-term economic growth in developing countries (Mowlaei, 2018; Chami et al., 2003; Jan Singh et al., 2009). According to Dutta et al. (2016), ODA is meant to help poor developing countries reduce poverty and ensure sustainable development by encouraging equity investment, technical cooperation, and humanitarian aid. As the developmental

needs of countries in SSA increase, so does the demand for foreign capital inflows to augment the limited domestic capital for sustainable economic development.

However, the ability to utilize foreign capital for economic prosperity is to ensure their efficiency, and higher foreign capital efficiency is the one way to avoid waste of these resources and provide economic development in the sub-region. Low-income countries, such as SSA, require the complementarity between the increase in foreign capital inflows and the efficiency of its use if economic development is to be achieved (Kurul & Yelta, (2017).

Against this backdrop, foreign capital inflows' efficiency has become a key issue in public finance. It has become a subject of a rapidly growing literature, including key contributions by Teplovo and Sokolova (2019), Wang and Le (2019), Veiderpass and Andersson (2007), Naeher & Narayana (2022), and ZhaWang, (2014). These studies typically measure foreign capital efficiency by relating foreign capital inflows to macroeconomic indicators that are found to be a target for foreign capital inflows, such as investment in infrastructure development, human development, health, education, and economic development in general.

Except for Veiderpass and Andersson (2007), who examined aid effectiveness in developing countries, most studies focused on FDI-specific efficiency. The results of these studies suggest a substantial efficiency difference among countries, irrespective of their levels of foreign capital resources. The differences in how efficiently foreign capital inflows are utilized can affect growth and development in the host countries if we understand the factors or determinants influencing efficiency. To appreciate the risks and benefits of foreign capital inflows and to identify appropriate policy guidance on its attraction and proper utilization, it is crucial to examine the factors that influence the efficient transformation of countries' foreign capital inflow.

The variation of efficiency of foreign capital inflows across countries in SSA may be influenced by several contextual determinants or factors, with the level of institutional development-encompassing Economic Freedom indicators by Heritage Foundation and the World Governance Indicators including (rule of law, government effectiveness, control of corruption, regulatory quality, political stability and absence of violence) in shaping investments outcomes of economic growth and human development (Teplovo & Sokolova, 2019). Hauner and Kyobe (2008) discussed

three categories of factors affecting government expenditure efficiency: institutional, economic, and geographical determinants. A favorable economic environment is essential for transforming FDI into economic growth (Agrawal and Kha'n (2011b). Jude and Leveige, (2013) found democratic accountability to be the most decisive influence on increasing the efficiency of FDI transformation. Brahim and Rachdi (2014) contend that the FDI inflow effect depends mainly on the level of institutional development, and that indicators of the investment environment, political stability, and democratic accountability are the most significant factors affecting growth. These studies suggest that efficiency determinants are contextual and broadly categorized into institutional, macroeconomic, and other environmental factors.

Building institutions is one of the key components of a nation's attractiveness. Thus, our goal is to provide some insight into the factors that will guide countries in SSA to effectively improve the utilization of their foreign capital resources for sustainable economic growth and human development. Belegri-Roboli and Michaelides, (2010) contend that macroeconomic factors become relevant contextual efficiency factors as long as firms are state-owned and controlled. Hauner and, Kyobe, (2008) used institutional and macroeconomic factors to account for the variation in Government efficiency in 114 countries from 1980 to 2006.

The urgency of addressing the efficiency gaps is underscored by recent empirical failures across the region, in which significant capital inflows have failed to translate into sustainable growth. A salient example is Zambia, which issued \$3 billion in Eurobonds between 2012 and 2015 to finance ambitious infrastructure projects. Due to poor project selection and inflated costs, these investments failed to generate sufficient economic returns to service the debt, ultimately contributing to the country's sovereign default in 2020 and to plummeting growth rates. Similarly, in Ghana, research indicates that approximately one-third of development projects started by local governments are never completed, consuming nearly 20% of total capital investment expenditure without delivering any public service or economic value. These 'white elephant' projects illustrate a critical disconnect: capital availability is not the binding constraint; instead, the inefficiency of its deployment stifles national growth.

In this chapter, we investigate the effects of institutional and macroeconomic indicators on the efficiency of FDI, ODA, and remittance inflows in SSA countries from 1996 to 2021. This enables us to understand the factors that affect each of them and identify appropriate policy initiatives to enhance their attraction and utilization. As institutional factors, we consider the WGI institutional quality indicators: control of corruption, government effectiveness, political stability, the voice of accountability, rule of law, and regulatory quality. We look for such determinants and assess their influence using the fractional regression model. Fractional regression is a statistical approach proposed by Papke and Wooldridge, (1996) to model dependent variables restricted to a fraction of values, typically in the interval  $[0,1]$ , offering flexibility in analyzing proportions or bounded outcomes. Fractional regression is preferred when the dependent variable is bounded between 0 and 1 and represents a proportion. Unlike Tobit, Probit, or Logit models, fractional regression directly accommodates the continuous nature of proportions and avoids imposing artificial boundaries or assumptions about censoring. Analyzing bounded dependent variables has been a persistent challenge in econometric research. Cox, (1970) provided early insights into proportional data analysis, but the field lacked a comprehensive framework until the groundbreaking work of Papke and Wooldridge, (1996). Their seminal paper, "Econometric Methods for Fractional Response Variables," revolutionized the treatment of bounded dependent variables by introducing quasi-maximum likelihood estimation (QMLE) methods that appropriately handle responses in the unit interval  $[0,1]$ . Earlier approaches relied heavily on transformations. Johnson; (1949) and Atkinson, (1985) advocated for logistic transformations, while Ferrari and Cribari-Neto, (2004) developed beta regression models. However, as Kieschnick and McCullough (2003) demonstrated in their comprehensive review, these methods had significant limitations, particularly in handling boundary values and maintaining prediction bounds. Therefore, the chapter adopts Papke and Wooldridge's (1996, 2008) fractional regression model, as the dependent variable, foreign capital inflow efficiency, is a continuous variable ranging from 0 to 1.

### **3.1.2. Theoretical and Practical Contributions of the Chapter**

This study advances the existing body of knowledge through distinct theoretical and practical contributions. Theoretically, it bridges a critical methodological gap by applying the Fractional Regression Model (FRM) to the determinants of efficiency. Unlike prior studies that utilized OLS

or Tobit models—which are statistically inconsistent for bounded variables (0 to 1)—this approach provides a more robust econometric framework for analyzing efficiency scores. Furthermore, by disaggregating foreign capital into FDI, ODA, and Remittances, the study refines the 'aggregate capital' assumption prevalent in growth theory, demonstrating that the efficiency drivers for each capital type are structurally distinct. In practice, the findings provide a targeted institutional diagnostic tool for policymakers. Rather than a blanket prescription for good governance, this study identifies precise levers for specific outcomes: for instance, prioritizing the Rule of Law to enhance FDI efficiency versus strengthening Government Effectiveness to maximize ODA utilization. This allows SSA governments to sequence their institutional reforms according to their dominant external financing source.

### **3.2 Review of Literature**

Foreign capital inflows are critical in the economic development of SSA. Therefore, the efficiency with which they are being used and the factors influencing their variation are essential questions in the recent literature. Ensuring efficient use of foreign resources is the only way countries in SSA can benefit from the large inflows of foreign capital trickling into the sub-region. To maximize the benefits of foreign capital, governments in this region must implement effective control systems to avoid waste or inefficient use of these resources. Against this background, foreign capital efficiency and the factors influencing it have become the subject of a growing literature. This section reviews the empirical and theoretical literature on the determinants of foreign capital inflows, focusing on FDI efficiency, ODA efficiency, and remittance efficiency.

#### **3.2.1 Theoretical Framework**

This study combines three theoretical perspectives to thoroughly explore the factors influencing foreign capital efficiency. The primary framework is Absorptive Capacity Theory (Cohen & Levinthal, 1990), which suggests that a country's ability to use external capital effectively depends heavily on its existing knowledge base and institutional structures. This is why macroeconomic stability and human capital are emphasized as crucial determinants.

Second, a critical perspective on Official Development Assistance (ODA) is offered by Public Choice Theory (Buchanan & Tullock, 1962), which posits that inefficiencies occur because political elites often divert aid flows for rent-seeking rather than for public welfare. This theory justifies including governance indicators, such as Control of Corruption, as factors influencing ODA efficiency. Lastly, Dunning's Eclectic Paradigm (OLI Framework) is used to explain FDI efficiency, asserting that performance benefits from FDI materialize only when the host country provides specific Location advantages, such as infrastructure and the rule of law, enabling multinationals to effectively internalize their assets. Combining these perspectives broadens the analysis from simple capital accumulation models to a more detailed understanding of how resources are utilized.

### **3.2.2 Literature on Determinants of FDI Efficiency**

Literature on the determinants of the efficiency of FDI is relatively scanty. However, there is a large body of literature on the factors that affect FDI inflows. Teplovo and Sokolovo, (2019) sought to rank the institutional factors that explain FDI efficiency in economic growth and intellectual capacity growth paths. They concluded that government effectiveness, rule of law, and control of corruption are key factors affecting the efficiency of FDI for the intellectual capacity (IC) path. In contrast, for the economic growth path, better regulatory quality and economic freedom are the key factors driving changes in FDI efficiency. Aydin & Zortuk, (2014), in their work measuring the efficiency of FDI in selected economies in fuzzy DEA, ranked Russia as the number one country among the 12 countries formerly in the USSR, with an average lower and upper bound efficiency score of 100, followed by Kazakhstan and Ukraine at the second and third, respectively. Vu, (2016) applied a stochastic production frontier model to cross-sectional data from 2009 to 2013 to examine the technical efficiency of FDI firms in the Vietnamese manufacturing sector. The results showed that FDI firms recorded an average efficiency of 60%, which was higher than that of domestic firms. Regarding the factors affecting FDI technical efficiency, the study found that net revenue per labor and firm age are significant determinants of FDI efficiency in Vietnam. Nourzad (2008) looked at openness and the efficiency of FDI using a panel stochastic frontier analysis approach and revealed that increased FDI increases potential output in developed and developing countries but is more pronounced in developed countries. Moreover, increased FDI

inflows reduce technical inefficiencies in open markets in developed countries. The study also revealed that the efficiency-enhancing effect of FDI depends on openness and the host country's development. Sayari (2019) found that FDI is mainly determined by institutional quality.

Bak (2024) analyzed the efficiency of foreign affiliates and their determinants using the DEA methodology for Korean multinationals. The results revealed that the total number of employees significantly affects FDI efficiency, whereas low wages and export promotion adversely affect it in Korea. Further, Moreira, (2008), in examining the determinants of FDI, concluded that FDI in Africa are driven by natural resources and local markets. Shah Rudin et al., (2010) examined the determinants of FDI in Malaysia from 1970 to 2008, focusing on economic, institutional, and political factors. The study revealed that market size, trade openness, and infrastructure development were significant economic factors influencing FDI inflows. Additionally, political stability and the quality of institutions, such as the absence of corruption and an efficient legal system, positively affected FDI inflows into Malaysia. Hoang and Bui (2015) investigated the determinants of FDI in ASEAN countries from 1995 to 2013. They found that economic factors, such as market size, trade openness, and economic growth, and institutional factors, such as political stability and control of corruption, were significant determinants of FDI inflows in the region.

Furthermore, Baby and Sharma, (2017) analyzed the determinants of foreign direct investment inflows in India. Their study found that market size, economic growth, trade openness, and labor costs were significant determinants of FDI inflows into India. Sultana (2016) empirically analyzed the macroeconomic determinants of foreign direct investment inflows to India from 1991-2014. The study found that market size, economic growth, trade openness, and infrastructure development were significant positive determinants. Also, Dua and Garg (2013) analyzed the determinants of foreign portfolio investment flows to India using vector autoregression (VAR) models and cointegration techniques. They found that stock market returns, exchange rates, interest rates, and economic growth significantly impacted portfolio flows.

Jadhav and Katti, (2012) examined the institutional and political determinants of foreign direct investment in BRICS economies from 2003 to 2009. Their research highlighted the importance of political stability, institutional quality, and favorable regulatory frameworks in attracting FDI. Brafu-Insaidoo and Biekpe (2014) investigated the determinants of foreign capital flows in

selected Sub-Saharan African countries, employing panel data covering the period from 1980 to 2010. They found that economic growth, trade openness, and financial development positively and significantly influence capital flows, while external debt and inflation negatively impact them. Additionally, political risk and institutional quality played a significant role in attracting foreign capital. Similarly, Abdullah et al., (2010) examined the determinants of international capital flows in Malaysia using time-series data from 1970 to 2008. Their study revealed that economic growth, trade openness, and financial development were positively associated with capital inflows. Conversely, exchange rate volatility and external debt hurt capital flows, highlighting the importance of maintaining a stable macroeconomic environment and promoting financial sector development to attract foreign capital. Papaioannou, (2009) investigated the drivers of international financial flows, focusing on the role of politics, institutions, and other determinants. The study employed cross-country regression analysis and found that political risk, institutional quality, and governance were significant determinants of capital flows, alongside traditional economic factors such as market size, economic growth, and trade openness.

Dua and Garg, (2015) analyzed the macroeconomic determinants of foreign direct investment in India using time-series econometric techniques. Their research revealed that market size, economic growth, trade openness, and infrastructure development were positively associated with FDI inflows. Additionally, they highlighted the importance of maintaining macroeconomic stability, including low inflation and a stable exchange rate, in attracting foreign direct investment. Geda and Yimer, (2018) studied the determinants of foreign direct investment inflows to Africa using panel data analysis. Their research indicated that economic growth, trade openness, natural resource endowments, and infrastructure improvements were key factors attracting FDI to African countries. Jayasekara, (2014) studied the determinants of foreign direct investment in Sri Lanka from 1970-2013, finding that market size, economic growth, trade openness, and labor costs were significant positive determinants, while political instability and inadequate infrastructure deterred FDI inflows.

Uddin et al., (2019) examined the institutional determinants of inward FDI in Pakistan using data from 1984 to 2014. Their results showed that political stability, control of corruption, regulatory quality, and government effectiveness positively influenced FDI inflows into the country. Tintin (2013) examined the impact of institutional factors on FDI inflows in Central and Eastern European countries during 1998-2004. The study found that institutional quality, including control

of corruption, regulatory quality, and the rule of law, significantly influenced FDI inflows. Countries with stronger institutional frameworks attracted more FDI as investors sought stable, transparent business environments. Similarly, Soumaila, (2017) studied the determinants of investment efficiency in the West African Economic and Monetary Union (WAEMU) region from 1995 to 2014, using panel data analysis. The results showed that macroeconomic stability, financial development, and institutional quality influenced regional investment efficiency. Mastromarco and Ghosh, (2009) conducted a stochastic frontier analysis to investigate the impact of foreign and human capital on efficiency in developing countries. Their study revealed that foreign and human capital played crucial roles in enhancing economic efficiency in developing economies.

Erena et al., (2021), in their study, Technical Efficiency, Technological Progress and Productivity Growth of Large and Medium Manufacturing Industries in Ethiopia, applied the Tobit regression model to conclude that the capital-expenditure ratio significantly enhances technical efficiency in the manufacturing sector. Moreover, Hauner and Kyobe, (2008) examined the determinants of Government efficiency in 114 countries from 1980 to 2006. They found that higher government expenditure lowers technical efficiency, while institutional and demographic factors significantly improve efficiency. Mastromarco and Ghosh (2009) examined the determinants of total factor productivity using Stochastic Frontier Analysis. They found that FDI, R&D, machinery and equipment imports, and human capital accumulation are essential determinants of efficiency. Hauner and Kyobe, (2010) analyzed the determinants of government efficiency across countries using panel data analysis from 1985-2007. Their findings indicated that government size, education levels, and trade openness positively influenced government efficiency.

### **3.2.3 Literature on Determinants of Remittances Efficiency**

Several empirical studies have extensively investigated the factors that attract remittance inflows in developing countries, such as those in SSA. In a systematic literature review, Hagen-Zanker and Siegel (2007) revealed three main theoretical determinants of remittances: altruism, insurance, the bequest motive, loan repayment, and the exchange motive. Altruism is when migrants care and feel about poverty and shock for the families they left behind, sending remittances back home to support their families. Funkhouser (1995) found that remittances are negatively associated with recipients' income and positively associated with migrants' income. For self-interest, migrants may

send remittances home to invest at home (i.e., Housing, livestock, etc.) against the future or in preparation for returning home. Remittances may also flow due to co-insurance agreements between migrants and households left behind, in which case remittances increase with shocks at home. In contrast, households support the cost of migration.

Mallick, (2017) found that economic growth, interest rates, home capital market returns relative to host countries, financial deepening, and per capita income are significantly related to workers' remittances in Asia. These findings imply that workers' remittances in Asia are influenced by both altruistic and investment motives among migrants. Schiopu, (2006) sought to investigate the determinants of remittance inflows within the European laboring region. The study demonstrated that remittance inflows are driven by altruistic motives, as indicated by the positive relationship between the GDP differentials of sending and receiving countries and remittance inflows. On the contrary, the study revealed an insignificant relationship between differential interest rates, suggesting a weak investment motive for migrant remittances. In the work of Heke et al. (2013), the impact of migrant Remittances on the technical efficiency of arable crop farm households in South Eastern Nigeria revealed that education, household size, farming experience, and farm size were significant factors in the technical efficiency of remittance receiving households, while years of education and farm size were identified as the factors affecting of technical efficiency of non-remittances receiving households. Laniran and Adeniyi, (2015) found that remittances to Nigeria between 1980 and 2013 were not driven by altruistic motives but by portfolio motives. Specifically, remittances in Nigeria respond to changes in exchange rate, interest rate, and deposit rate differentials rather than to altruistic motives. On the contrary, Schiopu and Siegfried (2006) found that altruism and investment motives underlie remittance inflows in Moldova.

In examining the macroeconomic determinants of remittance inflows in sub-Saharan Africa, Adenutsi et al. (2011) found that the macroeconomic conditions of both home and host countries have varying impacts on remittances over time. Specifically, the study revealed that migrant income, the exchange rate, and institutional quality have a positive and significant effect on remittance inflows in SSA. At the same time, family income and inflation rates also affect remittance inflows. In a related study, Adenutsi et al., (2021) showed that altruism, rather than self-interest motives, influences migrant remittances. The primary macroeconomic factors that account for variation in remittances inflows in SSA are home and host country income differentials,

inflation, real interest rate differentials, real exchange rate depreciation, private sector credit and institutional quality, and remittances inertia.

Singh, (2019), in his study, *Institutional Determinants of Remittances*, sought to investigate the institutional factors affecting workers' remittances in developed and developing countries. The results show that improvements in political stability, investment profile, internal conflict, and democratic accountability significantly increase remittance inflows. At the same time, a decrease in socio-economic conditions and corruption also attracts remittance inflows. Singh (2010), in his work, *Workers' Remittances to India: An Examination of Transfer Cost and Efficiency*, found that transaction cost payment infrastructure and the efficiency of the payment system are essential determinants of remittance inflows in India. Jijin, (2022) identified macroeconomic indicators, including the exchange rate, GDP, and oil prices, as significant determinants of remittances in India. The study also indicates that migrants are vulnerable to oil price shocks and that remittances are driven by a weak investment motive rather than an altruistic motive.

In Bangladesh, Barua (2007) found that income differentials between host and home countries positively affect remittance inflows. In addition, differences in inflation rates between home and host nations negatively affect remittance inflows, suggesting that higher inflation in the home country may have reduced workers' remittances. Ultimately, the study concluded that remittances to Bangladesh are driven by both altruistic and investment motives. Further, Mustafa and Ali (2018) showed that the host country's economic performance has a positive and significant impact on remittances, as reflected in the investment climate. Moreover, it is revealed that remittance inflows are driven by macroeconomic factors in receiving countries rather than in sending countries.

Freund and Spatafora, (2005) find that the number of migrants in the OECD countries, money transfer fees, and dual exchange rate regimes reduce the share of remittances in the national accounts of developing countries. Moreover, Bunduchi et al., (2019) postulate that wage differentials and tax rates are essential determinants of remittance inflows in Romania, whereas unemployment is found to be an insignificant factor.

### 3.2.4 Literature on Determinants of ODA Efficiency

In their work, Laure et al., (2018) found that corruption undermines the effectiveness of official development assistance in the CEMAC zone, negatively affecting short-term economic growth. However, its effect is positive in the long run. Parsad et al., (2021) sought to investigate the effectiveness of ODA on the economic growth stability of states from developing countries. They found that good government policy and institutional quality are significant factors influencing aid effectiveness for enhancing economic growth in the least developed countries. Yahyaoui et al., (2019) attribute the effectiveness of ODA in positively impacting the economy in SSA to good governance practices, including control of corruption, political stability, the voice of accountability, government effectiveness, regulatory quality, and the rule of law. The study concludes that these institutional factors are deterministic conditions for ODA to positively impact growth in the sub-region. This implies that the quality of institutions enables a better allocation of aid to productive projects, thereby enhancing economic growth in the sub-region.

Pierre, (2015) indicated that when foreign aid is implemented within a strong public policy framework and human development targets, it leads to relative success in economic development. Asongu and Amavilah, (2019), in investigating the effectiveness of development aid for agriculture in SSA, found that better institutions and economic freedom improve productivity growth and increase the effectiveness of development assistance. Lee & Hong, (2018) found that remittances and ODA are the most effective in promoting economic growth for developing countries, while FDI is the most effective for middle-income developing countries.

In examining aid effectiveness in the education sector, Michaelowa and Weber, (2006) applied the dynamic panel analysis to conclude that aid directly and significantly impacts school enrolment. However, this relationship is conditioned on the favorable general political and institutional environment. The study also confirms that, under poor governance, aid can harm enrolment. Akarsu, (2019). Investigated the determinants and welfare impacts of foreign aid and found macroeconomic factors, including real income per capita, trade openness, migration flows as a share of the total population, and government measures, that impact foreign aid significantly. This implies that foreign aid improves the welfare of recipient countries. However, for donor countries, poverty, donor interests reflected in migration flows, and governance quality are found to be significant determinants of foreign aid allocation.

### **3.2.5 Critical Synthesis and Methodological Gaps**

A critical review of existing literature highlights two major methodological gaps that this study seeks to address. First, although research such as Vu, (2016) and Mastromarco, (2008) has extensively investigated efficiency determinants, they mainly use standard linear regression (OLS) or Tobit models in the second stage. These methods are methodologically problematic for efficiency scores (which range from 0 to 1) because they do not ensure that predicted values remain within this range, often leading to biased marginal effect estimates. This study diverges from this approach by employing the Fractional Regression Model (FRM), which is more appropriate for bounded dependent variables.

Second, existing empirical findings on the role of institutions are largely fragmented. Studies like Teplova and Sokolova, (2019) focus on FDI-specific efficiency, while Singh, (2019) focuses solely on remittances. There is a marked absence of a unified framework that compares the institutional determinants across the three major capital inflows (FDI, ODA, and Remittances) within an everyday structural context. By synthesizing these fragmented strands, this study provides a more holistic view of how institutional quality differentially impacts the efficiency of diverse capital types.

## **3.3 Methodology**

### **3.3.1 Data and Variables**

The data for the study is taken from 35 sub-Saharan African countries from 1996 – 2021. The choice of this period is based on data availability. Specifically, the World Governance Indicators (WGI), which we used as our institutional quality variables, only began in 1996. The WGI data are presented as percentiles and estimates. We used the WGI estimates, scaled in a standard regular distribution unit of the governance indicators, ranging from -2.5 to 2.5, with -2.5 as the weakest institutional quality and 2.5 as the most potent quality. The macroeconomic variables are sourced from the World Development Indicators for 35 sub-Saharan African countries from 1996 to 2021. The dependent variables, efficiencies of foreign capital inflows, are estimates derived by the author from the Malmquist DEA methodology in Chapter Two. Table 3.1 below summarizes the variables used in the study with their descriptions and sources.

Table 3.1: Variables used, description and Sources

Variable	Description	Source of Data
GDP growth rate	Real GDP growth %	WDI
GDP per capita growth	GDP per capita growth, %	WDI
Inflation	Inflation rate (CPI) %	WDI
Trade	Trade openness (% of GDP	WDI
Institutional Quality (IQ)	World Governance Indicators (WGIs): Control of Corruption (CC) Governance Effectiveness (GF) Rule of Law (RL) Regulatory Quality (RQ) Political Stability (PS) Voice of Accountability (VA)	World Bank Group
Exchange rate	Annual recent change	WDI
Gross fixed capital formation	Gross fixed capital formation, % of GDP	WDI
Financial Development Index (FD)	The composite financial development index	WDI
HDI	UNDP Human Development Index	UNDP
FDI Efficiency	FDI Efficiency Index	Derived from Malmquist DEA estimation
ODA Efficiency	ODA Efficiency Index	Derived from Malmquist DEA estimation
Remittance Efficiency	Remittance Efficiency Index	Derived from Malmquist DEA estimation
POPGROWTH	Population growth rate	WDI
Govexp	Government expenditure % of GDP	WDI
PCA IQ	Composite Institutional Quality from Principal Component Analysis WGIs	PCA estimation
Years of Education (YE)	Years of education	UNDP
Life expectancy (LE)	life expectancy rate	UNDP
Technological adoption (Mobsr100)	Mobile subscription per 100	WDI

The two-stage approach is used to analyze the factors affecting the utilization efficiency of foreign capital inflows. In the first stage, efficiency scores are estimated using the nonparametric Data Envelopment Analysis (DEA) method. In contrast, the institutional and macroeconomic factors that affect efficiency are determined in the second stage using the Fractional regression model

(FRM). However, the DEA efficiency scores have already been estimated in Chapter Two. They will be used directly in the second stage of this paper to account for the factors or determinants that affect the variation in foreign capital utilization efficiency. The DEA efficiency scores herein, denoted as ( $y$ ), are defined over the bounded interval of  $[0,1]$ . In stage two, we examine the impact of institutional and macroeconomic factors on the efficiency of DMUs (sub-Saharan African countries). These factors are contextual to how foreign capital is utilized; therefore, it is only logical to consider them to determine which institutional and macroeconomic factors and discretionary variables affect the variation of foreign capital efficiency. Different regression models have been used for the second stage of the DEA Analysis, most of which have been inappropriate. Efficiency scores range from 0 to 1, according to Papke and Wooldridge (1996). The standard linear model is unsuitable for continuous bounded dependent variables such as the DEA efficiency scores. This is because the predicted values of the outcome variable ( $y$ ) may lie outside the unit interval, making the marginal effects of the covariates on  $y$  not compatible with the bounded nature of the DEA efficiency scores and the probable presence of a mass point at unity in the distribution of the efficiency scores. Another widely used approach questioned in modeling efficiency scores is the two-limit Tobit model, with limits between zero and unity (Simar & Wilson, 2007). However, according to Ramalho et al. (2010), the accumulation of observations at unity is a natural feature of how DEA scores are defined, rather than a result of censoring, as in the case of a Tobit model. They further argued that the domain of the two-limit Tobit model differs from that of DEA efficiency scores, since zero efficiency scores are rarely observed.

Given the bounded nature of the DEA efficiency scores, we adopt the logit fractional regression model proposed by Papke and Wooldridge, (1996, 2008). Ramalho et al. (2010) postulate that any data-generating process for DEA scores, defined on  $[0, 1]$ , requires the use of regression models suitable for handling fractional data in the second stage of the DEA analysis. In this chapter, we follow (Papke & Woodridge, (1996, 2008) to analyze the functional form of the efficiency scores suitable for handling the bounded nature of efficiency scores by using the fractional regression model (FRM). The choice of the Fractional Regression Model (FRM) over conventional alternatives is driven by the specific distributional properties of the dependent variable—efficiency scores—which are strictly bounded within the unit interval  $[0, 1]$ . One advantage of the FRM method is that the model can be estimated using quasi-maximum likelihood (QML), as it does not

require strict assumptions about the conditional distribution of DEA scores or about heteroskedasticity patterns (Papke & Woodridge, 1996).

Standard linear models, like Ordinary Least Squares (OLS), are theoretically unreliable in this analysis because they do not limit predicted values within the  $[0, 1]$  range; as a result, an OLS model could produce illogical efficiency predictions (e.g., - 0.2 or 1.5), making the coefficients untrustworthy for policy analysis.

Another common alternative, the Tobit model, is typically used for censored data. However, applying Tobit here would be a conceptual error. In efficiency analysis, scores of 0 or 1 are not 'censored' values (where the true value is unknown but beyond a threshold) but are actual observed outcomes representing minimum or maximum efficiency. The FRM, estimated via Quasi-Maximum Likelihood (QMLE), overcomes these limitations by using a functional form that ensures all predictions fall within the logical range  $[0, 1]$  while robustly handling the corner solutions at the boundaries. Thus, FRM offers a more rigorous and econometrically sound framework for modeling efficiency determinants than either OLS or Tobit.

The primary concern of FRMs is the specification of the conditional mean of the dependent variable (the DEA efficiency scores). Any misspecification of the functional form will lead to inconsistent results, and it is more serious than sampling variability of the DEA scores (Ramalho et al., 2010; Papke & Wooldridge, 1996). Therefore, the main concerns regarding the validity of FRM models are specification testing of the model's functional form and overall goodness-of-fit testing.

### 3.3.2 Model Specification

Given the bounded nature of our DEA efficiency scores and to avoid the problems associated with linear and Tobit models in the DEA framework, this study uses the fractional regression (FRM) model. The Fractional regression was introduced to handle outcome variables distributed within a unit interval, whether or not the boundaries are observed. The key advantage of the FRM approach is that it is less restrictive, and the most important requirement is the assumption of functional form for  $(y)$  that imposes the necessary restrictions on the conditional mean of the DEA efficiency scores, the dependent and bounded, or proportional outcome variable (Papke and Woodridge,

(1996). The type of fractional regression mode will be chosen after the specification test. The various fractional regression models, such as fractional probit, logit, and fractional heteroskedasticity probit, are used in the literature. We follow Papke and Woodridge, (1996), and Ramalho et al., (2010) to specify the fractional model as follows;

Suppose that the dependent variable  $y$ , which lies between  $0 < y < 1$ , is to explain  $1 \times M$  vector of the independent variable,  $\mathbf{x}$  ( $x_1, x_2, x_3, \dots, x_M$ ); the population model will be given as;

$$E(y|\mathbf{x}) = \beta_1 + \beta_2 x_1 + \beta_3 x_2 \dots \dots \dots \beta_m x_m = \mathbf{x}\beta \quad (1)$$

But  $\beta$ , which is an  $M \times 1$  vector, does not provide the best estimation of  $E(y|\mathbf{x})$  because  $y$  (DEA efficiency score) is bounded between 0 and 1; hence any effect of  $x_i$  It may not be constant throughout the range of  $x$ . This problem can be handled by supporting the linear model with a non-linear function of  $\mathbf{x}$ . This notwithstanding, the predicted values from OLS regression cannot be guaranteed to lie between 0 and 1. Hence, the problems associated with linear models for a fractional dependent variable are similar to those of linear probability models for binary choice data.

Papke and Woodridge, (1996) proposed an alternative to equation 1 is to transform the  $y$  into a log odds ratio as a linear function. Given that  $y$  is strictly between 0 and 1, then a linear model for the log odds ratio is given as follows;

$$E(\log\{y/(1-y)\} | \mathbf{x}) = \mathbf{x}\beta \quad (2)$$

Equation 2 can be modeled as a linear function because, as  $y$  varies between 0 and 1, the log odds ratio,  $\log\{y/(1-y)\}$ , can take any real value. However, the problem with equation 2 is that it cannot be confirmed without adjustment if  $y$  takes the boundary values 0 or 1 with positive probability. In other words, the log-odds transformation fails when responses at the corners or extreme boundaries (0 and 1) are observed (Papke & Wooldridge, 2006). Moreover, even where the variable is found within the unit interval, the conditional mean of the fractional dependent variable cannot be recovered from the log odds ratio without a strong assumption of independence (Papke & Woodridge, 2008).

Consequently, Hausman and Leonard (1997) and Papke and Woodridge (2008) specify the model as follows;

For cross-sectional observation  $i$ , with period  $t$ , the outcome variable  $y_{it}$ , which lies between  $0 \leq y_{it} \leq 1$ , where the boundary points, 0 and 1, are inclusive and  $y_{it}$  It could be binary. To account for the bounded features of the outcome variable, the following functional form for the expectation of  $y_{it}$  (efficiency score) at country  $i$ , at time  $t$  is specified, conditional on explanatory variables  $X_{it}$  and  $c_i$

$$E(Y_{it}|INS_{it}, X_{it}, c_i) = G(INS_{it}\alpha, X_{it}\beta, c_i) \quad (3)$$

where  $INS_{it}$  is the independent variable (institutional quality),  $X_{it}$  is a vector of the explanatory variables containing the macroeconomic determinants for country  $i$  at period  $t$ .  $c_i$  It is a country-specific fixed effect.  $G(\cdot)$  is the cumulative distribution function (c.d.f.), representing an S-shape fractional logistic function satisfying  $0 \leq y_{it} \leq 1$ , with  $G(X_{it}\beta, c_i) = \exp^{X_{it}\beta, c_i} / [1 + \exp^{X_{it}\beta, c_i}]$ .

Under equation (3),  $\beta$  can be estimated consistently using non-linear least squares (NLS). According to Papke and Woodridge (1996, 2008), the use of NLS is still sound, and the conditional expectation of  $y$  given the explanatory variables ( $E(Y_{it}|X_{it}, c_i)$ ) are estimated directly. The quasi-maximum likelihood estimator (QMLE) is also robust and relatively more efficient. Mullahy (1990) also suggests using NLS for continuous distributive outcomes on a bounded interval.

Papke and Woodridge (1996) suggested that the parameters of the FRM can be consistently estimated using the Bernoulli quasi-maximum likelihood estimator (QMLE), as follows.

$$l_i(\mathbf{b}) = Y_i \log [G(X_i\beta, c_i)] + 1 - Y_i \log [1 - G(X_i\beta, c_i)] \quad (4)$$

Equation (4) is well-defined for  $0 \leq y_{it} \leq 1$  and since it is a member of the linear exponential family, the quasi-maximum likelihood estimator (QMLE) of  $\beta$  derived from the maximization problem,  $\text{Max} \sum_{i=1}^N l_i(\mathbf{b})$ , is consistent for  $\beta$  If equation (3) holds.

The dependent variable in this study is the DEA efficiency scores for FDI, ODA, and remittance inflows. The independent variables comprise the institutional quality factors,  $INS_{it}$  and macroeconomic factors,  $X_{it}$ . Due to the highly correlated nature of the institutional quality variables and to address potential multicollinearity, Equation 3 is split into 7 models, with each institutional quality variable included in its own model, and a composite institutional quality measure (PCA) derived from principal component analysis as a robustness check in model 7. For instance, models 1, 2, and 3 include the rule of law (RL), regulatory quality (RQ), and political stability (PS) as the institutional quality variables, respectively. In addition, model 4 has the voice

of accountability (VA) as the institutional quality variable. In model 5, government effectiveness is used as the institutional quality factor, and in model 6, control of corruption is used as the institutional quality variable. In the final model (7), we used a composite institutional quality measure derived from a principal component analysis as a robustness check. The seven models are stated as follows;

$$E (EFF_{it}|RL_{it}, X_{it}, c_i) = G( RL_{it}\gamma_1, X_{it} \gamma_2, c_i) \quad \text{Model 1}$$

$$E (EFF_{it}|RQ_{it}, X_{it}, c_i) = G( RQ_{it}\delta_1, X_{it} \delta_2, c_i) \quad \text{Model 2}$$

$$E (EFF_{it}|PS_{it}, X_{it}, c_i) = G( PS_{it}\vartheta_1, X_{it} \vartheta_2, c_i) \quad \text{Model 3}$$

$$E (EFF_{it}|VA_{it}, X_{it}, c_i) = G( VA_{it}\phi_1, X_{it} \phi_2, c_i) \quad \text{Model 4}$$

$$E (EFF_{it}|GF_{it}, X_{it}, c_i) = G( GF_{it}\omega_1, X_{it} \omega_2, c_i) \quad \text{Model 5}$$

$$E (EFF_{it}|CC_{it}, X_{it}, c_i) = G( CC_{it}\rho_1, X_{it} \rho_2, c_i) \quad \text{Model 6}$$

$$E (EFF_{it}|PCA_{it}, X_{it}, c_i) = G( PCA_{it}\tau_1, X_{it} \tau_2, c_i) \quad \text{Model 7}$$

where  $EFF_{it}$  is the efficiency of FDI, ODA, and remittances inflows at time  $t$  in country  $i$ ,  $X_{it}$  represent macroeconomic factors, including GDP growth, inflation, financial development, population, gross fixed capital formation, trade, government expenditure, exchange rate, and labor force.  $RL$ ,  $RQ$ ,  $PS$ ,  $VA$ ,  $GF$ ,  $CC$ , and  $PCA$  are the WGI institutional quality factors for the rule of law, regulatory quality, political stability, voice and accountability, and control of corruption.  $PCA$  is an aggregate measure from the principal component analysis.  $c_i$  is the country-specific effect.

There are some functional specification models for fractional regression. These include the logit, probit, loglog, and Cloglog models, among others. The appropriate model to be selected is based on the results of the RESET test. Based on the RESET test results, the logit model was selected for the fractional regression across all models. Results of the RESET test are reported under the post-estimation diagnosis in each regression table. The remaining specification models were not reported because they were not significant in selecting an appropriate model.

### 3.4 Results

This section presents the study's results, starting with the descriptive statistics and correlation matrix. The summary statistics in Table 3.2 below show that the average efficiency levels are 0.68, 0.67, and 0.65 for FDI, ODA, and remittance efficiencies, respectively. The minimum efficiency levels are 0.31, 0.287, and 0.2815 for FDI, ODA, and remittances, respectively, while all recorded the maximum efficiency of 1 (100%).

*Table 3.2: Summary statistics*

Variable	Obs	Mean	Std. Dev.	Min	Max
Control of Corruption	805	-0.5395	0.6004	-1.6479	1.6334
Governance Effectiveness	805	-0.6431	0.6088	-1.8414	1.1609
Political stability	805	-0.4660	0.8667	-2.8479	1.2831
Regulatory Quality	804	-0.5362	0.5581	-2.0966	1.1969
Rule of Law	805	-0.5755	0.5938	-1.9184	1.0240
Voice of Accountability	805	-0.4695	0.6609	-1.8587	1.0072
GDP Growth	805	4.1458	4.1430	-28.1000	26.4173
Inflation	805	8.2113	26.1387	-8.4843	513.9070
Financial Development	805	0.1433	0.1171	-0.0334	0.6426
Trade	805	67.1694	35.9427	0.7569	225.0230
Population Growth	805	2.4239	0.9796	-2.6287	16.6255
Government Expenditure	758	108.0650	13.6635	57.6985	169.3738
Exchange Rate	805	4.9442	2.2205	-1.8107	9.2533
PCAIQ	804	-0.0011	2.1997	-3.8715	5.3717
Gross Fixed Income Formation	770	22.2436	10.0743	0.0000	79.4011
Total Labor Force	782	6.5611	0.6406	5.0500	7.8489
Financial development	805	1.0452	0.4361	0.0000	3.7223
Remittance Efficiency	805	0.6743	0.1518	0.2876	1.0000
ODA Efficiency	805	0.6518	0.1380	0.2876	1.0000
FDI Efficiency	805	0.6831	0.1386	0.3144	1.0000
Mobsr 100	780	53.7212	45.2685	0.0000	185.5593
Eys	782	9.7530	2.4752	2.4614	15.3183
Le	782	58.4391	6.4696	40.6979	75.1179

Our data clearly show that FDI inflows are the highest in SSA, followed by remittances, with ODA the least among foreign capital inflows in the sub-region. Among the six WGI institutional variables, political stability has the highest (1.283) and the lowest (-2.8478) institutional quality scores, with an average institutional quality of -0.46597. This is followed by regulatory quality with an average of -0.53617, a minimum of -0.2096, and a maximum level of 1.1969. The statistics

of the rest of the institutional quality indicators, control of corruption, the voice of accountability, the rule of law, and governance effectiveness have all shown high standard deviations compared to their means. Suggesting that institutional quality standards across the SSA countries vary widely. Similarly, the GDP growth rate ranges from -28 to 26.2%. The average GDP growth rate across countries in SSA is 4.12% throughout the study.

The correlation matrix presented in Appendix 1A shows that all the WGI institutional quality variables, control of corruption, governance effectiveness, political stability, the voice of accountability, regulatory quality, and the rule of law, are highly correlated with one another, with a correlation coefficient of more than 63% for all of them. This raises concerns about multicollinearity issues in the regression. Consequently, we resolve this problem by including each institutional quality variable in a separate model, yielding seven models, each representing a distinct WGI indicator of institutional quality. The seventh model, a robustness check, is an aggregated institutional quality index derived from conducting a principal component analysis. On the contrary, the macroeconomic variables do not correlate with one another or with the individual institutional variables. Therefore, multicollinearity concerns between the macroeconomic and the particular institutional quality measures do not correlate, allaying our fears of multicollinearity problems.

### **3.4.1 Results of determinants of foreign capital utilization efficiency**

Results of the determinants of the foreign capital inflows are presented in Tables 3.3, 3. 4, and 3.5 for FDI, ODA, and remittance efficiencies, respectively. Before we discuss the results, it is important to note that the coefficients and standard errors of the fractional regression model cannot be meaningfully interpreted directly (Papke & Woodridge, 1996). To make the coefficients meaningful, marginal effects are estimated from the fractional regression model, which is then used to interpret the results. For meaningful interpretation, we presented only the coefficients and standard errors of the marginal effects in Tables 3.3, 3.4, and 3.5. Consequently, we present only the marginal effects rather than the coefficients of the fractional regression model. Therefore, the coefficients in Tables 3.3, 3.4, and 3.5 represent the marginal effects of the fractional regression model. Because the fractional regression coefficients lack meaning, we estimated marginal effects from it. We included them in the results due to space constraints.

The dependent variables for Tables 3.3, 3.4, and 3.5 are FDI efficiency, ODA efficiency, and remittance efficiency. The analysis encompasses a comprehensive set of explanatory variables, including macroeconomic and institutional factors. As indicated earlier, we present the results in six separate models (along with the six WGI institutional quality indicators) due to potential multicollinearity concerns among the institutional quality variables.

### **3.4.2 Results of the determinants of FDI efficiency**

The results of factors affecting the efficiency of FDI inflows are presented in Table 3.3 below. The results from Table 3.3 reveal that GDP growth positively and significantly affects FDI efficiency across all seven models. This implies that higher GDP growth will improve the efficient use of FDI inflows for economic growth in SSA. For instance, a 1% increase in the GDP growth rate leads to 0.24%, 0.26%, 0.29%, and 0.16% increase in FDI Efficiencies in models 1, 2, 3, and 7, respectively. This means that in SSA countries, higher economic growth rates may offer more opportunities for foreign investors to capitalize on the higher growth to earn higher returns on their investments, which aligns with the market-seeking motive of FDI.

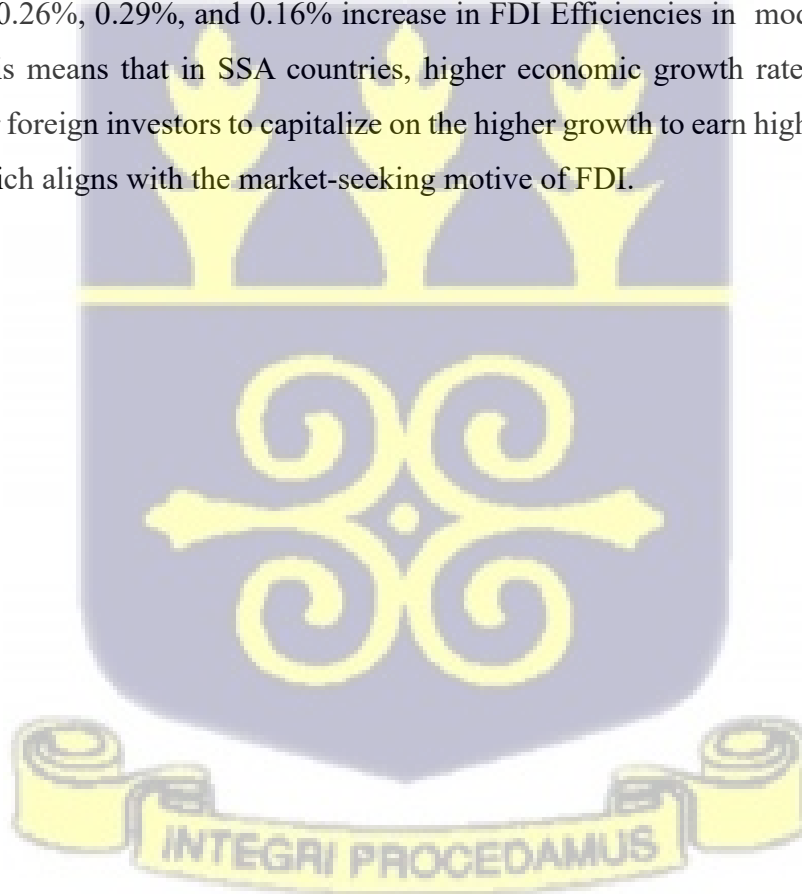


Table 3.3: Results of the Determinants of FDI Efficiency

Variable	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7
GDP growth	.00238* (.00137)	.00255* (.00139)	.002901** (.0013)	.00257* (.00138)	.00223* (.00138)	.01626** (.00690)	.00243* (.00139)
Inflation	-.001491** (.0000664)	-.02071*** (.00771)	-.001607** (.00007)	-.00229*** (.00008)	-.00322*** (.0000953)	-.00990 ** (.00042)	- .00219*** (.00007)
FD	-.005559 (.01039)	-.0041659 (.0105217)	-.0019328 (.0105968)	-.28575*** (.078634)	-.26569*** (.0809486)	-.2557*** (.0709486)	-.0039119 (.0105064)
Trade	.0001071 (.0001975)	.0001203 (.0001983)	-.0000742 (.0002007)	.0000384 (.0001906)	.0000117 (.0001966)	.0006581 (.0001901)	.0000639 (.0002011)
Technology	.00585 *** (.0001399)	.00614*** (.0001412)	.00659*** (.0001387)	.00715*** (.0001332)	.00776*** (.0001331)	.00658*** (.0001901)	.00628*** (.0001409)
Gfixcapform	.0009159 * (.0004931)	.001325*** (.0004898)	.001449*** (.0004884)	.00170*** (.0005233)	.001426 *** (.0005371)	.00131** (.000510)	.00120** (.0004899)
Population	.0081348 .0085823	.0000118 .0085933)	-.0039911 .0088847)	-.024174** .0099163)	-.0158711* .0097511)	-.022708 ** .0106134)	.0028855 .0086986
RL	.05978*** (.0091121)						
RQ		.03667*** (.010261)					
PS			.02732*** (.0055716)				
VA				.04726*** .008728)			
GF					.05964*** (.0120729)		
CC						.04141*** (.0110307)	
PCA							.01127*** (.0026068)
<b>Diagnosis</b>							
No. of Observations	745	744	745	735	745	745	745
Wald $\chi^2$ Prob.	134.36 (0.000)	98.55 (0.000)	126.30 (0.000)	157.38 (0.000)	100.07 (0.000)	158.01 (0.000)	102.06 (0.000)
RESET Statistic Prob.	0.32 (0.747)	-0.91 (0.365)	-0.43 (0.667)	-1.16 (0.247)	-1.20 (0.230)	-0.55 (0.582)	-1.51 (0.131)

Notes: Standard errors are reported in parentheses. \*\*\*  $p < 0.01$ , \*\*  $p < 0.05$ , \*  $p < 0.1$

In recipient countries, investors are attracted to markets that are expanding, and consumer demand is increasing. Our results lend credence to the economic growth hypothesis of foreign direct investment (FDI), which holds that economies with higher growth rates attract more effective FDI because they offer greater profitability and market expansion opportunities. Our results are also supported by Osei and Kim (2020), who found that the positive economic growth-FDI nexus largely depends on a country's financial market development and investment efficiency. Moreover, Mawugnon and Qiang, (2011) postulate that efficiency spill-overs to local firms from FDI inflows spur the positive impact of FDI on economic growth.

Furthermore, the results reveal that technological progress is highly significant and positively affects FDI efficiency across the seven models, with coefficients ranging from 0.06% to 0.07%. This means that a percentage increase in technological progress will lead to a range of 0.06% to 0.07% enhancement in the efficient use of FDI in economic growth. Intuitively, higher levels of technological development provide an improved infrastructure and human capital, which foreign investors can leverage to improve the efficiency of FDI inflows. This finding supports the technology spillover theory of FDI inflows, which posits that host countries with improved technological capabilities can absorb and benefit from the advanced technologies that accompany FDI inflows in developing countries.

Regarding gross capital formation, the coefficient is significant and positive at a 1% level in most models, with the impact factors ranging from 0.001 to 0.0014. This suggests that a percentage increase in gross capital formation is associated with an improvement of 0.1% to 0.014% in the efficient use of FDI inflows in SSA. High levels of capital formation indicate a country's capacity to invest in productive assets, which can complement FDI inflows to enhance the efficiency of foreign investment. The results align with the Neoclassical economic theory of capital accumulation and its relationship to FDI. This suggests that countries with better investment conditions can efficiently absorb and utilize foreign investment.

Our findings also reported a significant and negative effect of inflation on the efficiency of FDI inflows across all seven models. For instance, a 1% increase in inflation will decrease FDI efficiency by 2.07% in model 2 and vice versa. Inflation creates economic uncertainty and erodes

the value of returns, making it more challenging for foreign investors to plan and realize efficient investments. The negative relationship between inflation and FDI efficiency aligns with the macroeconomic stability hypothesis, which suggests that countries with a stable macroeconomic environment, especially in terms of inflation, are more attractive to foreign investors and are likely to utilize FDI inflows more efficiently.

Financial development is only statistically significant and negative in models 4, 5, and 6. Although Models 1, 3, and 7 are negative, they are not statistically significant. The negative relationship is counterintuitive. The results indicate that a 1% improvement in financial development will decrease FDI efficiency by 28.6% and 26.5% in models 5 and 4, respectively. However, we expect better financial development to improve FDI efficiency. This result is somewhat counterintuitive, as we might expect better financial development to improve FDI efficiency. However, domestic investment might be more efficient or preferred over FDI in countries with highly developed financial markets.

Regarding the institutional and governance factors considered in this chapter, we find that all governance indicators have a positive and highly significant impact on FDI efficiency, with magnitudes ranging from 0.027 to 0.06. An improved institutional environment with better governance structures, including the rule of law, regulatory quality, political stability, voice and accountability, government effectiveness, and control of corruption, all help to establish a more stable and predictable platform for foreign investors, which leads to more efficient use of FDI investments. These findings support the institutional theory of FDI, which indicates that institutional quality in the host country is critical in attracting and ensuring FDI efficiency.

Specifically, control of corruption in Model 1 has a significant, positive effect on FDI efficiency. This implies that control of corruption enhances FDI efficiency, whereas its absence adversely affects it. This outcome highlights the importance of fighting or combating corruption and other rent-seeking behaviors. The fight against corruption will create an environment that enables the use of foreign investment to achieve macroeconomic development. A 1% increase in the fight against corruption will enhance FDI efficiency by 4.14.% in model 6. This result is supported by Nguyen and Tran (2022), who concluded that corruption negatively influences corporate

investment efficiency. In Model 2, government effectiveness is significant and positively associated with the use of foreign capital inflows. Specifically, a percentage increase in government effectiveness is associated with a 5.96% improvement in FDI efficiency in model 5. This means that effective governance can deliver improved services and implement sound policies that respond to economic shocks. This can improve a country's economic conditions, reducing operational inefficiencies for foreign investors.

Similarly, the impact of regulatory quality on FDI efficiency is positive and highly significant at the 1% confidence level. For instance, a 1% increase in regulatory quality in SSA countries will increase FDI efficiency by 3.67% in Model 2. This means that a robust regulatory regime may provide a stable, transparent environment that can streamline business operations, reduce compliance costs, allow foreign investors to focus on productive ventures rather than navigate opaque systems, and enhance the operational efficiency of foreign capital investments.

The rule of law follows a similar pattern to the previous institutional quality indicators. It is upbeat and significantly influences the efficiency of FDI inflows at a 1% level throughout the models. For instance, a percentage improvement in the rule of law will lead to a 5.98% enhancement in FDI efficiency in the model. A robust legal system provides certainty and protection for foreign investors through property rights, contract enforcement, and fair dispute resolution, enabling them to operate more efficiently.

Evidence from Model 3 also shows that political stability is critical to efficient FDI utilization. A percentage increase in countries' stability will enhance FDI efficiency by 2.733%. Moreover, the outcome in Model 4 indicates the importance of the voice of accountability as an institutional quality factor. It is significant at the 1% level, with a 4.73% increase in FDI efficiency, driven by a higher percentage improvement in accountability from authorities.

Government effectiveness had one of the most considerable impacts on FDI efficiency, as shown in model 5. A percentage improvement in effectiveness will increase FDI efficiency by 5.96%, the largest positive and significant impact. Government effectiveness will lead to better public services and sound policies responding to economic challenges, reducing operational inefficiencies for foreign investors. Our finding is consistent with the findings of Brahim and Rachdi, (2014) and Jude and Leveigue, (2013).

As a robustness check, we also included an aggregated index of institutional quality derived from principal component analysis. The results from model 7 show a positive and significant impact of institutional quality on FDI efficiency at the 1% level. This confirms the overall effect of institutional development on FDI efficiency, as indicated by the different dimensions of institutional quality.

These findings align with those of Acemoglu et al. (2005), who found that higher institutional quality reduces uncertainty and risk for investors, leading to more efficient allocation and utilization of capital. Also, our results concerning economic growth coincide with those of Agrawal and Khan (2011b), Brahim and Rachdi, (2014), Jude and Levieuge, (2013 (Agrawal & Khan, 2011b; Acemoglu et al., 2005; Teplovo & Sokolova, 2019). These articles also reveal that the level of institutional development positively influences the effects of FDI inflow on economic growth. However, whereas Brahim and Rachdi (2014) assigned political stability and democratic accountability as the most significant influence on FDI efficiency, Teplovo and Sokolova (2019) ranked regulatory quality and economic freedom as the most critical factors. Regarding countries in SSA, we rank the rule of law and government effectiveness as the most influential factors impacting FDI efficiency. These differences are due to differences in jurisdiction across developed, emerging, and least developed countries.

In conclusion, these results support the idea that macroeconomic stability, technological development, capital formation, and good governance positively contribute to FDI efficiency. The counterintuitive finding regarding financial development might warrant further investigation. Overall, the results emphasize the importance of a stable, well-governed, and technologically advanced economic environment for maximizing the efficiency of foreign direct investments.

### **3.4.3 Results of the Determinants of ODA Efficiency**

The ODA efficiency results are presented in Table 4 below. The post-estimation results show that our results are valid for interpretation. Details of the post-estimation analysis are given later.

The results indicate that institutional development is critical for efficiently utilizing official development assistance in SSA countries. All six governance indicators used in the study, including

Voice and Accountability, Control of Corruption, Political Stability, Government Effectiveness, Rule of Law, and Regulatory Quality, show positive and highly significant impacts on the efficiency of ODA in SSA economies. Similar to the determinants of FDI efficiency, the rule of law and government effectiveness dominate the institutional factors that most affect ODA efficiency. The impact of the rule of law is positive and significant at the 1% level, with a magnitude of 0.062. This implies that a 1% improvement in the legal systems of SSA countries will lead to a 6.2% increase in the efficiency of ODA inflows, making the rule of law the most influential institutional factor in enhancing the utilization of ODA inflows in SSA. The highest institutional factors are government effectiveness and voice of accountability, with coefficients of 0.0482 and 0.0471, respectively. This means that a percentage increase in governance effectiveness will lead to a 4.82% enhancement in the effective use of ODA. In comparison, a 1% increase in the accountability index increases ODA efficiency by 4.71%. Our findings of the relationship between all the WGI institutional indicators and the efficiency of ODA strongly support the institutional development argument in the aid effectiveness literature, which states that improved governance leads to more efficient use of development aid in the host countries, especially in developing countries like SSA (Burnside & Dollar, 2000; Acemoglu et al., 2001).

The other institutional factors, control of corruption, political stability, and regulatory quality, though with relatively lower magnitudes, all have positive and enormously significant effects on ODA efficiency. As a robustness check on the institutional factors on ODA efficiency, we included an aggregated institutional quality index (PCA) derived from principal component analysis, and the result shows that it is positive and statistically significant at a 1% level, confirming the overall significance of all the institutional quality indicators used in the study. These findings align with the findings of Kabir, (2020) and Tadesse et al., (2019), who confirmed that institutional quality matters for aid effectiveness in developing countries.

Regarding macroeconomic factors, GDP growth is positive and statistically significant in all the models, with coefficients ranging from 0.0037 to 0.0042. This suggests that as GDP growth increases, ODA efficiency also increases. Specifically, in model 1, a 1% increase in GDP growth led to a 0.38% increase in ODA efficiency, close to 0.043% in model 3. This result implies that countries experiencing higher economic growth may have more resources.

Table 3.4: Results of the Determinants of ODA Efficiency

Variable	Model 1	Model2	Model 3	Model 4	Model 5	Model 6	Model 7
GDP	.003794	0.00382***	.00422***	.00347**	.0039***	.00409***	.00398***
Growth	(0.001443)	(.0014734)	(.0014396)	(.0015092)	(.001405)	(.0014399)	(.001429)
technology	1.84e-10**	.00026 *	.00032**	.00034 **	.00031**	.00021	.00027 *
y	(2.25e-10)	(.0001542)	(.0001532)	(.000154)	(.0001562)	(.0001583)	(.0001596)
Inflation	-.00010 *	-.00011*	-.00005	-.00008	.00009*	.00002	.00001
	(.0000608)	(.0000616)	(.0000603)	(.0000637)	(.0000611)	(.0000552)	(.0000573)
FD	-.34495***	-.233051***	-.21239***	-.30614***	-.00756	-.0059307	-.00557
	(.075824)	(.0697301)	(.0667077)	(.0761238)	(.0093605)	(.009528)	(.0094691)
Trade	-.0001269	-.0002308	-.000316	-.000185	.0000692	.0000351	-8.43e-06
	(.0002144)	(.0002069)	(.0002031)	(.0002111)	(.0002116)	(.000213)	(.000215)
YE	.0157452**	.0135023***	.012505	.0135472	.0103989**	.0098803**	.0102974***
	*	(.0029175)	***	(.0028791)	*	*	(.0029735)
	(.0028172)		(.0029293)		(.0028856)	(.0030072)	
LE	.00683***	.00651***	.00617***	.00560***	.00448***	.00614***	.00559***
	(.0010215)	(.0011406)	(.0011701)	(.0010881)	(.0011206)	(.0011293)	(.0011293)
Gfixcapfo	.00172***	.00165***	.00179***	.00154***	.00089 *	.00119***	.00112*
rm	(.0005237)	(.000519)	(.0005197)	(.0005313)	(.0004823)	(.0004764)	(.0004784)
POP	-.01660	-.01210	-.01478	-.01229	.00030	-.00074	.00099
	(.0105205)	(.0107643)	(.0105277)	(.0104576)	(.0001562)	(.0096587)	(.0096804)
Exchange	.00382*	.00517***	.00465**	.00659**	.01357***	.01009***	.01134 ***
rate	(.0023303)	(.0025971)	(.0024279)	(.0025807)	(.0026943)	(.0024995)	(.0026348)
VA	.04713***						
	(.0084727)						
CC		.02887**					
		(.0121643)					
PS			.02355***				
			(.0056906)				
GE				.04818***			
				(.0120174)			
RL					.06209***		
					(.0094273)		
RQ						.03799***	
						(.0092616)	
PCA							.01116***
							(.0027143)
<b>Diagnosis</b>							
No. Obs	747	747	722	722	722	721	722
Wald $\chi^2$	336.35	307.27	354.39	311.21	358.38	317.08	316.22
P - values	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Reset	1.19	-1.58	0.89	-0.60	-0.04	1.20	0.32
Test							
Prob.	(0.236)	(0.115)	(0.371)	(0.551)	(0.645)	(0.229)	(0.752)

Notes: Standard errors are reported in parentheses. \*\*\* p < 0.01, \*\* p < 0.05, \* p < 0.1

To better complement foreign aid in the successful implementation of projects. This can create the enabling grounds for ODA to be used more efficiently. Galiani et al.'s (2017) findings support this

finding. They found that as countries reach a certain income threshold, the efficiency of ODA tends to increase, supporting the positive relationship between economic performance and ODA efficiency.

Technological development has a positive, statistically significant impact on ODA efficiency, though with marginal magnitudes across all models. This implies that better technology can streamline aid delivery processes, improve monitoring and evaluation, and enhance the implementation of development projects, thereby increasing efficiency. This finding is consistent with the work of Jablosiki, (2014), who showed that using geospatial technology enhances aid allocation and efficiency in Kenya.

The relationship between ODA efficiency and financial development is negative and statistically significant. This means that, as financial development improves, the efficiency with which ODA is used decreases. This result is intriguing, but it might show that countries with more developed financial systems depend less on aid. One possible explanation could be related to the "Dutch disease" effect of aid, as Rajan and Subramanian (2011) discussed. Large aid inflows in countries with more developed financial systems might lead to genuine exchange rate appreciation, potentially harming export competitiveness and overall economic efficiency. Meanwhile, the results of Askaro and Doucouliagos, (2015) showed that aid effectiveness varies across levels of financial development, with decreased effectiveness in countries with more developed financial systems.

Furthermore, as a human development component, education is positive and significantly enhances the efficiency of ODA inflows across all seven models, including the aggregated institutional quality index. The positive coefficient suggests that more years of schooling are associated with improved efficiency of ODA utilization. For instance, a percentage increase in mean years of education will increase ODA efficiency by 10.89% in Model 3 and by 0.98% in Model 2. A more educated population can better benefit from development projects. Education can also improve the quality of local institutions, thereby enhancing aid project implementation. This result is consistent with the work of Birchler and Michaelowa, (2016), who indicated that aid for education has positive effects on education outcomes. This shows the vital complementarity between education levels and aid effectiveness.

Like the mean years of education, life expectancy is another human development component, with a positive and enormously significant determinant of the efficiency of ODA utilization in all seven models. This could be interpreted as an indication of overall human development in contributing to effective aid utilization.

Although inflation is statistically significant in only a few models, the coefficients are negative across all models. This suggests a tentative negative relationship between inflation and ODA efficiency. This implies that inflation can create economic instability and uncertainty, adversely affecting the efficient utilization of ODA inflow. Fischer, (1993) provided evidence that macroeconomic stability, including low inflation, is required for sustained economic growth and, to a large extent, more effective use of resources such as ODA inflows. Further, the study reports a positive and statistically significant impact of the exchange rate on the efficiency of ODA inflows. A stable and well-managed exchange rate regime provides enabling, predictable conditions for the efficient and effective implementation of aid projects. It reduces the loss of value due to currency fluctuations. This result aligns with Quattro and Fosu (2012), who found that aid effectiveness depends on the exchange rate, particularly for growth outcomes in host countries. In most models, the population variable negatively correlates with ODA efficiency. However, this relationship is not always statistically significant. This implies that using aid effectively may be more difficult with larger populations due to the complexity of aid management and distribution. In addition, most models show a strong, positive correlation between gross capital formation and ODA efficiency. According to Hansen and Tarp (2001), nations with higher levels of physical capital investment tend to use official development assistance (ODA) more effectively. This could be because aid and domestic investment complement each other.

The diagnostic statistics in Tables 3.4 and 3.5 highlight the overall model fitness and potential misspecification issues in the fractional regression model. The results in both tables show that the Wald test, used to test the overall or joint significance of the independent variables, is highly significant in all six model specifications, firmly rejecting the null hypothesis of zero covariate coefficients. This suggests that the models exert substantial explanatory power and that the included variables collectively explain variations in foreign capital utilization efficiency. Moreover, the regression specification error test (RESET) results indicate that the model is correctly specified, suggesting that the model's functional form is correctly selected or that the variables included in the study are relevant and correctly specified across all six models in both

regression models. In other words, no model misspecification exists across the models, suggesting that the functional form or the inclusion of additional relevant variables is correctly specified. According to (Papke and Woodridge, 1996, 1998), the most serious concern of the fractional regression model is the functional form specification. Issues of heteroskedasticity are addressed because the fractional regression model uses heteroskedasticity-robust standard errors for the estimators. Besides, the quasi-maximum likelihood estimator is strong and relatively more efficient (Woodridge, 2008). Based on the diagnostic outcome of our study, the results are valid for interpretation.

#### **3.4.4 Results of Determinants of Remittance Efficiency**

Results on the efficiency of remittance inflows are presented in Table 3.5 below. Starting with the institutional factors, the results show that most institutional quality indicators, particularly political stability, regulatory quality, rule of law, and voice of accountability, have a positive and statistically significant relationship with the efficiency with which remittances are used. This means that improvements in institutional development enhance the efficiency of remittances in SSA. Specifically, a 1% increase in accountability will increase remittance efficiency by 2.44%. Similarly, a percentage increase in the rule of law leads to a 4.6% enhancement in the efficient use of remittance inflows. Again, a unit increase in regulatory quality and political stability will result in increases of 1.17% and 2.05% in the efficiency of remittance inflows, respectively. Although control of corruption and government effectiveness are not statistically significant, they show a positive relationship with the efficiency level of remittance inflows. The positive relationships among most governance indicators, particularly the rule of law and accountability, indicate that good governance by host countries can create an enabling environment in which remittances are more likely to be used productively. More legal and accountability systems can lead to more efficient and transparent financial systems, including remittance channels, thereby enabling the proper use of remittance inflows. Regarding remittance efficiency, the rule of law is ranked as the highest-influencing factor, with a magnitude of 4.6%, followed by the voice of accountability, with a magnitude of 2.4%. As a robustness check, the aggregated institutional index was derived from a principal component analysis, and the results confirmed a positive and significant effect on remittance efficiency. This result is consistent with Kim, (2021) and Singh, (2019), who revealed that remittances are transmitted effectively and efficiently to improve financial development in countries with stronger institutions.

Table 3.5 Results of the Dominants of Remittance Efficiency

Variable	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7
Gdpgrowth	.00401** (.0015499)	.00367** (.0015161)	.00487*** (.0014554)	.0039** (.0015366)	.00406 *** (.0015656)	.00391*** (.0015027)	.00381 ** (.0015266)
Infla	-.00159 ** (.0000674)	-.00003 (.0000626)	-.00008 (.0000647)	-.00011* (.0000641)	-.00018 *** (.0000677)	-.00011* (.0000611)	-.00010 (.0000631)
FD	.00414 (.010601)	-.00072 (.0105043)	.00086 (.0107924)	.00273 (.0106473)	-.00430 (.010688)	.00183 (.0104485)	.00255 (.0105922)
Yrs of edu. (YE)	.00966*** (.0026521)	.00988*** (.0025984)	.01089*** (.0026482)	.00950 *** (.002657)	.009735*** (.0026572)	.00971*** (.0026387)	.00966*** (.0026281)
Live expectancy	.00622*** (.0010344)	.00484*** (.0010417)	.00654*** (.0010288)	.00598*** (.0010355)	.00632*** (.0010235)	.00570*** (.0010626)	.00565*** (.0010245)
Gcapform	.00244*** (.0005763)	.00229*** (.0005725)	.00175*** (.0005345)	.00244*** (.0005641)	.00248*** (.0005899)	.00245 *** (.0005648)	.00240*** (.00057)
Popgrowth	-0.00838 (.0059649)	-.004778 (.0053822)	-.00470 (.0056636)	-0.00746 (.005880)	-0.00918 (.0060081)	-.00743 (.0058843)	-.00638 (.0056043)
Exchange rate CC	.00735** (.0030646)	.01205*** (.0030505)	.00741 *** (.0026784)	.00864*** (.0027627)	.00653*** (.0029664)	.00862*** (.002669)	.01005*** (.0030239)
RL		0.04616*** (.0115584)					
PS			0.01170* (.0064438)				
RQ				0.02057 * (.0114393)			
GE					.00045 (.0122539)		
VA						.02439*** (.0090619)	
PCA							.00744*** (.0032357)
<b>Post Estimation Diagnosis</b>							
No. of Observation	747	747	747	746	747	747	747
Wald $\chi^2$	297.16	289.56	302.34	292.14	299.58	278.88	284.51
Prob of Wald	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Reset Test Prob.	-1.36 (0.174)	-0.66 (0.507)	-1.31 (0.192)	0.42 (0.674)	-0.78 (0.438)	0.48 (0.634)	-1.09 (0.275)
RESET							

Notes: \*\*\* p < 0.01, \*\* p < 0.05, \* p < 0.1

Turning to the macroeconomic determinants, the GDP growth rate is statistically significant and positively impacts the efficiency of remittance inflows across all the models. This means that as the economy of a host country grows, remittances received are put to better use. For instance, a 1% increase in the GDP growth rate led to improvements in remittance efficiency of 0.04%, 0.036, 0.048%, 0.039, 0.04%, 0.039, and 0.038% in models 1, 3, 5, and 7, respectively.

According to Kakhkharov et al., (2017), economic growth can lead to improved financial infrastructure, including financial technology, which may reduce transaction costs and improve the speed of remittance inflows and their utilization. For instance, Kakhkharov et al. (2017) revealed that when GDP per capita increased from \$1,832 in 2000 to \$2,951 in 2016, the transaction cost of remittances lowered from 8% to 4.7% in the Philippines. Moreover, the World Bank Group (2024) reported that China's rapid economic growth between the 2000s and 2010s improved its remittance channels, leading to the cost of sending remittances to China decreasing from 11% in 2000 to around 7% in 2020.

Another important macroeconomic factor affecting the efficiency of remittance is inflation. Although the magnitude of impact is minimal, the results show that inflation is negatively and significantly associated with remittance efficiency in most models, suggesting that higher inflation rates are associated with lower remittance efficiency. A 1% increase in inflation is associated with a 0.16% decrease in the utilization efficiency of remittance inflows in model 1 and a 0.003% decrease in model 2. Higher inflation erodes the value of remittances, adversely affecting the efficient maximization of remittance inflows. This finding aligns with Rivera & Tullao, (2020), who reported that macroeconomic instability erodes the purchasing power of remittances by affecting the amount of money invested in the economy. However, by focusing only on remittances and inflation, they found that inflation increases the sending of remittances for altruistic purposes.

Further, the expected years of education are consistently significant and positive in all the models. An increase in expected years of education is associated with greater efficiency in remittance inflows. For instance, a 1% increase in years of education will improve remittance efficiency by an average of 0.95% across all models. Better-educated people use remittances more effectively by directing funds to more productive investments. This result is consistent with Cebotari's (2020) findings, which show that children's education reaps significant benefits when they receive remittances in both in-kind and monetary forms. However, our results contradict those of Dzeha et al. (2018), who found that remittances received by skilled labor in host countries are significant but exhibit lower technical efficiency. In related findings, life expectancy, which measures human development in terms of years of education, is also positive and statistically significant across all models. This implies that improvements in human development enhance the efficient utilization of remittance inflows. A longer life expectancy may encourage long-term planning and remittance

investment, thereby improving efficiency. A healthy, well-educated citizen of the host country positively affects the efficiency of remittance inflows.

Furthermore, the results indicate that investment in physical capital is essential for efficiently using remittances. The coefficients of gross capital formation are positive and significant in all the models under study. This means that higher investments in physical capital in the host countries positively impact the efficiency of remittance inflows by providing better infrastructure and investment opportunities for remittance use.

Moreover, as indicated, the exchange rate showed a consistently significant and adverse relationship with the efficiency of remittance inflows in the host countries. This suggests that favorable exchange rates, such as currency depreciation, are beneficial and significantly affect the efficiency with which remittances can be used. This is because a favorable exchange rate encourages more remittances through formal channels and increases the local currency value of remittances. This is consistent with Yang (2008), who found that exchange rate shocks increase remittances. Although financial development is positively associated with efficiency, the association is not statistically significant. Similarly, the population growth, though substantial, is not statistically significant in explaining the variation in the efficiency of remittances inflows.

As indicated by Papke and Woodridge (1996), the most crucial post-diagnosis is the Wald chi-square test and the functional specification of the models. The results show that the Wald chi-square is highly significant at the 1% level across all models, whereas the RESET tests are insignificant. This suggests an acceptance of the null hypothesis that the models have no omitted variables bias and indicates a correct specification of the models. Therefore, the results as presented are valid and reliable for interpretation.

### **3.5 Conclusion and Policy Recommendations**

The paper set out to identify the institutional and macroeconomic factors affecting the efficiency of foreign capital utilization in 35 sub-Saharan African countries from 1990 – 2021. The efficiency of foreign capital inflows was estimated along two growth lines. The macroeconomic growth path, where efficiency is calculated with foreign capital inflows as inputs and GDP growth and others as output variables using the DEA approach, and along the human development growth path, where

efficiency is based on the same foreign capital inflows as the input and HDI as the mail Based on the nature of our dependent variable, we used the fractional regression model suggested by Papke and Woodridge, (1996), to deal with studies whose depended variables are bounded between 0 and 1. The results from the fractional regression model reveal that the quality of the institutional environment determines the efficiency of foreign capital inflows. All the institutional factors in this chapter significantly and positively affect the efficiency with which the sub-Saharan African countries utilize foreign capital inflows along the macroeconomic and human development growth paths. Specifically, control of corruption, governance effectiveness, rule of law, regulatory quality, political stability, and voice of accountability are essential institutional characteristics that enhance the efficiency of using foreign capital inflows in SSA, irrespective of the dimension of development- macroeconomic or human development.

Among these institutional quality factors, control of corruption is ranked the most important factor along the macrocosmic growth path by the magnitude and level of significance, followed by political stability and governance effectiveness, with voice of accountability as the least important factor. On the other hand, governance effectiveness is ranked the most important, followed by the rule of law and regulatory quality, and, like the macroeconomic growth path, the voice of accountability is the least important. The outcome on the ranking of the institutional factors in the level of importance along the human development growth path is consistent with the results of Teplovo and Sokolova (2019), who found that government effectiveness, followed by regulatory quality as the most relevant institutional factor that advances a country's efficiency transformation along the intellectual capacity growth path.

Regarding macroeconomic factors, GDP growth is consistently negative and, to a greater extent, significant along both macroeconomic and human development growth paths. This outcome supports the economic theory of diminishing returns to capital due to complacency, resource misallocation, etc. However, inflation is insignificant mainly in its relationship with efficiency. This aligns with the theory because it reduces the efficiency of foreign capital inflows, indicating that inflation impedes the efficient utilization of foreign capital in SSA countries. The role of government expenditure varies across the two growth paths of economic development. Evidence of labour's development in SSA countries, improving efficiency, can be confirmed along both lines of growth. This means that when countries invest in and train their labor force, it can improve the efficient use of resources, including the utilization of foreign capital. Interestingly, gross capital

formation in SSA is insignificant (along the human development growth path) or even harmful (along the macroeconomic growth path), impacting the efficiency with which foreign capital inflows are used. This means that capital goods in SSA, instead of helping promote growth and, for that matter, efficiency, hamper the efficient use of foreign capital inflows and productivity. One possible reason is that these generally fail to replace obsolete or worn-out capital goods as they reach the end of their useful life, leading to production declines and inefficiency. Population growth rates in SSA largely contribute to inefficiencies in the utilization of foreign capital inflows. This implies that as foreign capital flows in, primarily through ODA and remittances, a higher population growth rate will render their utilization ineffective due to rising social investment or demand pressures. Like the labor force, trade strongly and positively affects the utilization efficiency of foreign capital inflows in SSA. This implies that as countries open up to trade more and more, it will lead to greater efficiency in the use of foreign capital inflows for the benefit of the recipient country.

Based on the conclusions of this study, the following policy initiatives can be proposed. First, given that institutional quality is the primary driver of efficiency, SSA governments should move beyond general governance reforms to implement targeted administrative mechanisms. To operationalize this, policymakers should establish Specialized Commercial Courts dedicated to fast-tracking foreign investment disputes, thereby directly strengthening the rule-of-law indicator. Additionally, to enhance governance effectiveness and control of corruption, governments should mandate the digitization of public procurement and licensing processes (e-governance). This reduces human discretion in bureaucratic procedures, lowering the transaction costs that currently hamper the efficient utilization of capital.

Secondly, while government spending positively affects macroeconomic growth, it negatively affects human development. Therefore, policymakers should review government expenditure behavior to balance spending between investments in macroeconomic growth and investments in human development, including education, healthcare, and social programs.

Our findings also indicate that net gross capital formation in SSA does not enhance efficiency. This could be due to outdated capital goods that need to be replaced. Policymakers might address this inefficiency by conducting regular audits of capital assets, such as equipment and infrastructure, and by encouraging both the public and private sectors to modernize machinery and technology.

This approach can help better utilize foreign capital inflows. Additionally, implementing Technology Upgrade Tax Credits would enable firms to deduct taxes when replacing old machinery with modern, efficient equipment.



## CHAPTER FOUR

### ANALYSIS OF THRESHOLD EFFECTS OF INSTITUTIONAL QUALITY ON FOREIGN CAPITAL INFLOWS IN SUB-SAHARAN AFRICA (SSA)

#### 4.1 Introduction

Foreign capital flows have increased significantly in recent decades and are a key aspect of the global monetary system. The liberalization of financial markets, technological advancements, and increasing economic interconnectedness have transformed the landscape of international capital movements, leading to a highly liberalized world with greater capital mobility, especially in sub-Saharan African (SSA) countries (IMF, 2012). According to the International Monetary Fund (IMF), global capital flows expanded from approximately \$1 trillion in the early 1990s to over \$6 trillion by the late 2010s, dramatically increasing cross-border financial transactions (Obstfeld, 2015). Also, since the Global Financial Crisis (GFC) in 2007, the pattern of capital flows has affected the SSA differently from the rest of the world. Global foreign inflows rose rapidly between 2002 and 2007, reaching a high of \$12 trillion, or about 22% of global GDP, but declined during the GFC, continued to trend sideways, and never recovered from their pre-crisis performance. On the other hand, capital inflows into SSA fared better in the post-GFC era compared to their global counterparts. Inflows to emerging market economies (EMEs) fluctuated around pre-GFC levels, whereas flows to advanced economies (AEs) remained well below pre-GFC levels (Calderon et al., 2019). The significant components of foreign capital inflows in SSA are FDI, foreign aid, and remittances (Calderon et al., 2019). Between 2000 and 2017, FDI accounted for an average of 3.4 percent of GDP, while foreign aid and remittances accounted for 3.3 and 2.3 percent, respectively, outpacing other inflows such as foreign portfolio investment and loans (Calderon et al., 2019).

However, while foreign capital inflows can have enormous benefits, including enhancing efficiency, promoting financial development and financial sector competitiveness, and facilitating more significant productive investment and consumption smoothing, volatile flows can pose macroeconomic and financial stability risks, which can be exacerbated by loopholes in a country's institutional infrastructure (IMF, 2022).

Despite the increasing inflows, the literature on the growth benefits of financial liberalization in SSA and the associated foreign capital inflows is empirically inconclusive (Sleman et al., 2015; Kose et al., 2009; Carkovic & Levine, 2005). This suggests that certain threshold conditions must be met to attract and fully benefit from foreign capital inflows (Kurul, 2017; Kose et al., 2009; Slesman et al., 2015). Moreover, the IMF (2022) Institutional Review Report concluded that countries must achieve specific levels or thresholds of institutional development to better position themselves to maximize the full benefits of capital flow liberalization and the associated spikes in foreign capital inflows. Daude and Stein (2007) report that poor institutional quality, including lack of property rights, expropriation risk, corruption, and political instability, adversely affects FDI inflows by increasing business costs in the host country. This implies that improved institutional development is expected to attract more foreign capital inflows by reducing the associated risks. Also, Cezar and Escobar, (2015) noted that increased differences in institutional quality between the host and home countries lead to decreases in foreign capital inflows due to adjustment costs by the investor. In a related argument, Godinez and Liu, (2015) opine that negative corruption distance deters FDI inflows to host countries due to investors' internalized experience and ability to deal with corruption in the host countries. This means investors from a corrupt home country are deterred from investing in a host country with high institutional quality. This implies that a host country's low or poor institutional quality can attract international investors who take advantage of poorly regulated institutions. Institutional development could enhance the country's absorptive capacity, creating local conditions to benefit from foreign capital and mitigating the volatility associated with inflows. The question, therefore, is to what extent a host country can manage the volatility associated with a particular level of foreign capital inflows. Rastovski (2006) found that short-term debt inflows can raise the probability of a financial crisis, while long-term borrowing decreases this probability, and suggested that a distinct optimal capital account liberalization policy is critical to attract and benefit foreign capital. Fiodendji, (2013) indicates that a host country's ability to benefit from international capital flows and its resistance to vulnerability to financial crises depends on the level of its institutional quality and macroeconomic environment. Lee, (2021) contends that low-quality institutions can discourage foreign investors, but improving their quality through government efforts will send a positive signal to attract foreign capital inflows. Conversely, minor improvements might not significantly impact drawing in investments if the nation's institutions are of low quality, that is, below a

possible identified threshold. Wei, (2006) contends that countries with reasonable institutional development seem to be able to translate exposure to financial globalization into a stimulus for investment and growth on a suitable basis. This implies that attaining the right level of institutional development would help build the absorptive capacity required to use foreign capital inflows while mitigating their volatility. Therefore, institutions play a critical role in facilitating and attracting foreign capital inflows and in creating the enabling environment to benefit from these inflows, while at the same time minimizing their risks. Strengthening and deepening financial markets and improving countries 'institutional capacity would help improve their ability to handle capital flows (IMF, 2012).

Theoretically, the neo-classical economist believes that capital flows depend on the returns to capital between wealthy and less developed countries. This means that foreign capital should move from developed countries, where returns on capital are low, to developing countries with higher returns. However, Lucas, (1990) observed that capital flows move upstream. Alfaro et al. (2008) blame this situation on poor institutional quality. Moreover, Prasad et al., (2007) state that risk is associated with weak institutions, making the risk-adjusted return on capital lower in developing countries and higher in developed countries, hence the upstream movement of capital flows. This shows that improving the institutional environment can reduce the risks associated with weak institutions, such as corruption, property rights violations, irregularities, and political instability, leading to a higher return on capital and, hence, greater inflow attraction.

Countries' exposure to international capital flows can be determined by their de jure or de facto measures (Wei, 2006). The former, the de jure measure, is based on government policy restrictions or incentives on capital flows. In contrast, the latter is based on the actual amount of capital movement (the sum of a country's foreign total assets and total liabilities) scaled by the host economy's size (GDP). Bush, (2015) and Wei, (2006) conclude that the de facto measure may be more meaningful than the de jure measure. In this chapter, we will focus on the de facto measure of capital inflows by examining how recipient countries can develop their institutional and macroeconomic capacity to attract foreign capital.

Several studies in the extant literature (Asamoah & Laagered, 2021; Atiq-ur-Rehman, 2021; Masron, 2017; Igbinedion & Obayagbona, 2022; Nxumalo & Makoni, 2021; Aderinwale, 2019; Godfred et al., 2017; Bonnie et al., 2013; Nondo et al., 2016; Wang et al., 2021; Fiodendji, 2013)

have found a significant relationship between capital flows and institutional quality. However, none of these studies considered the possibility of a non-linear relationship between the two variables. These studies examine the linear relationship between foreign inflows and institutional quality, but there is no consensus on direction or significance. For instance, Nxumalo and Makoni (2021) found a unidirectional long-run linear relationship between foreign capital inflows (FDI, portfolio investment, and institutional quality). They recommended a call for future research to consider a possible threshold level of institutional quality to understand the institutions-foreign capital nexus better. Since this call, only a few attempts (Lee, 2022; Saha et al., 2022; Zhang & Kim, 2022) have been made to examine the threshold effect of institutional quality and foreign capital inflows. All these studies focused on FDI-specific inflows and used global data. Moreover, none considered other equally important foreign capital inflows, such as ODA and remittances, especially in the SSA region. Therefore, studies of institutional thresholds and capital inflows are few and skewed heavily toward FDI-specific inflows, financial development, or economic growth (see Igan et al., 2022); Chandra Das, 2021; Law et al., 2013; Okunade, 2022; Godfred, Bobkin, and Mensah, 2017; Bonnie et al., 2013; Anetor, 2019; Nondo et al., 2016; Wang et al., 2021; Fiodendji, 2013; Aderinwale, 2019), and most of these studies are conducted in the context of advanced or emerging economies. For instance, Okunade (2022) used the dynamic panel threshold panel model (DPTM) to find evidence of the presence of a threshold level of institutional development at 4.7 out of a 10-point scale that countries in Africa must attain to reap the full benefits of financial openness in terms of total factor productivity (TFP). Using the Hanson (2000) threshold technique, Law et al. (2013) established a significant institutional threshold level in the relationship between financial development and economic growth. Specifically, they found that the influence of finance on growth becomes positive and significant only once a threshold level of institutional development is reached. In their work on the non-linear threshold effects of institutional quality on capital flight, Chandra Das (2021) found that economic growth stimulates net capital flight up to a specific institutional threshold, after which there is no impact. Using an aggregate measure of foreign capital flows and institutional quality on industry growth, Igan et al. (2022) found significant differential industry growth effects of foreign capital inflows beyond a threshold level of institutional quality. However, these effects disappear and turn negative in countries below the threshold of institutional development. They also revealed that industries that rely on strong institutions grow faster than others when capital flows into the private sector, making

the channel of those flows an important one. In the context of SSA, where post-GFC inflows have continued to outperform the rest of the world, we consider the possibility of a non-linear relationship between foreign capital inflows and institutional quality. The non-linearity of institutional quality and capital suggests that certain institutional conditions must be met to benefit from capital inflows (IMF, 2012). A threshold analysis of institutional quality and foreign capital will help reveal the level of institutional development countries can leverage to maximize foreign capital at a minimal cost. According to surveys by Prasad, Rogoff, Wei, and Kose (2003) and Kose, Prasad, Rogoff, and Wei (2006), only nations with reasonably good public institutions (e.g., sufficient control over corruption) appears to be able to convert exposure to financial globalization into stimulants for investment and growth over the long term.

From the discussions above, it is clear that researchers have an increasing interest in the institutions-capital inflows nexus. However, most studies focused on the linear relationship, without consensus on the direction of the effect. The assumption of a linear relationship may not be realistic or credible due to differences in institutional quality across countries, i.e., corruption distance. Besides, evidence of non-linear relationships is also proven in the literature (see Lee, 2021; Okunade, 2022; Law et al., 2013). Therefore, we seek to test whether or not the institutions-foreign capital inflows, including FDI, ODA, and remittances- are threshold specific and how a possible threshold relationship affects the attraction of foreign capital inflows in SSA.

Directly related to our work are (Lee, 2021; Lee, 2022; Saha et al., 2022; Kurul, 2017; and Slesman et al., 2015). However, Lee (2021) merely estimated the non-linearity of institutions using a square term for institutions, which fails to test for the significance of valid threshold values of institutional quality. The study also focuses on Asia and Eastern Europe. Slesman et al. (2015) focused on the institutional threshold effect on growth, while (Kurul, 2017; Lee, 2022; and Saha et al., 2022) focused on FDI-specific capital inflow. Moreover, these studies are based on global sample data. Due to the vast differences in institutional environments between SSA and the rest of the world, it is essential to examine whether there is an institutional threshold and how it relates to foreign capital inflows in the SSA region. Besides, SSA's typical sources of foreign capital are FDI, ODA, and aid and remittances. Therefore, it is critical to go beyond FDI, as called by Nxumalo and Makoni (2021), and include the ODA and remittances in the foreign capital-institutional quality threshold analysis. We contribute to the existing literature in two ways: first, we go beyond FDI to include ODA and remittances in threshold analysis. Second, we use SSA data, which differs

significantly from the rest of the world, to examine the institutional threshold effect on foreign capital inflows.

To our knowledge, threshold studies involving the three common forms of foreign capital inflows, FDI, ODA, and remittances, and institutional quality in the context of sub-Saharan Africa are scarce. This study will provide answers to the call by Nxumalo and Makoni (2021) for further research, beyond merely analyzing the relationship between foreign capital inflows and institutions, to consider the impact of threshold effects of institutions on FDI and other forms of foreign capital inflows for improved policy initiatives. To the extent that foreign capital inflows can have both positive and negative effects on recipient economies, threshold analysis in SSA would help implement policy measures to identify the minimum levels of institutional quality required to improve the absorptive capacity of host economies to maximize the benefits of foreign capital inflows and, at the same time, mitigate the cost associated with volatile capital flows in SSA.

In this chapter, we contribute to the literature on the capital inflow-institutional quality nexus by investigating the threshold effect of institutional quality on the three most common forms of foreign capital inflows (FDI, ODA, and remittances) in SSA using the dynamic panel threshold model (DPTM) by Kremer et al. (2013). A critical gap in the extant literature is the predominant reliance on linear estimation techniques to model the institutions-capital nexus. Previous studies, such as those by Fiodendji (2013), assume a monotonic relationship, implying that any marginal improvement in governance yields a proportional increase in capital inflows. This linear perspective creates a significant blind spot: it fails to capture the 'tipping point' behavior where the impact of institutions may structurally flip from positive to negative (or vice versa) only after a specific threshold of development is reached. For instance, the linear consensus cannot explain why resource-seeking FDI might prefer weaker regulatory environments up to a point, but require stability beyond it. This study fills this gap by moving beyond linear assumptions and employing the Dynamic Panel Threshold Model (DPTM). This contribution enables the empirical identification of specific regime switches, providing policymakers with the precise institutional scores needed to trigger changes in capital inflow trajectories. Understanding the specific threshold levels of institutional quality is crucial for policymakers to move beyond generic advice to targeted, evidence-based reforms and to benchmark their current institutional standing.

## 4.2 Literature Review

### 4. 2.1 Theoretical Review

The extant literature has shown increasing interest in institutional development, capital flows, and economic growth. Existing literature reveals theoretical, linear, and non-linear relationships between foreign capital inflows and institutional quality or development. This section presents literature on the relationship between institutional development and foreign capital inflows.

First, the Neoclassical Economic Theory focuses on capital accumulation, total factor productivity, and technological changes. Based on this standard economic theory, where there are no capital controls, capital flows among countries depend on differences in capital returns across countries. Investors allocate capital to regions where it is scarce (developing countries) and to higher-return, capital-abundant countries (advanced countries). This allows countries to smooth their consumption patterns by either lending money to finance promising projects or borrowing more cheaply than they could domestically to finance investments. However, one key puzzle with financial liberalization is that foreign capital flows move upstream, contrary to the standard neoclassical economic theory. This means that instead of capital from rich to less-developed nations, the reverse is what Lucas (1990) found. Alfaro et al., (2008) argued that weak institutions are a key binding constraint that shapes the pattern of capital flows, in line with the Lucas paradox. Another theoretical basis for this study is the New Institutional Economics (NIE) by North and Thomas, (1973) and later Williamson, (1985), Matthews, (1986), and North, (1990). According to North and Thomas, (1973), the theory emphasizes the importance of institutional quality in economic development by relaxing the assumptions (perfect information, zero transaction cost, full rationality) of the neo-classical economic theory, which is mostly impractical. The point of this theory is that good policies alone are necessary but insufficient to ensure economic development, but they become effective when backed by strong institutional quality. Richter, (2005) supports this theory by indicating that institutional frameworks are not exogenous, unlike neoclassical economics. Instead, it is treated as an essential subject. How a country handles its institutional arrangements should be considered, as these arrangements can adversely affect economic performance. Foreign capital inflows will lead to economic development in countries with strong institutions. However, resources intended for investment could be redirected into rent-

seeking efforts that benefit private individuals and have little positive impact in countries with low or weak institutional quality (Ogbaro, 2019).

Bonizzi, (2013) argues for an alternative capital flows hypothesis, the ‘monetary economy framework,’ which recognizes money as both a flow and a stock of capital inflows. Therefore, capital flows should be seen as an international ‘flow of funds’ between countries, not actual resource flows in an open economy. In this sense, unlike traditional analysis of capital flows limited to current accounts-related transactions such as trade, capital flows not related to current accounts transactions, such as trade, have recently increased and are offsetting figures in the capital account. The theory, therefore, emphasizes the need to focus on gross capital flows against net inflows and the critical role of the institutional structure, with a focus on institutional investors as the key actors in attracting gross capital flows since gross capital flows to emerging markets may be explained by institutional investors' portfolio allocation choices in developing market assets.

Wei, (2018). emphasized two types of exposure to international capital flows, the de facto and the de jure measures. The latter concerns government policies on restrictions or incentives to capital flows. This means that the de jure measure of capital flows applies capital controls and legal limits in determining capital movement amounts in countries. The former measures international capital flows as the actual amount of capital movement scaled by the size of the host economy. The de facto measure of global capital is the sum of a country’s total assets and liabilities, scaled by its economic size (GDP). For financial reasons, the author concludes that the de facto measure is more reasonable and meaningful than the de jure measure, given the relationship between foreign capital inflows, institutional quality, and economic growth.

This study will focus on the de facto measure of cross-border capital movement, emphasizing the amount of foreign capital inflows rather than capital controls or restrictions. Kose et al., (2006) support this view by concluding that actual capital flows may be more relevant for examining the role of foreign capital in the growth process.

The paradox of economic theory and observed data on international capital flows has recently received increasing attention (Wei & Ju, 2018; Wei, 2018; Ju & Wei, 2006). The level of foreign capital inflows in developing countries is considered too low, as in the case of the Lucas paradox, or excessive when contrasted to the logic of Samuelson's, (1948) factor price equalization. On the one hand, Lucas, (1990), in a single-sector model, postulates that capital flows moving from

developed countries to developing countries are too low, given that the return on capital is higher in developing countries than in their developed counterparts. On the other hand, Samuelson, (1948), in a two-sector model, finds that capital flows from developing to developed countries remain high. The clash of theoretical underpinnings regarding capital inflows suggests that further research is needed to determine whether models that emphasize institutions and the financial system better reflect the data. Therefore, further research must assess whether an institutionally challenged country should wait for its institutions to strengthen sufficiently before opening up to global capital flows, or use exposure to the international capital market as a disciplinary device to reform its institutions. According to Wei, (2018) and Wei & Ju, (2018), the differences in the actual data patterns and the theoretical conclusions may be reconciled using either a capital composition effect or the threshold effect. However, Wei (2018) provided evidence that the two are linked. This study employs the threshold, or non-linear, approach to examine the nexus between foreign capital inflows and institutional quality in the context of SSA.

Another theoretical basis for this study is the New Institutional Economics (NIE) by North and Thomas, (1973) and later Williamson, (1985), Matthews, (1986), and North, (1990). According to North and Thomas (1973), the theory emphasizes the importance of institutional quality in economic development by relaxing the assumptions of neoclassical economic theory (perfect information, zero transaction costs, full rationality), which are mostly impractical. The point of this theory is that good policies alone are necessary but insufficient to ensure economic development, but they become effective when backed by strong institutional quality. Foreign capital inflows will lead to economic growth in countries with strong institutions. However, resources intended for investment could be redirected into rent-seeking efforts that benefit private individuals and have little positive impact in countries with low or weak institutional quality.

While the New Institutional Economics (NIE) framework posits a linear positive relationship between institutional quality and capital inflows, recent theoretical developments offer a more nuanced perspective that supports the non-linear approach adopted in this study.

First, the ‘grabbing hand’ critique challenges the universal applicability of the ‘helping hand’ view of institutions. Cuervo-Cazurra, (2006) argues that in specific high-return environments, foreign investors may not be deterred by corruption; instead, they may seek out weaker institutional environments where regulations are lax, and officials can be co-opted to secure favorable entry

terms. This theoretical pivot supports the possibility of a negative relationship between institutional quality and inflows at lower levels of development, where the cost of compliance in high-quality institutional settings might outweigh the benefits for certain types of rent-seeking capital. Second, the ‘Obsolescing Bargain Model’ (Vernon, 1971) introduces a dynamic time-inconsistency into the relationship. Initially, investors may be attracted to environments with weaker regulatory oversight. However, as investments mature and become immobile (sunk costs), the investor's bargaining power diminishes, and the need for strong property rights (to prevent expropriation) increases. This explains why capital inflows might respond differently to institutional quality depending on the maturity of the market. Finally, recent work on financial globalization by Kose et al., (2011) introduces the concept of ‘threshold conditions. This framework critiques the neoclassical assumption of automatic benefits, arguing instead that a country’s absorptive capacity is threshold-specific. According to this view, foreign capital generates benefits (efficiency spillovers, financial market discipline) only once a country surpasses a critical threshold of institutional quality. Below this threshold, capital inflows may be volatile or allocated inefficiently, providing the theoretical justification for the threshold regression analysis employed in this study.

#### **4.2.2 Empirical Review**

This section provides a comprehensive overview of studies exploring the impact of institutional development on foreign capital inflows, with a focus on the nuanced relationship between the two. Guenichi & Omri, (2024) found a specific institutional quality threshold in the FDI-growth nexus. Below this threshold, FDI does not significantly boost growth, but above it, strong institutions (rule of law, corruption control) amplify FDI's positive impact. Saidi, (2024), using a dynamic panel threshold model on African data, found a threshold effect where remittances only promote growth when financial development and institutional quality exceed a certain level.

Using data from 1996 to 2019, Okunade, (2022) identified a threshold for institutional development, measured on a 10-point scale, that African countries must reach (specifically, 4.73 out of 10) to unlock the benefits of financial openness and productivity growth fully. The study reveals that institutions in African countries need to be more adequately developed and capable of curbing excesses, corruption, and political interference in financial markets. Therefore, by

pinpointing a specific threshold level of institutional development, the researchers propose policy recommendations to address gaps in African countries' institutional frameworks. This strategy seeks to eliminate opportunities for illicit activities in the financial sector, ensuring that institutional development is robust enough to withstand the negative influences and risks associated with financial openness and productivity.

In a study examining the nonlinear relationship between foreign investment flows and institutional factors for 126 countries from 2002 to 2012, Kurul, (2017) uncovers the existence of an institutional threshold beyond which institutional development correlates positively with foreign direct investment (FDI). However, his work could be more robust, as the estimated threshold is based solely on a square term of institutional quality. Using linear and nonlinear estimation approaches, Saha et al., (2022) sought to investigate the effects of institutional quality on FDI in 28 lower-middle-income countries from 2002 to 2018. In the linear estimation, they find that regulatory quality and control of corruption positively influence FDI inflows, while the voice of accountability and the rule of law negatively influence FDI inflows. Similarly, the threshold analysis reveals a positive effect of regulatory quality on FDI when the per capita GDP of FDI recipient nations exceeds the threshold value of 7.197. At the same time, the voice of accountability positively affects FDI when per capita GDP exceeds the threshold of 7.776. The significance of institutional quality is evident across lower-, lower-middle-, and high-income countries. However, it is more pronounced in lower-income countries. Lee, (2021) reveals a threshold effect in the relationship between institutional indicators and FDI, and that institutions influence FDI attraction when institutional variables exceed threshold levels.

In their research on capital flows and institutions, Igan et al., (2022) demonstrated that industries relying on strong institutions experience enhanced growth when capital flows into the private sector. Conversely, this positive growth diminishes and even becomes negative in nations with deficient institutional quality. The study also uncovered that industries dependent on institutions witness a slowdown in growth when foreign capital flows into the official sector of the economy. These findings support the notion that, under specific circumstances, foreign capital inflows can impact institutional reforms. Additionally, the authors investigated the potential nonlinearity of the relationship between capital flows and institutional development, discovering evidence of threshold effects. However, the differential growth effects from the threshold disappear and become negative in countries with deficient initial institutional quality. Ogbaro, (2019) found

evidence that, with institutional quality as a threshold variable, the relationship between infrastructure and growth is nonlinear. The author further identified a threshold of 0.410, which will ensure efficient infrastructure use to stimulate growth. Overall, the study concluded that, on average, sub-Saharan African countries operate below this level, hence their poor growth.

Asongo and De Moor, (2019) investigated the threshold effects of financial globalization on the financial development of 53 countries from 2000 to 2011. They documented evidence of thresholds in financial development, with increases in the money supply of 20.50 and 16.00 for the below- and above-median sub-samples of financial globalization, respectively. They also found that the financial globalization-related thresholds for FDI that lead to a rise in banking and financial system activity (financial development) for sub-samples of financial globalization below the median are 13.81 and 13.29, respectively. This implies that, although initially unfavorable, the effect of financial globalization on financial development becomes moderately beneficial over time. Law et al., (2013) look at whether the growth effect of financial development changes in countries with different degrees of institutional development using a threshold estimate approach. The findings show that the link between finance and growth has a threshold effect. In particular, they discovered that finance can only positively and meaningfully impact growth once a certain threshold for institutional development has been reached. Up to that point, finance has had little effect on growth. This suggests that the nexus between financial development and economic growth is contingent on the level of institutional development. From the FDI-institutions literature, Sunhae, (2021) used the GMM-EGLS approach to establish that only higher levels or thresholds of institutional quality positively influence FDI inflows in Asia and Eastern Europe.

Chandra Das, (2021) examined the relationship between institutional quality and capital flight in Bangladesh using a non-linear threshold regression model. He revealed that, up to a specific institutional quality threshold, interest rate differentials are lower and economic growth increases net capital flight out of the country, but that institutions beyond the threshold show no significant effect. This implies that at lower levels of institutional development, investors are more engaged in capital flight than in higher levels of institutional development.

## 4.3 Methodology

### 4.3.1 Data

In this chapter, we rely on data from 35 countries in SSA from 1996 to 2021. The choice of study period and the participating countries was purely based on data availability for all the variables selected. The study uses the three most familiar foreign capital inflows: FDI, ODA, and aid and personal remittances. The choice of these inflows is because they are the most common foreign capital inflows in sub-Saharan African countries (Calderon et al., 2019). For institutional quality indicators, we followed the approach of Nuxumado and Makoni, (2021) and Godfred, Bobkin, and Mensah, (2017) by using a composite or aggregate measure of the six WGI indicators: control of corruption, rule of law, regulatory quality, voice of accountability, political stability, and government effectiveness. The composite is obtained by averaging all six indicators since they are highly correlated. The institutional quality variables used in this chapter are based on the WGI institutional quality estimates, scaled to a standard distribution between -2.5 and 2.5, with -2.5 representing the weakest and 2.5 the highest. The variables used in this chapter are presented in Table 4.1 below.

*Table 4.1: Variables used, description and Sources*

Variable	Description	Source of Data
GDP growth rate	Real GDP growth %	WDI
Inflation	Inflation rate (CPI) %	WDI
Trade	Trade openness (% of GDP)	WDI
Institutional Quality (IQ)	Composite World Governance Indicators	Derived from averaging all six WGI indicators
Exchange rate	Annual recent change	WDI
Financial Development Index (FD)	The composite financial development index	WDI
Population Growth	Population growth rate	WDI
Government Expenditure	Government expenditure % of GDP	WDI

### 4.3.2. Linear estimation approach

We begin by setting up a baseline model in which the variation in foreign capital inflows depends on institutional quality and macroeconomic factors (real GDP growth, government expenditure, population growth, trade openness, inflation, exchange rates, etc.). Therefore, we first examine the empirical linkages between foreign capital and institutional quality using the following pooled regression as our baseline.

$$FCI_{it} = u_i + \alpha INT_{it} + X\beta'_{it} + \lambda_t + \mu_{it} \quad \text{Eq. (1)}$$

where  $FCI_{it}$  is the foreign capital inflows in country  $i$ , at time  $t$ .  $INT$  represents an aggregate institutional quality variable for country  $i$  at time  $t$ .  $X$  is a vector of control variables comprising the macroeconomic factors described above.  $u_i$  represents the unobserved country-specific fixed effect.  $\lambda_t$  is the time effect, and  $\varepsilon_{it}$  is the idiosyncratic error term. Equation (1) estimates the direct effects of institutional development and macroeconomic factors on the variation of foreign capital inflows in SSA.

### 4.3.3. Nonlinear estimation approach

The method mentioned above assumes that the impact of the regressors (institutional development and macroeconomic factors) is symmetric and linear, meaning that foreign capital inflows are linearly influenced by a unit change in institutional quality, regardless of the degree of institutional development across countries. As Lee, (2021) indicated, low institutional quality may discourage foreign investors, whereas improvements will send positive signals to attract foreign capital inflows. This suggests that institutional development may be nonlinear. In this section, we consider the possibility of non-linear effects to assess the exact influence of institutional quality on foreign capital inflows. In particular, the degree of adherence to national policies on institutional quality affects how much foreign capital countries in SSA can attract. Stated differently, the extent to which foreign capital inflows vary may depend on thresholds, specifically whether a particular country falls or rises above this anticipated threshold level of institutional quality.

To capture the presence of possible non-linear or threshold effects and to offer a rich way of modeling the influence of institutional development on foreign capital inflows, equation (1) is transformed into a threshold, non-linear regression model following the Dynamic Panel Threshold

Model (DPTM) estimating approach suggested by Kramer et al., (2013), to explore the non-linear behavior of institutional quality on foreign capital inflows.

The selection of the Dynamic Panel Threshold Model (DPTM) by Kremer et al., (2013) over simpler static or linear alternatives is driven by two critical econometric advantages specific to the study. First, simpler static threshold models, such as those of Hansen, (1999), require strict exogeneity of regressors and fail to account for dynamic persistence, which is a defining feature of macroeconomic variables like capital flows, where past trends heavily influence current values. Applying a static model here would yield biased estimates because it omits the lagged dependent variable. secondly, the DPTM is superior because it explicitly addresses endogeneity. By combining the forward orthogonal deviations transformation (to eliminate fixed effects) with GMM-style instrumentation, it provides consistent estimates even when the threshold variable (institutional quality) and regressors are endogenous, a capability that simpler static models lack.

The linear model is modified from equation (1) above by introducing a threshold variable. In this chapter, our threshold variable is institutional quality, so the exact effect of institutional development depends on the level or extent of institutional quality. Based on Kramer et al. (2013), the Dynamic Panel Threshold Model (DPTM) threshold regression, the model takes the form of eq. (2) below.

$$FCI_{it} = u_i + \alpha_1 FCI_{it-1} + \alpha_2 INT_{it} + \alpha_3 X_{it} + \alpha_4 I(INT_{it} \leq \hat{\gamma}) + \alpha_5 I(INT_{it} > \hat{\gamma}) + \lambda_t + \mu_{it} - \text{Eq.(2)}$$

where  $INT$  represents the institutional quality, the threshold variable,  $\gamma$  is the standard threshold value that splits institutional quality into two regimes based on foreign capital inflow.  $I$  is an indicator function that equals 1 if the institutional quality is less than or equal to the threshold; otherwise, it equals 0.  $\alpha_4$  is the marginal effect of institutions on foreign capital inflows when institutional development is at or below the threshold value. At the same time,  $\alpha_5$  represents the marginal effect of institutions on capital inflows when institutional development exceeds the optimal threshold.  $u_i$ ,  $\lambda_t$ , and  $\varepsilon_{it}$  respectively represent the unobserved country-specific fixed effects, the time effects, and the idiosyncratic error term.

Threshold analysis is a non-linear regression approach. Therefore, the validity of equation (2) depends on the level of significance of the threshold value  $\gamma$ , which is determined by constructing a confidence interval within which  $\gamma$  Lies. The confidence interval (C) is based on the log-likelihood ratio statistic obtained as follows;  $\gamma: LR(\gamma) \leq C$ , where LR is the likelihood ratio. On

the assumption of robust heteroskedasticity. This expression means we are looking for a threshold value,  $\gamma$ , such that the log-likelihood ratio evaluated at  $\gamma$  is less than or equal to the confidence interval, C. LR is derived as follows;

$$LR_n(\gamma) = \frac{S_n(\gamma) - S_n(\hat{\gamma})}{S_n(\hat{\gamma})} \quad \text{Eq. (3)}$$

where  $LR_n(\gamma)$  is the likelihood ratio,  $S_n(\gamma)$  and  $S_n(\hat{\gamma})$  are the residual sum of squares for the null and alternative hypotheses.

The model sets the critical value using a 95% confidence level. The threshold value is then derived by plotting the likelihood ratio against the threshold estimates  $\gamma$ . As shown visually, the threshold value is obtained when the likelihood ratio line intersects the critical value.

Moreover, evaluating the non-linear effects depends on the presence of a threshold. Therefore, the statistical significance of the threshold value is tested, with the null hypothesis being that there is no threshold effect and the alternative that there is. Suppose the alternative hypothesis supporting the existence of a threshold is rejected by the null hypothesis. In that case, the model is linear and no threshold effect exists, but if the alternative is accepted, the model is nonlinear; hence, the presence of a threshold effect should be considered. In other words, the null hypothesis is rejected if evidence of a threshold is found.

To test the significance of a threshold, the following hypothesis is specified;

$$H_0: \alpha_4 = \alpha_5$$

$$H_1: \alpha_4 \neq \alpha_5$$

The null hypothesis of no threshold would be confirmed if the estimated regression yields. ( $\alpha_4 = \alpha_5$ , hence, we will conclude that no threshold exists. This implies that the relationship is linear and should be estimated as such. On the other hand, the hypothesis of no threshold will be rejected for regression estimates of ( $\alpha_4 \neq \alpha_5$ ), meaning that there is evidence of the presence of a threshold and that the model is non-linear. The rejection of the null hypothesis is indicated by the bootstrap probability value of 5 percent, which falls within the significance threshold.

To ensure accurate threshold estimates, strict protocols were implemented to address specific data biases and distribution anomalies. Regarding estimation bias, dynamic panel models that include lagged dependent variables often exhibit 'Nickell bias' - a correlation between the transformed

error term and lagged regressors when using standard mean-differencing. To reduce this bias, this study uses Forward Orthogonal Deviations (Arellano & Bover, 1995) within the GMM framework. Unlike traditional differencing, this method subtracts the average of future observations, maintaining the orthogonality of error terms and providing consistent, unbiased estimates even with small time panels.

Furthermore, Sub-Saharan African macroeconomic data is often characterized by high volatility. To avoid outliers causing false threshold detections, all continuous variables, such as Inflation and FDI, were winsorized at the 1st and 99th percentiles. This approach caps extreme values at these percentiles rather than removing them, maintaining the sample size while mitigating the influence of anomalous shocks, such as hyperinflation episodes. Furthermore, highly skewed variables, including ODA, were transformed using natural logarithms to achieve normalization. their distributions prior to estimation.

#### 4.4 Results and Discussion

The analysis of our findings begins with the descriptive statistics presented in Table 4.2 below. The average FDI inflows to the continent are 3.75% of GDP, with the highest at 57.87% of GDP in Madagascar and the lowest at -18.91% of GDP in the Republic of Congo.

*Table 4.2 - Descriptive Statistics*

<b>Variable</b>	<b>Obs</b>	<b>Mean</b>	<b>Std. Dev.</b>	<b>Min</b>	<b>Max</b>
Inst Quality	805	-0.53848	0.575805	-1.95653	0.875715
GDP Growth	805	4.145796	4.143027	-28.1	26.4173
Inflation	805	8.211256	26.13868	-8.48425	513.907
Fin Dev't	805	0.143313	0.117143	0.033399	0.642649
Trade	805	67.16944	35.94271	0.756876	225.023
Pop Growth	805	2.423867	0.9796	2.628656	16.6255
Gov Expen	758	108.065	13.66345	57.69854	169.3738
FDI	805	3.745166	5.543166	-18.9178	57.8772
Remittance	805	3.47356	6.957392	2.019492	98.3885
ODA	805	19.81394	1.431306	10.81978	23.12116
Exch Rate	805	4.944228	2.220515	1.810655	9.253343

The average remittance-to-GDP ratio over the period is 3.474 %. The maximum was recorded in Lesotho at 98.39%, and the minimum was -2.02% of GDP in Mauritania. Regarding ODA and aid, the average received as a percentage of GDP was 19.81, with Nigeria receiving the highest at 23.12 and Seychelles receiving the lowest at 10.81 in 2021. All ODA figures are in logs. The average institutional quality estimate is -0.54, with the maximum level of institutional quality recorded at 0.87 during the study period and the minimum level at -1.96. The institutional quality variable used in this chapter is based on the WGI institutional quality estimates, scaled to a standard distribution between -2.5 and 2.5, with -2.5 representing the poorest institutional quality and 2.5 the highest.

To assess the relative variances of the variables, we compute the coefficient of variation (CV), which is the ratio of the standard deviation to the mean. Among the three significant foreign capital inflows, remittances are the most volatile, with the highest CV of 2.003. This means that remittances received differ significantly across SSA countries. FDI inflows follow this. ODA and Aid are the lowest in terms of the CV, suggesting that Official Development Assistance varies relatively among countries in SSA. However, the level of institutional development among countries on the continent has the lowest CV. This indicates that countries in SSA do not differ significantly in their institutional quality environments.

#### **4.4.1 Linear Regression Results**

The following discussions present results from the specified econometric models, beginning with the baseline regression in Equation 1. Table 4.3 presents results on the relationship between foreign capital inflows (FDI, ODA, and Remittances) and institutional quality. Foreign capital inflows are the dependent variables, while institutional indicators are the independent variables.



Table 4. 3: Base Line Regression

Variable	Model 1. (FDI)	Model 2. (Remittances)	Model 3. (ODA)
Institutional Quality	-0.927*** (0.1589)	0.217*** (0.1308)	-0.428*** (0.0984)
GDP growth	0.049*** (0.0157)	0.012 (0.0130)	0.050*** (0.0098)
Financial development	9.036*** (0.8008)	1.841*** (0.6678)	2.421*** (0.5022)
Trade	0.001 (0.0021)	-0.0005 (0.0017)	0.017*** (0.0013)
Exchange rate	-0.012 (0.0339)	0.080*** (0.0283)	0.021 (0.021)
Inflation	-0.0004 (0.0003)	0.0002 (0.0002)	0.0005*** (0.0002)
Government expenditure	0.0006** (0.0003)	0.0003 (0.0002)	0.0003* (0.0002)
Population growth	0.453*** (0.0812)	-0.126* (0.0680)	0.340*** (0.051)
<b>Diagnosis</b>			
Constant	15.625*** (0.4176)	5.275*** (0.3472)	19.158*** (0.261)
R-square	0.1878	0.0496	0.399
F-Statistics	21.99(0.0000)	166.55(0.0000)	65.91(0.000)

Notes: Standard errors are reported in parentheses. \*\*\*  $p < 0.01$ , \*\*  $p < 0.05$ , \*  $p < 0.1$ .

The results indicate that greater improvements in institutional quality are associated with lower FDI and ODA inflows in models 1 and 3, respectively. However, in model 2, higher institutional quality further enhances remittance inflows. From Table 4.3, a unit improvement of institutional development reduces the inflow of FDI and ODA by 0.927 and 0.428, respectively, and these effects are statistically significant at a 1% level; poorer institutional development enhances the inflow of FDI and ODA by the same margin. Thus, contrary to the claim that stronger institutions attract FDI, our results reveal that countries with strong institutional structures experience lower FDI and ODA inflows. On the other hand, countries with lower levels of institutional development record high values of FDI and ODA inflows. For FDI, this result might indicate that MNEs are attracted to countries with poor institutional quality to take advantage of domestic policy lapses to their benefit, since the profit motive mainly drives FDI. In other words, multinational firms may prefer destinations with weaker institutional environments and governance as they allow them to operate freely, as suggested by Cuervo-Cazurra (2006). The negative and highly significant nexus between ODA and institutions is consistent with the literature. Most ODAs support and fix institutional building and economic development. Therefore, improvements in the instructional

infrastructure led to a shift in development partners to other countries with weaker institutional and governance capacities and greater development needs. The relationship between remittances and institutions is positive and highly significant at the 1% level. This indicates that countries with well-developed institutions tend to receive higher remittances than those with low institutional development. Higher institutional quality may build confidence among nationals in the diaspora and, hence, enhance the inflow of remittances for various investments in the economy. Generally, migrants are more likely to remit to countries with stronger institutions and better investment climates (Ahamada & Coulibaly, 2013; Zgharta, 2014).

For the control variables, the GDP growth rate is positive and significant at the 5% level in both the FDI and ODA models, suggesting that economic growth prospects may attract FDI and ODA inflows in sub-Saharan African countries. The study reveals that financial development positively affects all models of foreign capital inflows at the 1% significance level. This means that better financial sector development facilitates capital inflows by improving resource allocation and growth prospects, as supported by (Alfaro et al., 2004; Agbloyor et al., 2014). Government expenditure positively and significantly impacts the FDI and ODA models at 5% and 10%, respectively. This may indicate that higher government spending policies and public goods attract foreign investment. Asiedu, (2002) supports this result. The population growth rate is highly significant and positive in the FDI and ODA models, and these findings are consistent with the assertion that higher population growth attracts more inflows to meet growing market demand, as Anyanwu, (2012) indicates. However, population growth marginally reduces remittances at the 10% level. This may be due to remittance fatigue amid the rising dependency ratio. Although the exchange rate is not significant in the FDI and ODA models, it is essential and positive in the remittances model, supporting the findings of Balli and Balli, (2011), who suggest that currency depreciation increases remittance inflows by making them more valuable in the host country's local currency. The probability of the F-statistic is 1%, indicating high significance. This confirms that the overall model fitness and results are reliable.

So far, our discussions have focused on the linear estimations of the effects of institutional quality and other macroeconomic indicators on foreign capital inflows. The analysis needs to consider the extent or level of institutional quality that should be attained to fully utilize the benefits of foreign capital and mitigate its volatile consequences in host countries. IMF, (2012) and Wei (2006) argue that capital flow liberalization is more beneficial and less risky when countries reach a threshold

of financial and institutional quality. This implies that institutional quality could be nonlinear or threshold-specific. Moreover, evidence of institutional threshold has been documented by (Chowdhury et al., 2024 Olaniyi and Oladeji, 2020; Gueniche & Eid-Omri, 2024; Tanna & Nissah, 2023). Because of this, the effect of the institutional quality index may not be linear; instead, it shows threshold effects based on whether a country is above or below a particular level of institutional development.

This study examines the possibility of a threshold effect of institutional development on foreign capital inflows in the context of SSA, as discussed below. It begins with a test of nonlinearity or the presence of a threshold in the nexus between the two, demonstrated in Table 4.4 below;



#### 4.4.2. Results of the dynamic threshold regression model

Table 4.4: Results of a threshold effect of Institutions on foreign capital inflows

Threshold Estimate of IQ <sub>WGI</sub>	FDI	Remittance	ODA
$\hat{\gamma}$	0.332	-0.402	-0.142
95% Confidence interval	[-1.151, 0.332]	[-0.435, -0.371]	[-0.218, 0.332]
$\beta_1 \leq \gamma$	<b>10.588**</b> (4.720)	2.399 (1.900)	<b>-0.558</b> (0.518)
$\beta_2 \hat{>} (\text{INS} > \gamma)$	<b>-13.901*</b> (7.922)	<b>-5.547**</b> (2.241)	<b>-4.793**</b> (1.969)
<b>Regime Independent Variables</b>			
Lagged dependent variable	0.012 (0.069)	0.667*** (0.103)	0.399*** (0.0590)
GDP growth	0.080 (0.059)	-0.036* (0.020)	-0.013 (0.015)
Financial development	1.586 (10.125)	8.802 (8.11)	1.956 (1.257)
Trade	0.101*** (0.035)	0.002 (0.009)	0.008** (0.004)
Exchange rate	1.487* (0.923)	-0.175 (0.282)	0.134 (0.094)
Inflation	0.003 (0.003)	0.0001 (0.0005)	0.0003** (0.0001)
Government expenditure	0.006*** (0.002)	-0.0002 (0.0007)	0.0004 (0.0003)
Population growth	-0.137 (1.167)	-0.684 (0.550)	0.284* (0.154)
<b>Diagnosis</b>			
Number of observations	665	665	665
Number of countries below the threshold	30	24	28
Number of countries above the threshold	5	11	7
Wald chi2(Prob)	80.31 (0.000)	106.55 (0.000)	165.79 (0.000)
AR1	-2.748(0.006)	-2.264(0.235)	-2.9344(0.003)
AR2	-1.238(0.216)	0.5916(0.554)	0.21467(0.830)
Bootstrapping p-value	0.000	0.000	0.000

Notes: Standard errors are reported in parentheses. \*\*\*  $p < 0.01$ , \*\*  $p < 0.05$ , \*  $p < 0.1$ .

Table 4.4 above is in three parts. The first part presents the results of the threshold estimations, followed by the regime-independent estimations in the second part. In contrast, the post-estimation diagnosis is presented in the third part of the table. As shown in the table, our study finds evidence of threshold levels in the relationship between institutional quality and foreign capital inflows. Given the high bootstrapping p-value at the 1% level, the null hypothesis of the absence of a threshold is rejected in favor of the alternative hypothesis of the existence of a threshold in the relationship between institutional quality and foreign capital inflows, and the precise effect

depends on whether these countries fall above or below these threshold levels. The second part of Table 3 presents three threshold models for the relationships among institutions, FDI, ODA, and remittances. The results yield a threshold value of 0.332 under the FDI model, with a confidence interval of -1.151 to 0.332 (see column 1 of Table 3). The threshold value under the remittances model in column 2 is -0.402, with a confidence interval of -0.435 to -0.371. Regarding ODA and aid, the study reported a threshold value of -0.142, with a confidence interval of -0.218 to 0.332. We used the WGI estimates to measure institutional quality, meaning both the threshold and confidence interval values can take positive, negative, or zero values. This is because the WGI estimates give a country's institutional quality score on the aggregate indicator in units of standard normal distribution, i.e., ranging from approximately -2.5 to 2.5, with -2.5 representing the poorest institutional quality and equivalent to 0 in the percentile ranking. 2.5 indicates the highest form of institutional quality and is approximately equivalent to 100% in the percentile ranking. This also means that the threshold can take the value 0, indicating a median institutional quality or a 50% equivalent in the percentile ranking. Our threshold results for the three models are also confirmed by Figures 4.1 to 4.3 below.

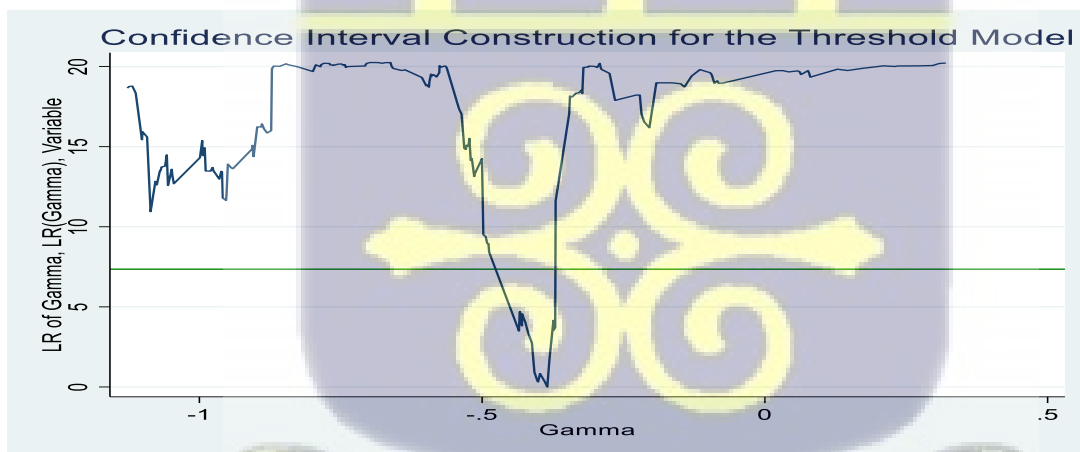


Figure 4.1: Confidence Interval and Existence of a Threshold Graph for Remittances

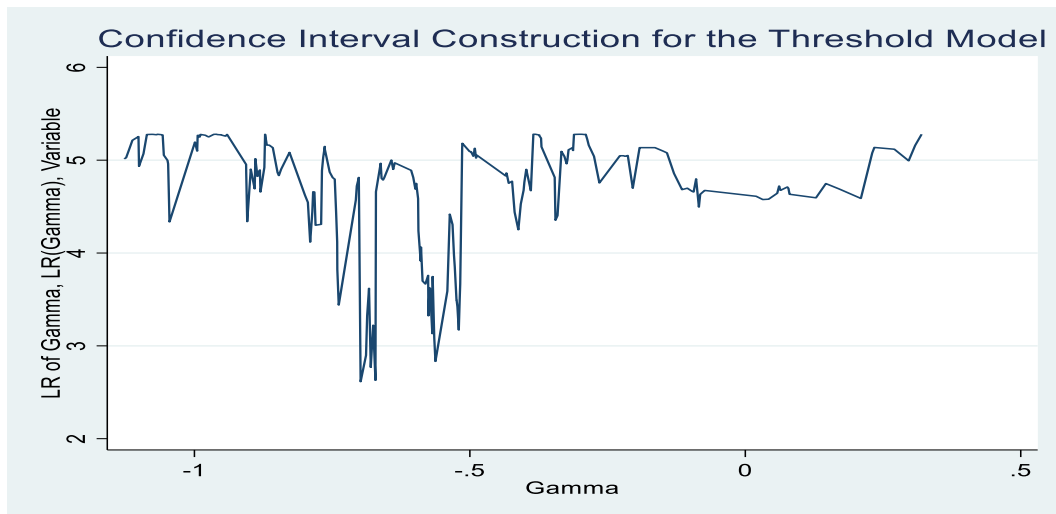


Figure 4.2: Confidence Interval and Existence of Threshold Graph for FDI

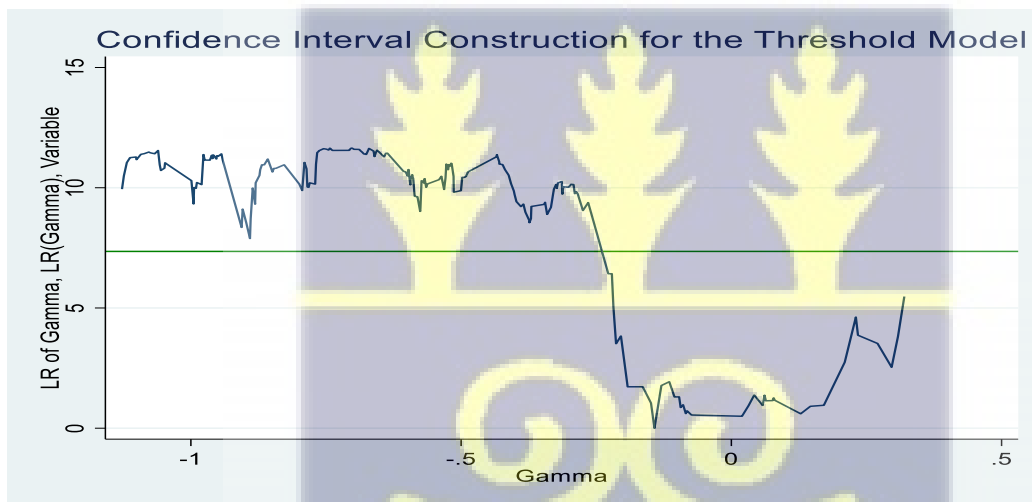


Figure 4.3: Confidence Interval and Existence of Threshold Graph for ODA

Figures 4.1- 4.3 present the confidence intervals for the threshold models for remittance, FDI, and ODA, respectively. Interestingly, it is seen from Figure 4.1 that the upper-level confidence interval and the detected threshold value of the FDI model are the same. This means that the optimal level of institutional quality under the FDI model can be accurately determined. The presence of threshold values of 0.322, -0.402, and -0.142 for FDI, remittances, and ODA, respectively, indicates that the impact of institutional quality on foreign capital inflows depends on whether countries in SSA are below or above these threshold levels in each of the three models.

At these threshold levels, only 5 of 35 countries (14.3%) exceed the FDI threshold of 0.332. These countries include Botswana, Guinea, the Seychelles, Namibia, and Mauritius. The remaining 30 countries, representing 85.7%, have institutional quality below the threshold. Regarding the ODA model, the threshold is -1.42, and 7 of the 35 countries (20%) fall above it, while the remaining 28 (80%) fall below it. The threshold value for the remittances model is -0.402. 11 of 35 countries (31%) exceed this threshold, while the remaining 24 (69%) fall below it. Consequently, most SSA nations need more robust institutions to attract capital inflows. Otherwise, approximately 22% of countries have excellent institutional quality, whereas the average is over 78% with poor institutional quality.

Interestingly, the threshold estimates in Table 3 indicate that the relationship between FDI inflows and institutional quality is negative and statistically significant when institutional quality exceeds the threshold. However, the relationship becomes positive and significant at the 5% level when institutional quality falls below the threshold. The existing literature on the link between FDI and institutional quality needs clarification. For instance, whereas Sabir et al. (2019; Siddica & Angkor, 2017; Bhasin & Garg, 2020) found a positive relationship, Schulz, (2009) and Bissoon, (2012) recorded a negative nexus between the two. This study resolves the debate by first establishing that the relationship is nonlinear and showing when it is positive and negative. The FDI-institutional quality nexus is negative when institutional quality exceeds the threshold of 0.332 and becomes positive when it falls below this threshold. These results are supported by existing literature. For instance, using two-stage least squares (2SLS), Bhanumurthy and Sinha, (2014) found a strong negative relationship between FDI and efficiency, implying that FDI flows more into less efficient Indian states. Moreover, Alvaro, (2006) found that corruption, which is an institutional quality variable, results in higher FDI inflows when multinationals come from countries with a high level of corruption, indicating that investors who have been exposed to corruption at home are not deterred by corruption abroad and instead seek countries where corruption is prevalent. This also means that multinationals from pro-corruption countries will not move into countries with strong institutions, such as those with firm control of corruption and effective governance. Krifa-Schneider and Matei, (2022) contend that corruption can attract FDI but cannot be a long-term option. Godinez and Liu, (2015) corroborate Alvaro's, (2006) findings on corruption distance and FDI flows in Latin America. The study opined that firms based in corrupt countries have internalized knowledge of how to deal with corruption and with institutional

environments abroad, increasing their desire to look for weak institutional environments to take advantage of their weaknesses. The results also support the ‘obsolescing bargain theory by Vernon, (1971), which indicates that countries with better institutions initially attract FDI due to a stable environment, but beyond a certain point, stronger institutions may impose more regulations and constraints that discourage FDI inflows.

Regarding remittances, the coefficient for institutional quality below the threshold is positive but not significant. However, the relationship becomes negative and statistically significant at the 1% level when institutional quality exceeds the threshold, suggesting that remittances decrease with further improvements in institutional quality. Intuitively, countries where institutional quality improves may limit their losses from corruption, political instability, lack of accountability, and weak rule of law, thereby enabling more effective resource allocation, which in turn translates into higher GDP and employment. Consequently, individuals with gainful employment can earn income. This will reduce the dependency ratio, potentially reducing remittances intended for household consumption. At the same time, where institutions and governance are weak, migrants tend to remit more because families may rely heavily on these remittances for sustenance. These findings are supported by Abdoh et al., (2008), who documented a negative impact of the remittance-to-GDP ratio on domestic institutional quality, even after controlling for potential reverse causality. The results on the institutions-remittances nexus are also consistent with the findings of Lacheheb et al., (2022), who revealed that remittances have an inverted U-shaped effect on political institutional indicators. Specifically, they concluded that, before the turning point (below the threshold), remittances were associated with a high level of democracy, a stable political system, and more civil freedom. However, moving beyond the threshold reveals low political institutions in the host country.

For the nonlinear linkage between institutions and official development assistance and aid, irrespective of regime (whether institutional quality is below or above the threshold), the association between the two is negative and statistically significant at the 5% level in both regimes. This outcome suggests that ODA inflows decrease as institutional quality improves further. The negative nonlinear relationship is consistent with the literature, as donors tend to provide more aid to countries with weaker institutions and more significant development needs. Still, as these countries achieve improved institutional development, they focus on less developed areas for

support. This finding is consistent with Asongu's, (2013) results, which confirmed the perilous nature of ODA for institutional quality across 53 African countries from 1996 to 2010. Alesina and Weder, (2002) support the negative nexus between ODA and institutional quality when seeking to answer whether corrupt governments receive less aid. Overall, the relationship between foreign capital inflows and institutional quality is nonlinear, and the data show that across all three capital inflow models, the more developed the institutions, the lower the inflows of foreign capital. The varying reasons for this phenomenon are discussed above. These findings are consistent with and strongly supported by Challe et al., (2019) in their work, *Institutional Quality and Capital Inflows: Theory and Evidence*, which empirically confirmed the theoretical prediction of a decline in institutional quality following rising capital inflows across the globe. Regarding the regime-independent variables, the coefficients on lagged remittances and ODA inflows are positive and significant at the 1% level. However, FDI is small. The results suggest that, except for FDI, previous remittances and ODA inflows positively and significantly impact the current foreign capital inflows. Previous FDI inflows are independent of current FDI inflows. Economic growth has a negative relationship with remittance inflows, suggesting that financial development may lead to employment and, consequently, improve household income, thereby reducing the dependency ratio and, in turn, decreasing remittance inflows. Trade is positively and significantly crucial in the FDI and ODA models. This means that trade enhances inflows of FDI and ODA but has no bearing on remittances in SSA. Government expenditure is also seen as enhancing FDI inflows, while population growth attracts more assistance from donor partners in SSA. Regarding post-estimation diagnostics, Blundell and Bond, (2000) believe that dynamic panel estimations require first-order serial correlation but not second-order serial correlation. As a result of the serial correlation test, this study did not reject the null hypothesis of first-order serial correlation; however, the second-order serial correlation test was wholly dismissed. Therefore, the study passed the serial correlation test for first-order serial correlation, and no second-order serial correlation was found. Based on the Wald test, the overall estimated models are statistically significant, which supports the threshold model's fitness and is appropriate for the analysis. The bootstrapped p-values are statistically significant at the 1% level for all three capital inflow models. This implies that the null hypothesis of no threshold is flatly rejected in favor of the alternative hypothesis of a threshold. This confirms that the relationship between institutional quality and foreign capital inflows is nonlinear and threshold-specific. Given the validity and significance of the threshold

value ( $\gamma$ ) on which equation (2) relies, our results on the nonlinear approach in the relationship between institutional quality and capital inflows are more valid and reliable than the linear approach used in a section of the extant literature.

#### 4.4.3 Robustness Check: Driscoll-Kraay Robust Standard Errors

To check the robustness of our threshold results and account for cross-sectional dependence in the data, we ran the regression with the Driscoll -Kraay robust errors model; the results are presented in Table 4.5 below.

*Table 4.5: Results of the Driscoll-Kraay Robust Standard Errors*

Threshold Variables	FDI	Remittance	ODA
Institutional Quality	2.9266*** (0.8287)	1.5962* (0.8875)	-0.4543 (0.4411)
Institutional Quality (Squared)	-0.5480* (0.2977)	-.01389 (0.1028)	-0.6229** (0.2924)
<b>Other Independent Variables</b>			
GDP growth	0.0394* (0.0224)	-0.0015 (0.0222)	0.0041 (0.0088)
Financial development	3.4105 (2.6031)	0.8314 (0.7925)	3.4659* (1.7341)
Trade	0.0120*** (0.0038)	-0.0010 (0.0023)	0.0012 (0.0029)
Exchange rate	0.4451* (0.2312)	0.9382*** (0.1817)	0.3032*** (0.0689)
Inflation	-0.0002 (0.0002)	0.0003 (0.0004)	0.00006 (0.00007)
Government expenditure	0.0002 (0.0002)	0.0001 (0.0002)	0.0002* (0.0001)
Population growth	-0.1522 (0.0958)	-0.1444** (0.0636)	0.0412 (0.0321)
Constant	14.4000*** (1.2685)	2.5763** (1.0415)	17.6764*** (4.4051)
<b>Diagnostics</b>			
Within R-squared	0.2761	0.2192	0.1967
F-stats(P-value)	30.86(0.0000)	166.55(0.0000)	108.57(0.000)

We used the Driscoll-Kraay robust standard errors model as a robustness check to critically validate the initial threshold regression analysis. By addressing potential cross-sectional dependence and spatial correlations, this approach offers a more nuanced examination of the relationship between institutional quality and foreign capital inflows in Sub-Saharan African

countries. The analysis reveals a complex, non-linear interaction that varies across the different types of capital inflows - foreign direct investment (FDI), remittances, and official development assistance (ODA).

The Driscoll-Kraay estimation accurately confirms the initial findings for the FDI model. The institutional quality coefficient shows a statistically significant positive relationship, while the squared term indicates a harmful component, suggesting an inverted-U-shaped dynamic. This reinforces the earlier argument that FDI responsiveness to institutional quality is not straightforward but depends on sophisticated institutional thresholds. The positive coefficient (2.9266) at a 1% significance level underscores the critical role of institutional development in attracting foreign direct investment.

The remittance model presents a more nuanced picture with only marginal statistical significance. The institutional quality coefficient shows a weak positive relationship, though it diverges slightly from the initial threshold regression. This subtle variation highlights the complex mechanisms by which institutional quality influences remittance inflows, suggesting that the relationship may be less pronounced than for other capital inflows. The marginal significance indicates that remittance flows may be less sensitive to variations in institutional quality.

Official development assistance (ODA) demonstrates a consistently negative relationship with institutional quality, aligning with the initial research findings. First, the significant squared term confirms the existence of the threshold estimated earlier by the dynamic threshold model. Moreover, the negative and significant coefficient of the squared term suggests that donors may prioritize countries with weaker institutional frameworks. This finding supports the perspective that international aid is strategically directed toward countries with more significant developmental challenges, potentially diminishing as institutional quality improves Asongu, (2013).

The control variables provide additional insights into the dynamics of capital inflows. Macroeconomic indicators such as GDP growth, trade, and exchange rates exhibit consistent effects across models, with trade showing a particularly significant positive impact on FDI. These variables highlight the multifaceted nature of capital inflows, emphasizing that institutional quality interacts with broader economic fundamentals in complex ways.

#### 4.5 Conclusion and Policy Discussion

This study explores the non-linear impact of institutional quality on foreign capital inflows in 35 sub-Saharan African countries from 1996 to 2021. We use WGI to measure institutional quality. Due to the highly correlated nature of the WGI factors, we follow (Nuxumado & Makoni, 2021; Godfred, Bobkin, and Mensah, 2017) to use an aggregate measure of institutional quality by averaging the six WGI indicators to measure the overall impact of the six dimensions of the institutional quality index on foreign capital inflows. We focused on the three typical foreign capital inflows: FDI, ODA, and remittances, leading to three equations, each with one foreign capital.

The empirical results from the threshold analysis reveal that the relationship between institutional quality and foreign capital inflows is non-linear. The bootstrapped p-values for all three models are significant at the 1% level, confirming the existence of threshold levels in the quality of institutions. The threshold levels that bifurcate the impact of institutional quality on the various capital inflows are identified as 0.332, -0.402, and -0.142 for FDI, remittances, and ODA, respectively. Under the FDI model, with a threshold of 0.332, our study revealed that only 5 of the 35 countries have their institutional quality index above the threshold, while the remaining 30 fall below it. Regarding the remittances model, 11 of 35 countries have their institutional quality index above the threshold of -0.402, while the remaining 24 fall below it. Lastly, 7 of the 35 countries exceed the threshold of -0.142, while the remaining 28 fall below it. This suggests that most countries in sub-Saharan Africa need better institutional infrastructure. Our study revealed that, in SSA, higher levels of institutional quality (above the threshold) are associated with lower net FDI inflows. In comparison, at lower levels of institutional development, FDI inflows increase. However, while higher levels of institutional quality lower FDI inflow, its positive influence on net FDI inflows is huge at lower levels of institutional development. Why would multinational enterprises, for instance, move into SSA when institutional development is low and vice versa? Our results are supported by the view that some MNEs may be corrupt and seek to move into corrupt environments where they can take advantage of their superior expertise in handling corruption abroad to pay their way through, to the detriment of the host country (see Alvaro et al., 2006). This finding also aligns with the theory that, with firmer and tighter regulations and restrictions, MNEs are deterred, while fewer regulations attract more FDI inflows (Vernon, 1976).

We observed from the remittances model that institutional quality only significantly affects remittance inflows at higher levels (above the threshold), where remittances are negatively affected. In our study, higher institutional development means effective control of corruption, governance effectiveness, the rule of law, an improved regulatory environment, political stability, and a voice of accountability—the dimensions of institutional quality that positively impact economic growth. Economic growth can generate employment and increase income, eventually reducing the dependency ratio and remittance receipts. Under the ODA and Aid model, it is observed that, regardless of the regime and institutional quality above or below the threshold, institutional quality negatively affects official development assistance and aid. The effect on ODA is relatively small, below the threshold. Official Development Assistance is usually a strategic inflow into low-income countries for varying reasons, including supporting development agendas and reducing poverty. Therefore, decisions on aid allocation are primarily influenced by strategic considerations or historical ties, which could outweigh the importance of institutional quality in many cases. Again, donor countries may assume that countries with relatively stronger institutions can better leverage their resources and attract private investments, thereby reducing the need for external aid.

Our empirical results provide policy implications for countries in sub-Saharan Africa. First, the study found that 78% of countries in SSA have fallen below the identified thresholds for institutional quality. This implies that institutional development in sub-Saharan African countries could be improved. Governments in the subregion need to implement measures or adopt policies to strengthen their institutions. This will position the countries to handle foreign capital inflows in ways that benefit host countries while minimizing the negative consequences associated with them. Effective handling of corruption, enforcement of the rule of law, establishment of effective regulatory regimes, good governance, and a voice of accountability will lead to proper utilization of the attracted foreign capital inflows. Given the non-linear relationship between foreign capital and institutions, the study showed that foreign investments are surprisingly inversely associated with the level of institutional development. This means that the low institutional quality in SSA countries attracts foreign investors. This may suggest that poor institutions in SSA are an incentive for some foreign investors who exploit loopholes to the detriment of host countries. Therefore, governments in SSA must ensure adequate assessment and monitoring of attracted foreign

investments to prevent foreign investors from taking advantage of domestic institutions' weaknesses. This notwithstanding, initiating policies to improve the quality of institutions can attract foreign investments for economic development. In the case of ODA, higher levels of institutional development reduce inflows of ODA and aid, regardless of institutional quality. Nonetheless, improving the quality of institutions may imply economic independence and, hence, a step towards SSA countries warding themselves off the restrictions and conditionalities associated with foreign aid.



## CHAPTER FIVE

# EXAMINING THE MODERATING ROLE OF EFFICIENCY IN THE FOREIGN CAPITAL-LED GROWTH HYPOTHESIS IN SUB-SAHARAN AFRICA

### 5.1 Introduction

With the liberalization of cross-border capital accounts worldwide, the volume of capital inflows to sub-Saharan Africa (SSA) has sharply increased, especially following the global financial crisis of 2007-2008. Net capital inflows to the region amounted to \$4 billion in the 1980s and 1990s, increasing about sixfold to \$25 billion in 2007 and doubling again to \$60 billion in 2017. As a percentage of GDP, net capital flows to sub-Saharan Africa reached a record high of 3%, exceeding the global average by about 2% of GDP between 2015 and 2017 (IMF, 2008). As indicated by Calderon et al. (2019), the significant components of foreign capital flows in sub-Saharan Africa are Official Development Assistance (ODA), Foreign Direct Investment (FDI), and remittances, with FDI recording an average of 3.4% of GDP, while foreign aid and remittances amounted to 3.3% and 2.3% of GDP respectively, between 2000 – 2017. Table 5.1 below presents the trends in FDI, ODA, remittances, and GDP growth from 1990-2021. These inflows (FDI, ODA, and remittances) have long been considered critical sources of financing for economic growth, particularly in developing countries (Alfaro et al., 2004; Giulian & Ruiz-Arranz, 2009; Burnside & Dollar, 2000). Foreign capital inflows provide much-needed capital for investment, technology transfer, and access to international markets, thereby stimulating productivity and economic expansion (Bodart et al., 2020).

Despite the increasing inflows of foreign capital, their impact on economic growth has been debated. While some studies have found a positive relationship (Awad, 2021; Zubaidi et al., 2015; Rehman & Ahmad, 2016; Nguyen et al., 2021; Jawaid & Saleems, 2017; Mowlaei, 2018; Ehigiamusoe & Lean, 2019; Neanidis, 2019; Combes et al., 2019), others have reported insignificant or even negative relationship between the two (see Alvarado et al, 2017; Belloumi, 2014; Saqib et al, 2013; Carkovic & Levine, 2005; Herzer et al., 2008; Klobodu & Adams, 2016; Adams & Klobodu, 2018).

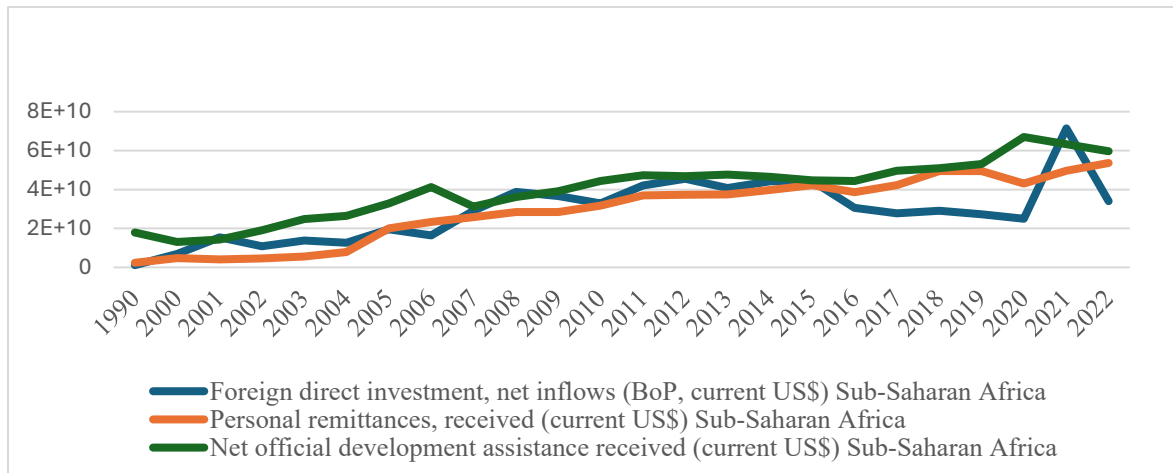


Figure 5.1: Foreign Capital Inflows from 2000 - 2022

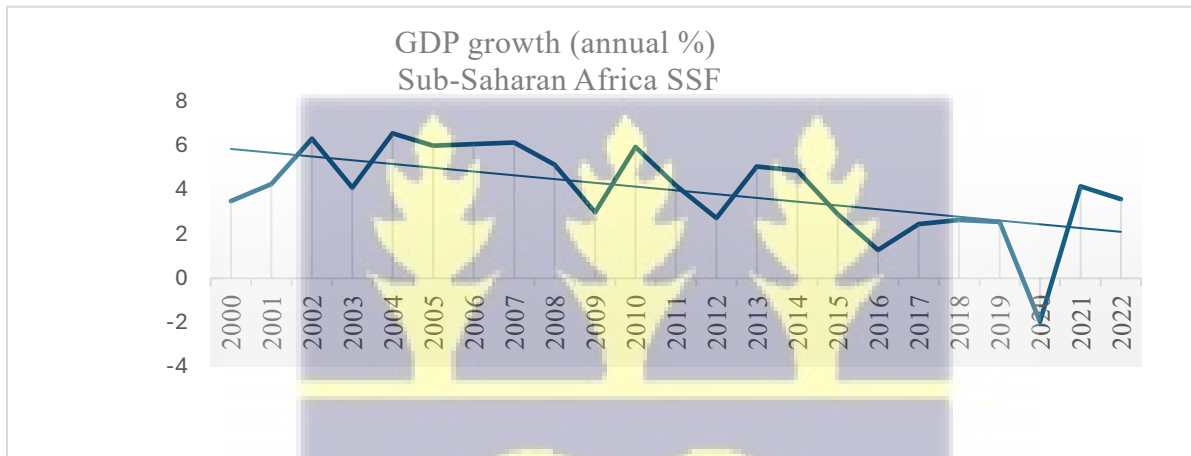


Figure 5.2: GDP growth trend from 2000 - 2022

Evidence from Table 5.1 below indicates that while all three foreign capital inflows continue to increase from 1990 to 2021, GDP growth, expressed as an annual percentage, fluctuates and eventually trends downwards over the past decade. This trend is further clarified in the graphs in Figures 1 and 2 below, which show increasing inflows of foreign capital in Fig. 1 against declining GDP growth in Fig. 2. These dynamics suggest that the growth-enhancing effects of foreign capital may depend on other factors.



Table 5.1: Trend of FDI, ODA, remittances and GDP growth from 1990 - 2021

Period	1990 - 1994	1995 - 1999	2000 - 2004	2005 - 2009	2010 - 2014	2015 - 2019	2020 - 2022
<b>ODA (USD Billion)</b>	18.29	15.52	19.55	36.13	46.52	48.52	63.3
<b>FDI (USD Billion)</b>	2.26	5.79	11.93	28.13	41.08	32.38	44.44
<b>Remit (USD Billion)</b>	2.74	3.6	5.37	25.2	36.64	44.53	48.11
<b>GDP Growth (%)</b>	0.48	3.44	4.94	5.34	4.94	2.38	1.15

Source: Author's calculations on data from World Development Indicators.

One factor that has garnered increasing attention is the efficiency with which foreign capital is transformed within an economy. For instance, studies by (Teplova & Sokolova, 2019; Wang & Le, 2019; Naeher & Narayana, 2022; Veiderpass & Andersson, 2007; Alfaro et al., 2004; Batten & Vo, 2009) have contributed to the existing literature on the role of efficiency in the economic development of various regions across the globe, although none of them considered the direct moderating effect of efficiency on growth. The efficient allocation and absorption of foreign capital inflows are crucial to transforming these resources into productive investments that drive economic growth and support the continent's prosperity. Inefficiencies from poor macroeconomic policies, corruption, weak institutions, or inadequate infrastructure can hinder the effective utilization of foreign capital and diminish its potential benefits (Nav et al., 2019; Sohrab et al., 2017).

Several studies have also explored the moderating role of various factors on the relationship between foreign capital inflows and economic growth. For instance, Alfaro et al. (2004) found that financial development enhances the benefits of FDI, suggesting that the FDI growth nexus is conditioned on financial market development. Similarly, Batten and Vo (2009) demonstrated that the growth impact of remittances is amplified in countries with better institutional quality and fewer restrictions on capital flows. Xu (2012) found that an inefficient financial system limits the growth benefits of FDI in the Chinese economy, and that domestic financial reforms are crucial to ensure positive benefits from FDI. This confirms the suggestion that other factors play a role in the foreign capital inflows -economic growth nexus, especially in sub-Saharan African countries.

Theoretically, Cilingirtürk and Turani, (2014) suggest that DEA efficiency is a moderator variable that influences the relationship between inputs (independent variables) and the output variable. The authors premise their argument on the fact that similar processes with the same input level

may exhibit different outputs due to efficiency. Efficiency is thus described as a mediating black box that should mediate or moderate inputs or independent variables to explain the output variable. They offer a novel approach that distinguishes and statistically tests the moderation effects of efficiency in the context of the input-output process. Based on this, we use the efficiency of foreign capital inflows as a moderator variable in the relationship between them and economic growth.

Studies by (Berger et al., 2004; Kale & Eken, 2022; Hasan et al., 2008; Akbar et al., 2020; and Adams, 2009) have employed the DEA efficiency measure to analyze the effects of foreign capital on growth. However, these studies primarily focus on firm-level efficiency and its impact on performance or growth. These studies have yet to examine how efficiency moderates the relationship between foreign capital inflows and economic development. The moderating role of foreign capital efficiency on the link between foreign capital inflows and economic growth remains largely unexplored.

The rationale for this study stems from a significant gap in the existing literature on foreign capital growth. While key studies such as Alfaro et al., (2004) and Batten and Vo, (2009) recognize financial development and institutional quality as necessary for capital absorption, they treat these factors as static conditions rather than dynamic processes. Notably, there is a lack of empirical research that measures the efficiency of capital use as a moderating variable. This study aims to fill that gap by viewing efficiency not just as a residual, but as an active mechanism that transmits effects.

This theoretical gap has significant real-world consequences. In Sub-Saharan Africa, foreign liabilities are increasing faster than the region's GDP can support. By focusing on efficiency, this study addresses a practical diagnostic issue: it helps policymakers determine whether growth stagnation results from insufficient funds (necessitating more capital) or from inefficient resource use (requiring better management). Making this distinction is crucial for assessing debt sustainability, shifting the policy approach from 'attracting capital at all costs' to 'optimizing existing flows.'

Specifically, the study investigates how efficiency influences the relationship among FDI, remittances, ODA, and economic growth. It will show how a country's capacity to absorb and

effectively use foreign capital inflows can impact economic growth. The research is fundamental given the growing focus on the quality and efficiency of foreign capital use rather than just the volume of inflows (Muronji et al., 2022). Understanding the moderating role of foreign capital efficiency can offer valuable insights into the conditions under which foreign capital inflows are more likely to support economic growth.

By addressing this gap, the proposed study aims to contribute to the ongoing discourse on the determinants of the growth-enhancing effects of foreign capital inflows. We seek to shed light on the potential moderating role of foreign capital efficiency to inform policymakers on the importance of improving the efficiency of foreign capital utilization and developing complementary policies to maximize the growth benefits of these inflows. Our research seeks to achieve this objective in two stages. In the first stage, the efficiency of foreign capital is estimated using the DEA approach, as described in Chapter Two. In the second stage, we interact foreign capital efficiency with capital inflows to explain variation in GDP per capita growth. Therefore, this study uses the two-stage approach to evaluate the moderating impact of efficiency on the nexus between foreign capital inflows and economic growth.

## **5.2. Literature Review**

### **5.2.1. Theoretical Framework**

Theoretically, Solow and Swan, (1956) are credited with the neoclassical growth model, which states that economic growth is driven by three key factors: accumulation of capital stock (K), labor levels (L), and technological change. The model posits that the accumulation of physical capital, population growth, and technological progress influence an economy's long-run output. Based on the model, the higher the capital stock, the faster the economy will grow, because higher capital positively affects growth, though at a diminishing rate. As marginal returns decline, additional units of capital contribute less to growth. Growth in the labor force increases productive capacity, but this depends on the distribution of capital within the labor force. In the long run, labor does not influence per capita output. Technological change is the primary driver of long-term output growth, as it increases the productivity of both labor and capital, thereby supporting sustainable economic development. The most prevalent capital inflows to Sub-Saharan Africa (SSA) are FDI,

ODA, and remittances. These inflows supplement the country's relatively low domestic savings to support the recipient's capital stock, which is used to fund development expenditures and spur economic growth. This aligns with the 'big push theory' by Rosenstein-Rodan (1943), which requires significant investment to close the capital gap through savings and lump capital. Given the low savings rates in SSA, foreign aid, remittances, and FDI would help augment the existing low capital stock, leading to greater economic growth.

The neoclassical model also postulates that capital flows from rich to poorer countries, where the marginal return to capital is relatively high. A key tenet of the neoclassical theory is the Distinction Between Exogenous and Endogenous growth. The former states that economic growth is mainly driven by technological progress independent of economic forces, while the latter emphasizes that internal factors influence long-term economic growth. However, Lucas (1990) found that capital often flows in the opposite direction, from capital-scarce developing countries to capital-abundant developed countries. Capital flowing from rich to developing countries was significantly higher than that flowing from developing to rich countries. To further confirm the Lucas puzzle, Prasad et al. (2007) sampled 59 developing countries into a range of low and high average growth rates from 1970 to 2004 to understand whether foreign capital affects growth and, if not, why it flows uphill. They found that net foreign capital flowing into high-growth developing countries has been smaller than that flowing into lower- to medium-growth countries. Their study reaffirms that. The paradox of foreign capital inflow is even worse than Lucas had imagined. At the same time, regarding whether international capital drives growth in developing countries, they conclude that growth patterns are more influenced by domestic savings than by foreign capital inflows. This implies that foreign capital does not promote economic growth in developing economies. Gourinchas and Jeanne's (2007) 'Allocation Puzzle' in which capital flows to countries with lower productivity growth instead of moving to countries with high productivity growth, which should be attracting these inflows for investment, argues in line with 'Lucas's paradox.' The authors identified the roles of savings, financial underdevelopment, and trade in accounting for the puzzling behavior of capital flows. This paper examines the role of efficiency as a possible channel through which foreign capital affects economic development. Following these theoretical prepositions, part of the existing literature argues that inadequate capital is the reason for underdevelopment (Sachs, 2005). The theoretical propositions above suggest a divided conclusion on the impact of foreign capital and economic growth. Based on these theoretical foundations, this

study will contribute to the theoretical and empirical literature by examining domestic conditions that utilize these capital inflows. Notably, the study will examine the efficiency of foreign capital and its impact on economic growth in SSA.

### 5.2.2 Empirical Literature

Given the theoretical arguments above, a body of empirical studies has extensively examined the relationship between foreign capital inflows and economic growth. Foreign capital inflows are viewed as a significant resource for productive growth in recipient economies (Driffield & Jones, 2013; Ibhagui, 2019). In the age of globalization, global capital flows have increased. Some argue that financial globalization can encourage capital accumulation, particularly in developing countries (Slesman et al., 2015). Elleer et al., (2006) contend that the positive relationship between FDI and economic growth is driven by the financial system's efficiency, suggesting the pivotal role of the efficiency channel in transmitting the growth-enhancing effects of FDI. Feng et al. (2018) examined the effects of environmental regulation and two-way (inward and outward) FDI on green innovation efficiency in China's manufacturing industry from 2006 to 2015, using a stochastic frontier analysis. They found that stricter environmental regulation positively affects green innovation efficiency, with inward FDI exerting a positive effect, while outward FDI has a negative effect. The interaction between environmental regulation and inward FDI positively affected green innovation efficiency, whereas the interaction with outward FDI negatively affected it. Awad (2021) conducted a study on the relationship between foreign capital inflows and economic growth in low-income countries in Sub-Saharan Africa using panel data from 26 countries from 1980 to 2018; the study found a positive and significant relationship between foreign capital inflows and economic growth in both the short- and long-run. The study identified investment financing, improved balance of payments, knowledge spillovers, and technology transfer as the channels through which international capital influences growth. Rehman and Ahmad (2016) found similar results. Still, they revealed that the effectiveness of foreign capital inflows in promoting economic growth may depend on factors such as the quality of institutions, the level of human capital, and the macroeconomic environment. This implies that policies that focus on improving the quality of institutions and promoting human capital development may enhance the efficiency of foreign capital inflows in driving economic growth. Also, the findings of Nguyen et al. (2021) support the

positive and significant short and long-run nexus between foreign capital and economic growth in Vietnam. Similar observations were made by Mowlaei (2018), who conducted a study on the impact of foreign capital inflows on economic growth in selected African countries. They used panel data from 12 African countries from 1980 to 2014 and found that foreign capital inflows positively and significantly impacted economic growth in these countries. The author suggests that foreign capital inflows can provide financial resources for investment and economic development, especially in countries with low domestic savings. Additionally, the study finds that the impact of foreign capital inflows on economic growth is influenced by a country's economic structure and institutional quality, with a more diversified economy and stronger institutions enhancing the positive impact. In addition, Adeola, (2017) used panel data from 15 Sub-Saharan African economies from 1980 to 2015 and found a positive and significant impact of foreign capital inflows on economic growth. The study also finds that the relationship between foreign capital flows and economic growth is influenced by other factors, including the type of capital flows, the country's level of development, and institutional quality, which affect the strength and direction of this relationship. Evbaziegbere et al., (2024) investigated the effects of foreign capital inflows in francophone and anglophone African countries. They showed that FDI and FPI negatively affect economic growth in both continental blocks. Moreover, Onwuteaka et al., (2023), in their study of international capital inflows and economic development in Nigeria, found no significant nexus between foreign capital inflows in the form of FDI, FPI, remittances, external borrowing, and economic development in Nigeria. Similarly, Rehman and Ahmad, (2016) investigated the impact of all the foreign capital inflows on economic growth. They found that external debt and ODA significantly and negatively affect growth, while FDI and remittances significantly and positively enhance economic growth. In the study by Eggoh et al., (2019), remittances were found to favorably enhance economic growth, while FDI and aid had no significant impact on economic growth in developing countries. They went on to show that the effect of remittances on economic growth is nonlinear with two extreme regimes. While the effect of remittances on economic growth is positive in the first regime, it is negative in the second regime, suggesting that migrants' inflows affect economic growth at lower private and global investments as threshold variables. At the same time, economic growth is negatively impacted when private and global investments are higher.

The extant theoretical and empirical literature is widely divided over the magnitude and direction of the effects of foreign capital inflows on economic growth in developing countries. While

neoclassical economists believe that international capital flows will move from rich to poor countries, which will positively impact economic growth through technological, labor, and capital accumulation, numerous studies, theoretical and empirical, have found that capital inflows can have a negative or insignificant impact on economic growth, especially in developing countries (see Lucas, 1990; Aizenman et al., 2012; Klobodu & Adams, 2016; Adams & Klobodu, 2018). As a result, many authors have attempted to identify the reasons for the existing literature's failure to reach a definitive conclusion on the capital inflow-growth nexus and why capital inflows do not enhance economic growth in certain economies. One approach has been to introduce a contingent effect into the literature, whereby the impact of capital flows on economic growth is influenced by conditional variables such as human capital, institutions, financial development, etc.; among such noteworthy studies is that of Dinh Su and Phuc Nguyen, (2022) who surveyed the impact of foreign financial flows and human capital on economic growth in developing countries. The study used panel data from 44 African developing countries from 2000 to 2018 and found that foreign financial flows and human capital positively and significantly impact economic growth. The authors suggest that foreign financial flows help finance investment and spur economic activity, while human capital enhances labor productivity and enables effective technology development and adoption. Furthermore, the study finds that institutional quality moderates the effects of foreign financial flows and human capital on economic growth, with better institutional quality amplifying their positive impact. The survey by Musibau, Yusuf, and Gold, (2019) examines the relationship between foreign capital inflows, human capital development, and economic growth in 22 African countries from 1980 to 2016, using the Pooled Mean Group (PMG) estimator. The study finds that foreign direct investment (FDI) and foreign aid positively and significantly affect economic growth, with FDI having a more considerable impact. The study also finds that human capital development positively and significantly affects economic growth. Furthermore, the study finds that the interaction between foreign capital inflows and human capital development has a positive and significant effect on economic growth, suggesting that the impact of foreign capital inflows on economic growth is stronger in countries with higher levels of human capital development.

Similarly, Sghaier, (2021) explores the impact of foreign capital inflows on economic growth in North African countries, focusing on the role of human capital. The author uses panel data and a fixed-effects model to examine the relationships among foreign direct investment (FDI), foreign

aid (FA), and economic growth in five North African countries (Algeria, Egypt, Libya, Morocco, and Tunisia) from 1985 to 2018. The study finds that both FDI and FA positively and significantly impact economic growth in the region. Additionally, the interaction between FDI and human capital has a positive and significant effect on economic growth, while the interaction between FA and human capital has no significant impact. This highlights the critical role of human capital in enhancing the effectiveness of FDI in promoting economic growth. Using a vector error correction model (VECM), Ogbuagu and Ifionu, (2015) explore the causal relationship between capital flows, human capital development, and economic growth in Nigeria using time series data from 1980 to 2012 and find evidence of bi-directional causality between capital flows and economic growth, implying that capital inflows promote economic growth and vice versa. Moreover, they find unidirectional causality from human capital development to economic growth, suggesting that human capital development leads to economic growth.

In examining the impact of foreign capital inflows and productivity growth in Asia, Beirne and Panthi (2024) found that foreign capital inflow significantly and negatively affected productivity growth in developing Asia. Still, the financial development of the host countries was found to substantially mitigate the adverse impact of portfolio equity and debt inflows. Bationo et al., (2023) opined that the negative relationship between foreign private capital inflows and economic growth stems from these inflows being directed to extractive and infrastructure sectors, which have a lower impact on productivity growth in developing countries. Trabelsi and Boujelbene, (2024), in their work, *Public Sector Efficiency and Economic Growth in Developing Countries*, postulate that increasing government expenditure decreases economic growth in developing countries. Still, by interacting government expenditure and the efficiency of the host countries, efficiency is found to boost public spending on economic growth. Doudo and Baidoo, (2022) examined the impact of foreign capital inflows on remittances, foreign aid, FDI, and external debt. In contrast, their results found that FDI and external debt inflows had adverse effects, while remittances positively impacted growth. By examining the effects of foreign capital inflows and institutional quality, they found that all inflows had a positive effect on growth. Ehigiamjusoe et al. (2024), in their work on the moderating role of human and physical capital on the impact of foreign aid on economic growth in Nigeria, revealed that though foreign aid significantly and positively impacts growth in

Nigeria, the moderating role of human and physical capital further enhances the impact of aid on economic growth. Sando et al. (2024) posit that foreign capital is in the form of external debt. Negatively and significantly relates to economic growth in thirty-one SSA countries. Still, the relationship reverses, positively enhancing economic growth when external debt interacts with public sector management quality (PSM), with countries with stronger PSM quality experiencing higher economic growth than those with weaker PSM quality.

On the basis of capital utilization efficiency, several studies have examined the efficiency of foreign capital flows and reported mixed results. Aydin and Zortuk, (2014) examine the efficiency of foreign direct investment (FDI) in five transition economies using fuzzy data envelopment analysis (DEA). The authors find that FDI efficiency varies across the countries, with Bulgaria and Romania having the highest scores and Hungary the lowest. The factors influencing FDI efficiency also differ across nations, with infrastructure and education being the most critical in Bulgaria and Romania. At the same time, market size and trade openness are the most essential factors in the Czech Republic, Hungary, and Poland. Ahmed et al., (2017) examine the efficiency of different channels of foreign remittances in the Sylhet region of Bangladesh using data envelopment analysis (DEA). The study finds that banks are the most efficient channel of remittances, followed by post offices and mobile banking. Informal channels have the lowest efficiency score. The authors also find that education level, income, and remittance amounts are positively associated with the efficiency of the channels. Wang, (2014) also employed the DEA model to investigate the financing utilization efficiency of state-owned, private, and foreign direct investment (FDI) enterprises in China. The study finds that private enterprises have the highest financing utilization efficiency, while state-owned enterprises have the lowest. FDI enterprises have intermediate efficiency levels. The study highlights the importance of considering ownership structure, size, and industry sector when analyzing efficiency.

Mastromarco, (2008) also examines the impact of foreign direct investment (FDI) and foreign portfolio investment (FPI) on economic efficiency in developing countries. The author uses a panel dataset covering 40 developing countries from 1980 to 2000 and finds that both FDI and FPI positively affect efficiency, with FDI having a larger impact than FPI. The author also notes that institutional quality significantly moderates the relationship between foreign capital and efficiency. The findings suggest that policymakers in developing countries should focus on attracting FDI

rather than FPI and on improving institutional quality to maximize the benefits of foreign capital inflows. Moreover, Mastromarco and Ghosh (2009) used the stochastic frontier analysis (SFA) to estimate efficiency scores for 59 developing countries. They found that foreign and human capital positively affect efficiency, with foreign direct investment (FDI) having a greater impact than foreign portfolio investment (FPI). The authors also find that human capital has a greater effect on efficiency than physical capital, and that the impact of FDI on efficiency is more substantial in countries with higher levels of human capital. Institutional quality is found to have a significant positive effect on the relationship between foreign capital and efficiency, but no significant impact on the relationship between human capital and efficiency.

Li and He, (2018) article investigates the impact of foreign direct investment (FDI) on regional innovation efficiency in China. Using a panel dataset covering 27 provinces in China from 2003 to 2013 and a two-stage DEA model, the authors find that FDI has a mixed impact on regional innovation efficiency. Specifically, FDI positively impacts innovation efficiency in regions with high technological development but negatively in areas with low technological development. Additionally, FDI hurts innovation efficiency in regions with high levels of competition but has a positive impact in areas with low levels of competition. On the other hand, Bhanumurthy and Sinha (2014) used the two-stage least squares (2SLS) estimation procedure with two-panel fixed-effects regression models to examine the relationship between equity and efficiency of foreign direct investment (FDI) across different Indian states. The findings indicate a strong negative correlation (-0.996) between equity and efficiency. This implies that states with higher efficiency tend to receive lower FDI flows, suggesting that non-economic factors influence FDI flows and regional development.

Valach (2022) examines the impact of foreign capital on the economic efficiency of food industry enterprises in the Slovak Republic. The study uses a sample of 111 firms and Data Envelopment Analysis (DEA) to estimate the firms' efficiency scores. The findings suggest that most firms are technically inefficient and that foreign capital positively affects the economic efficiency of enterprises. The study also finds that the effects of foreign capital on firm efficiency vary by investment type, with joint ventures having the most significant positive impact. In examining the effects of FDI on efficiency in the Swedish manufacturing sector, Svedin and Stage (2016) found a positive impact of FDI on efficiency. The positive effect of FDI is more substantial for large

firms and firms operating in high-tech industries. The study also finds that FDI has a positive impact on domestic firms' productivity, suggesting spillover effects.

### 5.3 Methodology

The neoclassical growth theory emphasizes the fundamental roles of capital, labor, and technological progress as production factors. Efficiency was not included as a factor in the production function, even though it could play a crucial role in production. As Pagano, (1993) indicated, the AK model shows that output is a function of capital stock and total factor productivity. The AK model is specified as follows;

$$Y_t = AK_t \quad (1)$$

where  $Y_t$  stands for aggregate output,  $K_t$  Aggregate capital stock at time t and A stands for capital productivity. Capital can be consumed or invested by producing a single good in a simple economy. However, capital is subject to depreciation at a rate of  $\delta$  at a given level of gross investment,  $I_t$  is invested; this implies that gross investment at time t equals the initial capital K, less capital depreciation, as stated in equation 2.

$$I_t = K_{t-1} - (I - \delta) \quad (2)$$

The model then assumes a closed economy without government intervention. This also means that gross investments,  $I_t$  is equal to gross savings at time t,  $S_t$ . However, transaction costs ( $\emptyset$ ), such as charges, brokerage fees, etc., will be deducted from savings. In other words, a proportion of savings  $(1-\emptyset)$  will be lost to the cost of the financial intermediation process, with the remaining amount channeled into investments as;

$$\emptyset S_t = I_t \quad (3)$$

The growth rate at t+1 will be obtained by extending equation 1 as follows;

$$g_{t+1} = \frac{Y_{t+1}}{Y_t} - 1 = \frac{K_{t+1}}{K_t} - 1 \quad (4)$$

By dropping the time indices from equation 2, we have the growth rate at the steady state as follows;

$$g = A\frac{1}{Y} - \delta = A\phi s - \delta \quad (5)$$

Based on this, Pagano (1993) identifies three main ways finance can influence economic growth: first, growth can be influenced by raising the proportion of savings,  $\phi$  which can be channeled into investment. Second, growth can also be affected by the marginal productivity of capital,  $A$ , and, finally, by increasing the rate of private savings.

Although the AK model emphasizes capital stock and capital productivity, it is essential to distinguish between efficiency and productivity. In simple terms, whereas efficiency is the ability to produce without wasting material, time, and energy, productivity focuses on producing in large quantities within a given period, without necessarily accounting for input waste. The traditional growth theories account only for capital, labor, and technological progress as the factors of production, without including efficiency.

Given that efficiency can play an essential role in improving output and preventing resource waste in the input-output transformation process, several empirical studies (Caligiuri & Turani, 2014; Wang, 2014; Pan et al., 2022; Bhanumurthy & Sinha, 2014) have incorporated efficiency as a factor of production. Thus, this study complements the traditional growth models by including efficiency as an additional factor in the production process, using it as a moderator variable as proposed by Caligiuri and Turini (2014)

Based on the theoretical discussion above and given the nature of the research question, panel data sets are appropriate for modeling such dynamic relationships. To empirically investigate the moderating effect of efficiency in the foreign capital - economic growth nexus, we specify equation (6) below, where economic growth depends on foreign capital inflows, efficiency, labor, technology, and other control variables. We select our study as follows;

$$y_{it} = f(FDI_{it}, ODA_{it}, REM_{it}, EFF_{it}^A, X_{it}) \quad (6)$$

where the dependent variable  $y_{it}$  is economic growth represented by the GDP per capita growth of country  $i$  at time  $t$ ;  $EFF_{it}^A$  is a vector of foreign capital efficiency of country  $i$  at time  $t$ ;  $FDI_{it}, ODA_{it}, REM_{it}$  are indicators of foreign capital inflows for country  $i$  at time  $t$ .  $X_{it}$  is a vector of control variables, including labor and technology progress at time  $t$  and country  $i$ , respectively.

In this chapter, we assume that the effect of foreign capital inflows on economic growth has a time lag. To examine whether foreign capital efficiency dampens or magnifies growth, we set up a baseline model (Model 0 in Table 5.3) in which economic growth is contingent on a one-period lag of indicators of foreign capital inflows (FDI, ODA, and remittances) and a vector of controls. Specifically, we estimate equation (7), model 0 as follows:

$$y_{it} = \alpha_0 y_{it-1} + \alpha_1 FDI_{it} + \alpha_2 ODA_{it} + \alpha_3 REM_{it} + \alpha_4 X_{it} + \gamma_i + \mu_t + \varepsilon_{it} \quad (7)$$

where  $y_{it}$  is GDP per capita growth, which is the dependent,  $y_{it-1}$  is the lag of the dependent variable, GDP growth, representing the initial conditions of economic development,  $\alpha_0$  will indicate a test for the country's catch-up or convergence effect on economic growth.  $\gamma_i$  are the country-specific fixed effects;  $\mu_t$  is the time effects while  $\varepsilon_{it}$  is the idiosyncratic error term

In equation 8, we test for the effect of the moderator variables by including the efficiencies of all the foreign capital inflows described in equation 6 as  $EFF_{it}^A$ , where A= FDI efficiency, ODA efficiency, and remittance efficiency Models 3 to 5 are therefore specified in equation 8 as follows;

$$y_{it} = \alpha_0 y_{it-1} + \alpha_1 FDI_{it} + \alpha_2 ODA_{it} + \alpha_3 REM_{it} + \alpha_4 EFF_{it}^A + \alpha_5 X_{it} + \gamma_i + \mu_t + \varepsilon_{it} \quad (8)$$

Beyond the direct effects of foreign capital inflows and efficiency on economic growth in equations 7 and 8, the study will also ascertain the possible channel through which foreign capital inflows affect economic growth, using efficiency as the primary channel. To do so, we include a multiplicative interactive term between foreign capital inflows and their efficiency to capture the moderating effect of efficiency on the relationship between foreign capital inflows and economic growth. Hence, we estimate equation (9) below. The model expresses foreign capital efficiency as an index constructed via the Data Envelopment Analysis (DEA) methodology, obtained in Chapter Two, FDI, ODA, and remittances as foreign capital inflows (FCIs), the interactions between efficiency and each of the FCIs, and a vector of control variables.

$$y_{it} = \alpha_0 y_{it-1} + \alpha_1 FDI_{it} + \alpha_2 ODA_{it} + \alpha_3 REM_{it} + \alpha_4 EFF_{it}^A + \alpha_5 (FDI_{it} \times FDI_{it} EFF_{it}) + \alpha_6 (ODA_{it} \times ODA_{it} EFF_{it}) + \alpha_7 (REM_{it} \times REM_{it} EFF_{it}) + \alpha_8 X_{it} + \gamma_i + \mu_t + \varepsilon_{it} \quad (9)$$

To correctly interpret the results of the moderation effects of efficiency in the capital-growth nexus, we compute the marginal effect by taking the partial derivatives of the three interactive terms and show how these marginal changes can influence economic growth. The coefficients of the interactive terms,  $\alpha_6$  and  $\alpha_7$  measure the effect of foreign capital inflows conditioned on the efficiency with which these inflows are utilized to grow the economy. Therefore, we examine these conditional effects by taking the partial derivatives in equation (9) concerning foreign capital inflows (FDI, ODA, and remittances), as presented in equations 10, 11, and 12 below. We follow the procedure outlined by Ogbonna et al., (2021) and Ibrahim & Muzungu, (2021) for the partial derivatives of the interactive terms. Based on the dynamic nature of our model, the lagged dependent variable depends on the dependent variable; hence, the partial derivatives for FDI, ODA, and remittance are as follows;

For the marginal effects of FDI,

$$\frac{\partial EG}{\partial FDI} = [1/(1 - \phi_{it})]\alpha_1 + \alpha_5 FDIEFF_{it} \quad (10)$$

For the marginal effect of ODA,

$$\frac{\partial EG}{\partial ODA} = [1/(1 - \phi_{it})]\alpha_2 + \alpha_6 ODAEFF_{it} \quad (11)$$

For the marginal effect of remittances,

$$\frac{\partial EG}{\partial REM} = [1/(1 - \phi_{it})]\alpha_3 + \alpha_7 REMEFF_{it} \quad (12)$$

Thus, this research focuses on the behavior of the coefficients in the partial derivatives in equations 10, 11, and 12. Ideally, if efficiency should enhance economic growth by magnifying the effect of foreign capital, then  $\alpha_1, \alpha_2, \alpha_3, > 0$  and  $\alpha_5, \alpha_6, \alpha_7 > 0$ . On the other hand, if  $\alpha_1, \alpha_2, \alpha_3, < 0$  and  $\alpha_5, \alpha_6, \alpha_7 > 0$  implies that the foreign capital in question is a curse, hurting economic growth in the region. At the same time, efficiency moderates this negative influence, turning it into a blessing by enhancing growth. Suppose the coefficients of both the capital inflows and their efficiencies are positive. In that case, foreign capital is a blessing, and ensuring efficiency will further intensify the blessing on economic growth. However, if both are negative, foreign capital dampens growth, and efficiency intensifies the adverse effects.

The introduction of a lagged dependent variable raises endogeneity concerns, as the error term may be correlated with it (Greene, 2003). In this research, we will use the dynamic generalized methods of moments (GMM) by Arellano and Bond, (1991) and Arellano and Boxer, (1995) to estimate the equations above. Compared with the conventional ordinary least squares (OLS) and cointegration estimation approaches, the GMM estimator addresses the econometric problems of endogeneity of the lagged dependent variable and unobserved country-specific effects prevalent in panel estimations, as presented in equation (9).

In the presence of endogeneity, we require the error term to be uncorrelated with the explanatory variables when estimating equation (9) above. We require instrumental variables that affect economic growth by influencing the explanatory variables. This implies that the explanatory variables are weakly exogenous, indicating that current and past values of economic growth must be uncorrelated with the realization of future error terms.

Arellano and Bond, (1991) proposed using lags of the regressor variables as valid instruments for the control of endogeneity. To do this, we choose appropriate lagged values of the dependent variable,  $y_{it}$  and the explanatory variables,  $FCIS_{it}$  and  $x_{it}$ . Moreover, they assume no correlation between them and the error term. This leads us to the following moment conditions for our different GMM models:

$$E \left[ \begin{pmatrix} y_{it} \\ \vdots \\ y_{it-q} \\ FCIS_{it} \\ \vdots \\ FCIS_{it-q} \\ x_{it} \\ \vdots \\ x_{it-q} \end{pmatrix} (\epsilon_{it} - \epsilon_{it-p}) \right] = 0 \text{ where } \epsilon_{it} = \gamma_i + \mu_t + \varepsilon_{it}, \text{ } t=3, \dots, T \text{ and } q \geq 2 \text{ FCI= FDI,}$$

(13)

ODA and remittance

Therefore, assuming the covariates' weak homogeneity and the uncorrelated error terms property, the dynamic panel GMM estimation will rely on the following moment conditions in first differences.

$$E [y_{it-q}(\Delta\epsilon_{it})] = 0 \quad \text{for } q \geq 2, t=3, \dots, T \tag{14}$$

$$E [FCIS_{it-q}(\Delta\epsilon_{it})] = 0 \quad \text{for } q \geq 2, t=3, \dots, T \quad (15)$$

$$E [x_{it-q}(\Delta\epsilon_{it})] = 0 \quad \text{for } q \geq 2, t=3, \dots, T \quad (16)$$

Indeed, the efficiency of the GMM estimates depends on the validity of the instruments. This study addresses this by using the serial correlation test and Sargan/Hansen's test for overidentifying restrictions. The serial correlation test assesses whether or not the error terms are serially correlated at first order (AR1) or second order (AR2). In contrast, the Sargan/Hansen's test will be used to evaluate the homogeneity of the instruments. Finally, we use Driscoll-Kraay robust standard errors to address cross-sectional dependence and heteroskedasticity. Hoechle, (2007) contends that running the regression with Driscoll-Kraay robust standard errors accounts for the nuisance of cross-sectional dependence in the data.

### 5.3.1 Data

Data covering the period of 1996 to 2021 for 35 sub-Saharan African countries was used for the study. Data for technological change and efficiencies of foreign capital inflows (FDI, ODA, and remittance efficiencies) are based on the DEA estimation in Chapter Two. For financial development, we use the IMF composite financial development index. The remaining variables are sourced from the World Development Indicators of the World Bank. Details of the variables used, their description, and sources are summarized in Table 5.2 below.

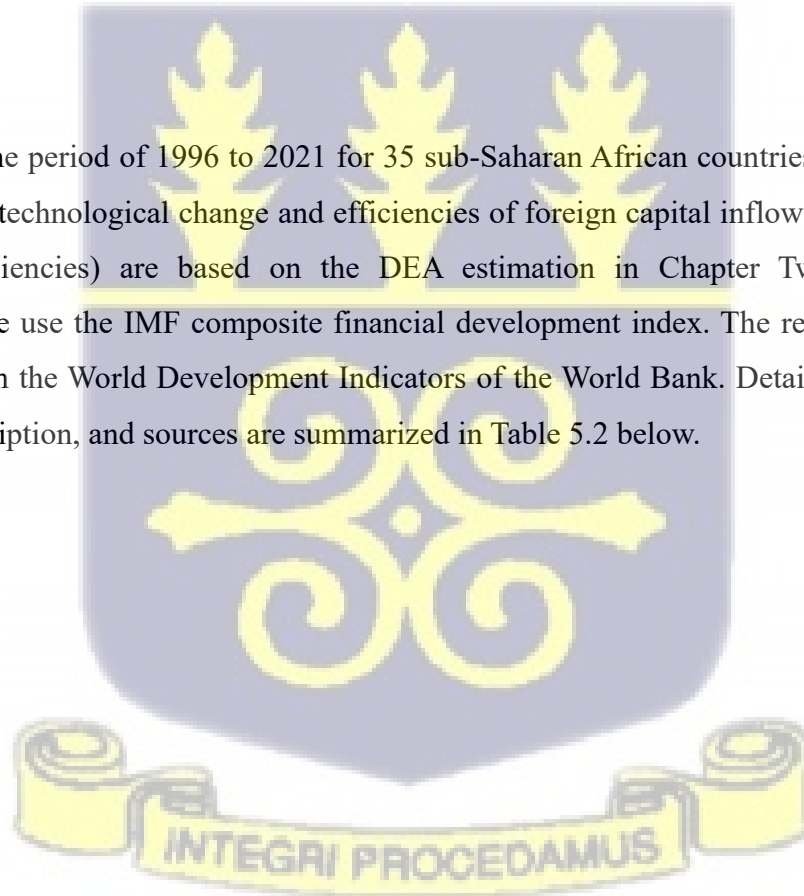


Table 5.2. Variables, description, and sources of data

Variable	Description	Source of Data
Real GDP growth rate	Real GDP growth (%)	World Development Indicator
Govexp	Government Expenditure As % of GDP	WDI
inflation	Inflation rate (CPI) % of GDP	WDI
LTlaborforce	Log of Total labor force	WDI
FDI	FDI inflows, net % of GDP	WDI
LNetODA	Log of Official Development Assist and aid	WDI
Remit	Remittances received as a percentage of GDP	WDI
HDI	Human Development Index	UNDP
Gross fixed capital formation	Gross fixed capital formation, % of GDP	WDI
Techchange	Technological change	Derived from Malmquist Index calculations
PopAnngrowth	Annual population growth rate	WDI
FD	Financial Development	UNDP database, Svirydzienka (2016)
FDleffie	FDI Efficiency Index	Own calculation from DEA
remiteffie	Remittance Efficiency Index	Own calculation from DEA
ODAeffie	ODA Efficiency Index	Own calculation from DEA

## 5.4 Results

### 5.4.1 Descriptive Statistics

Table 5.3 presents the summary statistics of the data used in this analysis. Focusing on the variables of interest, the average GDP growth is 1.26%, with a maximum increase of 60.1% in Rwanda in 1995, while the minimum growth is -41% recorded in the same country the previous year. Interestingly, the worst and best economic performance from 1990 to 2021 occurred in the same country, in successive years from 1994 to 1995. This outcome is attributable to the 1994 Rwandan genocide, but it also shows the speed at which the economy recovered immediately in the year following the genocide. The average FDI inflow is 2.99%, with the lowest inflows in the Republic of Congo at -18.92% and the highest net inflows of 56.3% in Seychelles in 2012. The standard deviation of 4.9, compared with the mean of 2.99%, suggests wide variation in FDI inflows across countries in SSA. Official Development Assistance averaged 19.7 (on a logarithmic scale) during

the study period, with a standard deviation of 1.36, indicating that ODA received does not vary much across countries in SSA. The lowest ODA received was 10.82 in Seychelles, with the highest at 50.06 in Nigeria in 2006. The mean remittance inflows as a percentage of GDP is 3.85%, and the standard deviation is 12, indicating wide variation across countries in SSA. The maximum remittances received is 167.43% in Lesotho, with the minimum being 0 in many countries, including the Comoros.

Regarding the efficiency of each foreign capital inflow, all three types achieved 100% efficiency. However, the minimum levels of efficiency recorded over the period are 0.042%, 0.037%, and 0.035% for FDI ODA and remittances inflows, respectively.

The correlation matrix of this paper is presented in Appendix 1. The table clearly shows that, except for the three efficiency variables (ODA efficiency, FDI efficiency, and remittance efficiency), all have low correlation coefficients, suggesting they are uncorrelated. The correlation among the efficiency variables will not pose multicollinearity problems because they are not combined in a single equation. Each efficiency variable is used in separate models due to their levels of correlation. Overall, our regression models are not expected to suffer from multicollinearity.

*Table 5.3: Summary Statistics*

Variable	Obs	Mean	Std. Dev.	Min	Max
GDP growth	1120	1.258	4.786	-41.587	60.091
Govexp	1041	107.441	13.275	57.699	169.374
LTotalLForce	1088	6.514	0.641	4.990	7.849
Gcapform	1063	21.301	10.024	-2.424	79.401
FD	1120	0.135	-0.109	-0.033	0.643
Techange	1085	2.212	10.942	.008	178.123
FDI	1119	2.997	4.929	-18.918	56.264
remit	1055	3.85	12.237	0	167.433
LNetODAid	1112	8.543	.591	4.699	10.058
Infation	1120	557.437	322.565	1	1115
PopAnngrowth	1120	2.434	1.308	-16.881	16.626
FDIeffie	1120	.886	.099	.576	1
Remeffie	1120	.382	.381	0	1
ODAeffie	1120	.933	.066	.515	1

## 5.4.2 Moderating Role of Efficiency on the Foreign Capital Inflow- Economic Growth

### Nexus

The results of the role of efficiency on the foreign capital inflow-growth nexus are presented in Table 5.4 below. Model 0 presents the baseline regression results on the impact of foreign capital inflows on economic growth, without including capital inflow efficiency as a moderating variable or the interactive terms. Model 1 presents the regression results for foreign capital inflows, including individual foreign capital efficiencies and moderating variables. Model 2 extends Model 1 by including and reporting the estimation of the moderating effect of FDI efficiency on the FDI-growth relationship. In contrast, Model 3 is extended to estimate the moderating impact of remittance efficiency on the nexus between remittance and economic growth. Finally, model 4 addresses the estimation of the moderating effect of ODA efficiency on the relationship between ODA and economic development.

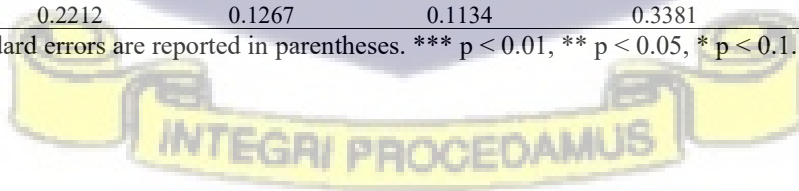
The study subjected the models to important diagnostic tests, starting with post-estimation diagnostics, including Hansen's test for overidentification restrictions, the Arellano and Bond tests for first- and second-order serial correlation, and instrument proliferation. The test results suggest that the models are valid and suitable for inference and policy recommendations. The Hansen test of overidentification restrictions for all four models reported probabilities greater than 10% and exceeded the recommended level of 25%. This implies that the instruments adopted in this chapter are valid for reliable inferences. In addition, the Arellano and Bond first and second-order tests for serial correlation (AR1 and AR2, respectively) confirm that the study has no issues with serial correlation. Moreover, the number of instruments is less than the number of cross-sections, suggesting that no instrument proliferation problem exists in the model. Overall, the results of these tests indicate that the models are suitable for inference and policy recommendation.



Table 5. 4. Regression Results for the Moderation Effect of Efficiency on the FCIs - Growth Nexus

Variables	Based Line	Moderators	FDI	ODA	Remittances
	Model 0	Model 1	Model 2	Model 3	Model 4
GDPPC (-1)	-0.199552*** (0.023730)	-0.159970*** (0.023031)	-0.198440*** (0.033666)	-0.118875*** (0.038506)	-0.106035*** (0.020492)
Investments	-0.104085** (0.031124)	-0.209977*** (0.048565)	-0.151534*** (0.053729)	-0.061744 (0.066934)	0.009739 (0.008605)
Technology	-0.058132 (0.058236)	-0.104964*** (0.033265)	0.004341 (0.077295)	0.060541 (0.090775)	-0.017651 (0.027294)
Labour	-1.177848*** (0.065108)	-3.30E-07** (1.67E-07)	-7.00E-07*** (1.96E-07)	-7.89E-07*** (2.50E-07)	-6.28E-07*** (2.05E-07)
Population growth	-1.177848*** (0.065108)	-1.249475*** (0.060082)	-1.152754*** (0.036357)	-1.432595*** (0.084423)	-1.250390*** (0.064531)
Inflation	-0.001170*** (0.000393)	-0.000353 (0.000331)	-0.000921** (0.000421)	-0.000384 (0.000496)	-0.000172 (0.000371)
FD	-1.198635 (12.63972)	5.071014** (21.05538)	3.139584 (20.44868)	21.03104 (24.35763)	5.426762*** (14.97851)
FDI	-0.739983*** (0.239777)	-1.073623*** (0.310210)	-1.618322*** (0.039012)	-0.867020*** (0.365422)	-0.865126* (0.444508)
ODA	-0.290455*** (0.072725)	-0.231429** (0.065712)	-0.223837** (0.082663)	-2.78901** (1.237192)	-0.272661 (0.258304)
Remittances	0.386486* (0.216226)	0.12380 (0.19890)	0.179956 (0.225113)	0.217295 (0.258146)	-0.436872** (0.265526)
FDI Efficiency		2.140913*** (0.773956)	1.382388*** (0.579865)		
ODA Efficiency		-1.921853* (1.058218)		2.644215** (1.200051)	
Remit Efficiency		2.118109* (1.094888)			1.473795* (0.764763)
FDI*FDIEFF			1.138954** (0.610400)		
ODA *ODAEFF				1.746720** (0.809041)	
REMIT*REMIT EFF					0.360667*** (0.151755)
<b>Post Estimation Diagnosis</b>					
Observations	745	745	745	764	704
Cross-sections	33	33	33	33	33
Instruments	30	29	27	27	27
J-statistic P-value	0.655138	0.3755	0.6511	0.9343	0.2565
AR (1) P-value	0.000	0.0000	0.0000	0.0203	0.0000
AR (2) P-value	0.2212	0.1267	0.1134	0.3381	0.23820

Notes: Robust Standard errors are reported in parentheses. \*\*\* p < 0.01, \*\* p < 0.05, \* p < 0.1.



Results from Table 5.4 reveal that the lag-dependent variable, real GDP per capita growth (GDPPC (-1)), negatively and significantly impacts current GDP growth in all five models. This implies that previous GDP growth adversely affects current GDP growth. This outcome is consistent with the catching-up or convergence theory of economic development.

ODA and FDI have a statistically significant and negative impact on economic growth throughout the five models. For instance, economic growth will decline by 1.0736 units for each additional unit of FDI in Model 1. Likewise, a one-unit increase in official development assistance inflows is associated with a 0.2314 decline in GDP in the same model. Contrary to popular belief, FDI generally benefits recipient countries. This study supports the literature, which finds that FDI is negatively correlated with economic growth, especially in developing countries. De-investments may account for the adverse effect in SSA countries. This implies that foreign direct investment (FDI) alone might not be enough to propel economic progress in Africa. The results are consistent with Alfaro et al., (2004), who found that FDI inflows into the manufacturing sector positively impacted growth, while FDI in the primary sector tended to have an adverse effect. Similarly, Umeora, (2011), Inekwe (2013), Belloumi, (2014), and Saqib et al., (2013) found that FDI negatively affects economic growth. The adverse impact of ODA supports the notion that aid inflows are subject to limitations or restrictions generally tailored to serve the interests of donor communities rather than the economic interests of recipient nations. Except for models 0 and 5, remittances received do not appear to have been important in influencing the variation in GDP growth in SSA. It is weakly optimistic about growth in model 0 and negatively affects growth at 5% in model 5, and this further indicates that the impact of remittances on growth is unclear.

The results in Model 1 clearly illustrate the significance of foreign capital efficiency to economic development in SSA. While FDI Efficiency and Remittance Efficiency show a positive and significant contribution to economic growth in SSA, ODA Efficiency shows a negative and weakly significant contribution (-1.922,  $p < 0.1$ ) in the model at hand. The existence of a discrepancy in the significance of the efficiency variables suggests that while the efficiency of investment and remittances in SSA has an immediate growth effect, the efficiency of official development assistance in the aggregate model may be constrained by the restrictive nature of aid conditionality

or the displacement of domestic savings, as noted in the 'aid syndrome' literature. Nonetheless, for the ODA-specific model in Table 3 (Model 3), the ODA efficiency depicts a revised positive significance of 2.644

Overall, in all the models, from Model 1 to Model 4, the lag-dependent economic growth variable, measured as real GDP growth, is significant and negative. This implies that current growth is adversely affected by past growth rates. This result supports the convergence or catching-up theory of economic development. As expected, inflation and population growth rate are inversely related to growth, but inflation is statistically insignificant except in models 0 and 2. On the other hand, population growth is enormously significant and negatively affects growth as expected. This is because population growth rates in SSA are high, which eventually puts strain on these economies' limited resources. Investments (measured as gross fixed capital formation) are not crucial in promoting economic growth in SSA. This may be because resources in SSA are not used productively or may be exploited to benefit foreign powers. Labor force, like population growth, is harmful and significantly affects growth in SSA throughout the five models, probably due to the notion that a growing labor force will lower the capital-labor ratio, expansion of the informal sector, unemployment, and underemployment, etc., all of which can adversely affect the economic growth of a country. Our results show that technological changes do not promote growth in this region.

Turning to the focus of this study, the moderating impact of efficiency in the foreign capital-growth nexus is presented in models 2, 3, and 4 for FDI, ODA, and remittances, respectively. The models focus on the interaction between efficiency and foreign capital inflows. The results from model 2 on FDI inflows confirm the baseline and model 1 results, with significant negative (-1.618) and positive (1.382) effects of net FDI and FDI efficiency on economic growth, respectively. A 1% change in FDI inflows will affect economic growth by 1.618, and vice versa. However, an increase in FDI efficiency will enhance economic growth by 1.382. More importantly, the interaction between FDI and FDI efficiency (FDI\*FDIEFF) showed a positive, statistically significant coefficient of 1.138. This result indicates that while net FDI inflows may hurt economic growth, their impact on growth becomes positive when they are efficiently absorbed and utilized. The marginal effect of the interaction between FDI and efficiency is dampening the adverse impact of

FDI inflows, though not too much to turn it into a positive net effect. Specifically, the results highlight that FDI's contribution to economic growth depends on the recipient country's capacity to channel these inflows into efficient and productive economic activities. This result is in line with the findings of Benetrix et al. (2023), who discovered that enhancing financial development and bolstering human capital is critical to drawing in and reaping the benefits of high-value global value chains (GVCs) linked to foreign direct investment (FDI) inflows.

Model 4 investigates the interaction effect of ODA efficiency in the relationship between official development assistance (ODA) and economic growth. Like the FDI model (model 1), the results show that ODA inflows, as in the baseline results, negatively and statistically significantly affect economic growth. A unit increase in ODA inflows in SSA led to a 2.78 decrease in the real GDP growth rate. This outcome aligns with the findings of Anwar and Cooray (2015), who found that ODA had a detrimental impact on growth. It also corroborates with Arellano et al., (2009), who revealed that ODA inflows caused investments in the African nations under investigation to decline while consumer spending increased, adversely affecting growth. Similar results have been documented by (Abd et al. 2013; Moyo, 2010; Ang, 2010; Mallik, 2008), all of which found a significant negative impact of foreign capital on economic growth. Although ODA inflows negatively impact growth in SSA, ODA's efficiency has a positive and significant (2.644) effect on economic growth. Africa's economic growth will increase by 2.644 percent for every unit increase in aid efficiency. The ODA and efficiency interaction term (ODA\*ODAEFF) has a positive and significant (1.746) effect on growth at the 5% confidence level. As with Model 3, this result shows that although ODA hurts growth, it positively affects economic growth when it interacts with efficiency. Thus, the efficiency with which recipient nations use aid to further their interests will determine how vital aid is to economic growth. The findings highlight the importance of strengthening governance capabilities to ensure the effective and efficient use of development aid to achieve targeted growth outcomes.

The results from model 4 display patterns similar to those of models 2 and 3, in which remittances interact with remittance efficiency. Although remittances are insignificant in the first three models, their impact on real GDP growth is negative and statistically significant at the 5% confidence level in model 5. A unit increase in the inflows of remittances reduces economic growth by 0.436. One reason for the negative outcome is the loss of labor and dependency culture theories, which suggest

that remittances tend to make recipient countries less inclined to seek employment. Like the other models, remittance efficiency (REM\_EFF) has a positive and highly significant effect, with a coefficient of 1.474 on economic growth, and more importantly, the interactive term between remittances and remittance efficiency (REM\*REM\_EFF) is positive and significant with a coefficient of 0.361. These results imply that while remittance inflows may not promote economic growth, their potential to contribute positively to growth outcomes depends on the recipient country's capacity to efficiently and productively utilize these inflows, ensuring they are not wasted. Countries that can efficiently harness remittance inflows by channelling them into productive investments or consumption are more likely to experience favourable growth effects. This outcome is consistent with the work of IZA World, (2014), which postulates that remittances could improve economic growth and people's well-being if recipient countries design policies to help them be used most productively. This also suggests that the importance of remittances on growth depends on ensuring their efficient utilization and avoiding waste.

These empirical findings align closely with well-established economic frameworks, particularly the Absorptive Capacity Theory and the Theory of the Second Best. The positive and significant interaction terms (FD \*Efficiency, ODA\*Efficiency) ( $p < 0.05$ ) support the Absorptive Capacity hypothesis, which claims that external capital alone is not sufficient; it requires a complementary domestic knowledge stock (efficiency) to be effective. Therefore, the negative direct coefficients for FDI and ODA observed in Models 2 and 3 can be explained by the Theory of the Second Best. In economies with structural distortions (low efficiency), increasing resource inflows (capital) may not lead to welfare improvements. It might worsen distortions (such as rent-seeking or Dutch disease) unless the primary issue—inefficiency—is addressed first.

After a close look at the findings from all five models, a consistent pattern emerges in all three primary foreign capital inflows. While foreign capital may not promote economic growth, this study has demonstrated that inflows of foreign capital will enhance growth if recipient countries can efficiently utilize them. The importance of efficiency in improving the impact of foreign capital inflows is highlighted by the respective efficiency variables and their interactions with the foreign capital inflow variables. Results from Table 5.4 confirm that efficiency plays a significant role in

enhancing the impact of foreign capital on economic growth. The findings of the study are consistent with the existing literature. For instance, a recent study by Trabelsi and Bluejeaned, (2024) found that increasing government expenditure affects economic growth. However, when examining public sector efficiency, they found that it can further boost the impact of government spending on economic growth. Elleer et al., (2005) maintain that the positive relationship between FDI and economic growth is driven by the level of efficiency of the financial system, suggesting the pivotal role of the efficiency channel in transmitting the growth-enhancing effects of FDI. In a related study, Duodu and Baidoo, (2022) found that foreign capital inflows do not promote economic growth. However, upon interacting foreign capital with institutional quality, foreign capital's impact positively and significantly enhances economic growth. It is also supported by Ofori et al., (2023), which found that the effect of FDI on inclusive green growth is contingent on the level of energy efficiency, with higher energy efficiency amplifying the positive effects of FDI. This study's primary concern is the marginal effect of foreign capital inflows on economic growth conditioned on the role of efficiency. Given the parameters of all the foreign capital inflows, the efficiencies, and their interactive terms, we compute the marginal effects of foreign capital inflows at the average, minimum, and maximum levels of efficiency using the partial derivatives in equations 12, 13, and 14 below.

$$\frac{\partial y_{it}}{\partial FDI_{it}} = \left[ \frac{1}{1+0.20} \right] (-1.62 + 1.14EFF) = -1.35 + 0.95EFF_{it} \quad \text{Eq. (12)}$$

$$\frac{\partial y_{it}}{\partial Remit_{it}} = \left[ \frac{1}{1+0.11} \right] (-0.44 + 0.361EFF) = -0.396 + 0.33EFF_{it} \quad \text{Eq. (13)}$$

$$\frac{\partial y_{it}}{\partial ODA_{it}} = \left[ \frac{1}{1+1.12} \right] (-2.64 + 1.75EFF) = -1.254 + 0.83EFF_{it} \quad \text{Eq. (14)}$$

From the summary statistics, the average efficiency levels are 0.886, 0.382, and 0.933 for FDI, remittances, and ODA efficiencies, respectively. The minimum levels of efficiency are 0.576, 0, and 0.515 for FDI, remittances received, and ODA, respectively, while the maximum levels of efficiency are 1 (100%) for all inflows. Based on the partial derivatives in equations 12, 13, and 14 above, the results of the marginal effects of FDI, remittance, and ODA efficiencies are presented in Table 5.5 below.

Table 5.5: Computation of marginal effects of foreign capital efficiency at minimum, average, and maximum levels for FDI, ODA, and remittances inflows

Capital	Minimum	Average	Maximum
<b>FDI</b>	$\frac{\partial y_{it}}{\partial FDI_{it}} = \left[ \frac{1}{1+0.20} \right] (-1.62 + 1.14EFF)$ $= -1.35 + 0.95 * 0.576 = -0.803$	$\frac{\partial y_{it}}{\partial FDI_{it}} = \left[ \frac{1}{1+0.20} \right] (-1.62 + 1.14EFF)$ $= -1.35 + 0.95 * 0.886 = -0.508$	$\frac{\partial y_{it}}{\partial FDI_{it}} = \left[ \frac{1}{1+0.20} \right] (-1.62 + 1.14EFF)$ $= -1.35 + 0.95 * 1 = -1.283$
<b>Remit</b>	$\frac{\partial y_{it}}{\partial Remit_{it}} = \left[ \frac{1}{1+0.11} \right] (-0.44 + 0.361EFF)$ $= -0.396 + 0.33 * 0 = -0.396$	$\frac{\partial y_{it}}{\partial Remit_{it}} = \left[ \frac{1}{1+0.11} \right] (-0.44 + 0.361EFF)$ $= -0.396 + 0.33 * 0.382 = -0.267$	$\frac{\partial y_{it}}{\partial Remit_{it}} = \left[ \frac{1}{1+0.11} \right] (-0.44 + 0.361EFF)$ $= -0.396 + 0.33 * 1 = -0.066$
<b>ODA</b>	$\frac{\partial y_{it}}{\partial ODA_{it}} = \left[ \frac{1}{1+1.12} \right] (-2.64 + 1.75EFF)$ $= -1.254 + 0.83 * 0.515 = -0.827$	$\frac{\partial y_{it}}{\partial ODA_{it}} = \left[ \frac{1}{1+1.12} \right] (-2.64 + 1.75EFF)$ $= -1.254 + 0.83 * 0.933 = -0.4796$	$\frac{\partial y_{it}}{\partial ODA_{it}} = \left[ \frac{1}{1+1.12} \right] (-2.64 + 1.75EFF)$ $= -1.254 + 0.83 * 1 = -0.424$

From Table 5.5, the marginal effects of foreign capital inflows on growth, computed at the average efficiency, are -0.508, -0.267, and -0.476 for FDI, remittances, and ODA, respectively. Also, the marginal effects at the minimum levels are computed at -0.803, -0.396, and -0.823. For FDI, remittances, and ODA, respectively. Finally, the marginal impact at the maximum efficiency level is computed as -0.40 for FDI efficiency, -0.066 for remittances, and -0.424 for ODA. The marginal effect of -0.803 at the minimum efficiency level for FDI suggests that an increase in FDI inflows will decrease economic growth by 0.803. As efficiency improves from the minimum to the average level, the magnitude of the marginal effects drops to -0.508 and then further decreases to -0.40 at the maximum efficiency level. Hence, a unit increase in FDI would lower economic growth by 0.803, 0.508, and 0.40 at the minimum, average, and maximum levels of FDI efficiency. These negative effects are down from the initial adverse effect of 1.62 without efficiency. This suggests that in sub-Saharan Africa, the marginal effects of FDI are adverse at both low and high levels of efficiency, indicating that though efficiency has a dampening effect on the adverse effects of FDI inflows, a much higher standard of efficiency is required to overturn the inherent curse of foreign capital inflows as efficiency improves from low to higher levels, the adverse effects of FDI on growth decrease from a magnitude of 1.62, but not enough to turn the negative effect into a positive one. This result aligns with a study by Oyefiabi et al., (2021), which found that good governance is required to favourably alter the effect of FDI on economic growth in Nigeria. It is also consistent

with Hayley and Panizza, (2023), which indicates that the relationship between FDI and growth is unclear. However, FDI positively affects growth when financial development and global value chain activity are present. Batten and Vo, (2009) found that to benefit from FDI in developing countries depends on effective education attainment and institutional characteristics.

The marginal effect of remittances and ODA inflows follows a similar pattern to FDI. At the minimum efficiency level, the marginal effect of remittances is -0.396, indicating that a unit increase in remittances inflows decreases economic growth by 0.396. When efficiency improves to the average level, the marginal impacts improve to -0.267, which reduces to -0.066 at the maximum efficiency level. The findings show that remittance inflows remain negative at all levels of efficiency, but the negative impact on growth decreases as efficiency improves from low to higher levels. However, regardless of the efficiency level, the magnitude of the adverse effects is lower than the initial level of 0.44 when efficiency is included. At the minimum efficiency level, the magnitude of the adverse effect on growth is 0.396. However, at the maximum efficiency level, the adverse effect of remittances reduces drastically to 0.066. These results, like FDI, indicate that efficiency mitigates the adverse marginal effect of remittances. Regarding ODA inflows, at the average efficiency level, the marginal effect is -0.476, indicating that a unit increase in ODA inflows reduces economic growth by 0.476. However, at the maximum efficiency level, this adverse effect decreased to 0.424, while the marginal effect of ODA at the minimum level adversely affects economic growth by 0.823. The magnitude of the initial negative effect of ODA on growth without the efficiency interaction was 2.79, far greater than the magnitudes of the coefficients when the role of efficiency is considered. These findings on ODA are consistent with those of Ogbonna et al. (2021), who concluded that as institutional quality improves, the adverse effect of foreign aid on economic growth decreases. It is also consistent with theoretical and empirical literature that the effective use of foreign aid positively impacts economic growth (Demsctz, 1967; Ogbuabor et al., 2019; Maruta et al., 2020).

Overall, the moderation effects of the three capital inflows indicate a negative, statistically significant impact of foreign capital inflows on the economy. All three capital inflows, FDI, ODA, and remittances, are negative and statistically significant at the 5% level. This finding is consistent with the results of Prasad et al., (2007), which showed that the fastest-growing developing countries rely less on foreign capital inflows. In other words, their results indicated a negative

relationship between foreign capital inflows and growth in developing countries in both the short and long run.

Interestingly, the statistical significance of foreign capital efficiency was tested in the dynamic GMM model. The results reveal that, except ODA efficiency, all foreign capital efficiencies are significant and positively affect economic growth in SSA. This finding implies that the efficient utilization of foreign capital inflows would increase economic growth in developing countries, underscoring the importance of efficiency in extant growth theories. A unit change in the efficiency of foreign capital inflows would increase economic growth by 2.14 and 2.12 for FDI and remittances, respectively. However, the impact of aid efficiency on growth is negative and weakly significant at the 10% confidence level. This finding is counterintuitive, but a possible explanation for these results is the donor community's overly restrictive approach to aid. Most aid packages come with specific implementation rules. When host countries fail to meet certain implementation criteria, the funds are either left untouched or eventually misappropriated by government officials. These restrictions, intended to avoid waste and ensure efficiency, may end up impeding growth. All three moderation terms give the same results. They are statistically significant and positively impact economic growth in SSA countries. As stated above, the marginal effect calculations and analysis show that although foreign capital inflows do not promote growth in SSA, the overall marginal effect of the interaction between foreign capital inflows and efficiency indicates that efficiency mitigates the adverse effect of these capital inflows. As efficiency improves, so does its suppressing power, which dampens the adverse effect of foreign capital inflows. In other words, at higher levels of efficiency in the receiving countries, the adverse effects of foreign capital inflows on economic growth diminish. This result is consistent with empirical and theoretical readings that higher levels of efficiency will spur growth (Oghonna et al., 2021; Çilingirtürk & Turanlı, 2014).

Overall, this study's findings present evidence that, whereas foreign capital inflows do not promote economic growth on their own, higher levels of efficiency suppress the growth-dampening effects of foreign capital inflows in SSA.

## 5.5 Conclusion and Policy Discussion

The study investigated the dynamic moderating role of efficiency on the effect of foreign capital inflows and economic growth in sub-Saharan SSA. We used data from a panel of 35 sub-Saharan African countries from 1990 to 2021. The choice of these countries is strictly based on data availability. The dynamic GMM framework is used to address endogeneity. In this chapter, we established that foreign capital inflows, including FDI, ODA, and remittances, do not promote economic growth in SSA countries. All three inflows negatively and significantly impact economic growth in SSA. Moreover, the interaction between foreign capital inflows and efficiency negatively affects economic growth. Based on this, the marginal effects of foreign capital inflows are computed, and the results still confirm a negative and significant impact on economic growth. We have established and presented evidence that, while foreign capital inflows do not promote economic growth, higher levels of efficiency in their utilization suppress the growth-dampening effects of these inflows in SSA. This finding is consistent with Prasad et al. (2007), who found that the fastest-growing developing countries rely less on foreign capital inflows. Our study established the statistical significance of the DEA efficiency of foreign capital inflows in SSA countries. In other words, the efficient utilization of foreign capital inflow is a crucial factor in determining economic growth on the continent. While the study revealed a negative impact of foreign capital on economic growth, the efficiency of FDI and remittances significantly enhances economic growth. Except for ODA efficiency, which hurts growth, FDI and remittance efficiencies significantly and favorably influence economic growth.

More importantly, the study demonstrated that the recipient countries' efficiency levels can moderate the adverse effects of these foreign capital inflows. However, the marginal effects of the interactive terms remain adverse, indicating that the marginal effect of foreign capital inflows on economic growth is negative. Nevertheless, the study shows that the adverse effects of foreign capital inflows diminish as efficiency improves.

An important policy implication of this finding is that policymakers in sub-Saharan African countries should understand that the efficient use of foreign capital inflows is a significant factor in fostering economic growth on the continent. As demonstrated by our research, the prevailing inefficiencies in Sub-Saharan Africa may account for the region's countries' continued inability to take advantage of massive foreign capital inflows, particularly in the form of FDI, ODA, and

remittances. To spur economic growth and lessen the disastrous consequences of poverty on the continent. The 'aid syndrome' may explain the adverse effects of ODA, which makes the argument that unearned income dependence negatively affects growth (Ogbonna et al., (2021). The negative impact of remittance on our study is consistent with the loss of labor and the Dutch disease theories of the recipient. Countries (Sutradhar, 2020). Similarly, the negative marginal impact of FDI on growth could result from capital flight and disinvestment.

This may be why the resources in SSA do not trickle down to meet her requirements for sustainable economic growth. The challenges of the aid curse, the Dutch disease linked to remittances, capital flight, and disinvestment syndromes identified as associated with vast foreign resources in SSA, and extreme poverty justify deliberate steps to ensure efficient management of these resources to improve economic development. As a result, structural adjustments are required to address current practices across the continent and ensure the efficient utilization of these resources. Therefore, structural changes are needed to address the current structural distortions on the continent. As a result, countries in the region must become more efficient to better utilize foreign capital inflows and promote growth and development.



## CHAPTER SIX

### CONCLUSION AND POLICY RECOMMENDATIONS

#### 6.1 Introduction

Over the past decades, sub-Saharan Africa has faced challenges in achieving sustainable economic growth and social transformation (AEO, 2024). Growth rates have been low and insufficient to keep pace with population growth, leading to low per capita GDP. Attempts to implement structural changes have been limited, with countries in the region largely dependent on traditional, low-productivity, low-skilled services for growth. The continent requires strategic investments aligned with the Sustainable Development Goals (SDGs) to achieve substantial, sustainable economic development, including in education, health, energy, and productivity-enhancing technology and innovation. However, the financing gap for the required investment is vast in SSA, with an estimated US\$ 402 billion annually until 2030 (AEO, 2024). This requires policy initiatives to scale domestic resource mobilization and enhance private-sector investments. However, given the size of the financing gap, adopting policies to attract external financial flows to complement limited domestic resources is imperative (UNCTAD, 2021). Wei, (2006) submits that foreign capital inflows support a sustained economic outcome in sub-Saharan African countries. Consequently, through liberalization, many countries have attracted increasing foreign capital inflows in the past decades. However, for the sub-region to achieve its developmental goals, such as the SDGs, effective mobilization and efficient utilization of internal and external resources are required. The role of institutional development in facilitating the achievement of these desired development goals is crucial. Countries with stronger institutions tend to attract more stable and productive foreign investment while being better equipped to manage and regulate these inflows (Acemoglu et al., 2005). Conversely, weak institutions may lead to capital flight, resource misallocation, and increased vulnerability to external shocks (Papaioannou, 2009). Therefore, this study evaluated the efficiency of foreign capital inflows- FDI, ODA, and remittances- and examined the impact of institutional development in attracting foreign capital inflows in SSA. This will help maximize the growth-enhancing effect of efficient foreign capital inflows.

The study's first objective (Chapter Two) contributes to the literature on foreign capital efficiency by distinctively focusing on the disaggregated foreign capital inflows, mainly involving FDI, ODA, and remittance efficiencies along macroeconomic and human development growth paths. Our study complements and extends a few recent studies by Teploval and Sokolova, (2019), Wang and Le, (2019), Naeher & Narayana (2022), and ZhaWang, (2014), who have examined the efficiency of FDI inflows using global data.

In the second objective (Chapter Three), we assessed the institutional and macroeconomic determinants of FDI, ODA, and remittance efficiency. Studies on these determinants are scanty. Teplovo and Sokolova (2019) examined the institutional determinants of FDI inflow but did not examine the determinants of ODA and remittance efficiencies. Moreover, they did not consider macroeconomic factors affecting FDI efficiency.

In objective three (Chapter Four), the thesis estimates the threshold effects of foreign capital inflows on institutional quality in SSA. Few studies, including Kurul (2017) and Slesman et al. (2015), have examined the effect of institutional quality on FDI. They focused only on FDI inflows, excluding other forms of foreign capital inflows, such as ODA and remittance efficiencies, which, together with FDI, are the common forms of foreign capital inflows in SSA.

In the final objective (Chapter Five), the thesis examines the moderating role of foreign capital efficiency in the relationship between foreign capital inflows and economic growth. The nexus between foreign capital inflows and the economy is widely researched. Therefore, our key contribution in this paper is the role of efficiency with which foreign capital is used. Foreign capital efficiency here is disaggregated into FDI, ODA, and remittance efficiencies, which makes our study unique.



## 6.2 Summary of Findings

In this section, we present a summary of our findings from the four empirical papers or objectives as follows;

### 6.2.1 Utilization efficiency of foreign capital inflows into steady economic growth and human development.

Results from the first objectives show that the overall foreign capital efficiency, disaggregated into FDI, ODA, and remittances inflows, is generally poor. Along the macroeconomic growth path, the overall average efficiencies over the entire period across all countries are 40.7%, 40.9%, and 43.6% for FDI, ODA, and remittance efficiencies, respectively, indicating inefficiency in leveraging foreign capital inflows to improve economic growth is more than 56% across the three types of foreign capital efficiencies. Similarly, the average overall FDI, ODA, and remittance efficiencies along the human development path are 69%, 63%, and 65%, respectively, with inefficiency levels of 31%, 37%, and 35%. This also reveals that, on average, countries in SSA are relatively more efficient at transforming foreign capital into human development outcomes than at spurring economic growth.

Regarding ranking countries in the sub-region along the macroeconomic growth path, Benin, Ethiopia, and Mali rank among the top three countries in FDI efficiency, indicating they can leverage FDI inflows to achieve higher growth than their peers. Conversely, the bottom five in FDI efficiency are Malawi, Kenya, Botswana, Senegal, and Sudan, which are unable to translate FDI inflows into growth efficiently. The top three countries in terms of ODA efficiency are Gabon, Ethiopia, and Burkina Faso, with ODA efficiency scores of 51.8%, 47.8%, and 46%, respectively, suggesting they are better able to leverage foreign aid to spur economic growth than their peers. The bottom five of the ODA efficiency table are Kenya, Senegal, Eswatini, DR Congo, and Sudan. Regarding remittance efficiency, Burkina Faso ranked first, followed by Togo, Guinea-Bissau, and Mali. DR Congo, Kenya, and Sudan went in the bottom three.

Along the human development growth path, Sierra Leone, Eswatini, Gabon, Senegal, and Cameroon rank among the first six countries in FDI efficiency, with efficiency scores over 70%

in each. This suggests that these countries' policymakers can direct policies that better benefit their citizens than their peers. Madagascar, South Africa, and The Gambia are at the bottom of the FDI ranking. For ODA efficiency, Gabon, Sierra Leone, Botswana, Sudan, and Cameroon are ranked in the top five, indicating a better utilization of foreign aid to improve the quality of living for their citizens; again, like the FDI ranking, Madagascar, Gambia, South Africa, and Mauritius are ranked the bottom four on the ODA ranking. Regarding remittance efficiency, the same countries (Gambia et al.) are ranked in the bottom four, with South Africa at the bottom. The top five are Sierra Leone, Gabon, Burkina, Botswana, and Senegal, closely similar to the FDI rankings.

Along the human development path, Sierra Leone, Gabon, Botswana, Senegal, Burkina Faso, and Cameroon are consistently efficient in leveraging all the foreign capital inflows to improve the quality of life of their citizens. These countries rank at the top in FDI, ODA, and remittance efficiency. Conversely, South Africa, Madagascar, Gambia, and Mauritius are the same countries that continue to rank at the bottom on all foreign capital efficiency lines.

Along the macroeconomic growth path, Ethiopia, Burkina Faso, and Mali consistently perform well on two measures of foreign capital efficiency. At the same time, countries like Sudan, Senegal, and DR Congo consistently rank low. Sudan is the least-ranked country across all three types of efficiencies. Burkina Faso exhibits strong efficiency in both macroeconomic growth and human development. This means it has policy initiatives that facilitate the use of foreign capital to improve its people's economic growth and human development.

Regarding efficiency changes from 1990 to 2021, the Malmquist results show that all three types of foreign capital efficiency follow the same pattern in both the macroeconomic and human development growth paths. They exhibit high annual volatility, but there is no clear long-run trend from 1990 to 2021. In other words, there is neither an increasing nor a declining trend in efficiency changes over the period. This means countries remain stagnant in terms of efficiency changes over time.

Moreover, the patterns in the efficiency changes reveal that in both the macroeconomic and human development paths, periods of sharp increases in efficiency occurred in the preceding years of major global financial and economic crises, including 1997, 2007, 2014, and 2019, in which the

Asian financial crisis, the 2008 Global financial crisis, 2014 Commodity price plunge and the COVID-19 pandemic respectively occurred. This implies that the efficiency of foreign capital inflows improves when there is a looming threat of a global crisis in SSA countries.

### **6.2.2 Institutional and Macroeconomic Determinants of Foreign Capital Inflow Efficiency in SSA.**

Evidence from objective two (Chapter Three) indicates that institutional development is critical in facilitating the efficient utilization of foreign capital inflows in SSA. Institutional quality, measured by World Governance Indicators (control of corruption, political stability, government effectiveness, rule of law, regulatory quality, and voice of accountability), has all shown a positive and statistically significant impact on the variation of the FDI, ODA, and remittance efficiencies in both the macroeconomic and human development growth paths.

Regarding macroeconomic factors, real GDP growth, inflation, and gross fixed capital formation are essential determinants of the efficiency with which foreign capital is utilized. Real GDP growth positively and significantly influences the efficiency of FDI, ODA, and remittances. As expected, inflation hinders the efficiency of foreign capital inflows due to its destabilizing economic impact. Except for remittance efficiency, financial development negatively and significantly affects efficiency in most models (1-7) for both FDI and ODA efficiencies in Tables 3.3 and 3.4. This means that financial development and foreign capital inflows are substitutes. A country with a high level of financial development may not require foreign capital inflows for economic development, and vice versa. In the FDI efficiency in Table 3.3, technological adoption is an essential factor, as shown in all seven models in both the FDI and ODA efficiencies in Tables 3.3 and 3.4, with a strong positive relationship with efficiency. This result is consistent with the widely held view that FDI inflows benefit the recipient countries' economies through technological and knowledge transfers. Gross fixed capital formation shows strong positive significance, mainly at the 1% level, across all three levels of efficiency, as shown in Tables 3.3, 3.4, and 3.5. On both ODA and remittance efficiencies, Human development indicators involving years of education and life expectancy have a significant and positive impact on the efficiency of FDI and ODA, suggesting that a highly educated and healthy population will improve the efficiency with which FDI and

foreign aid can be utilized. Except for remittance and ODA efficiency, population growth negatively impacts FDI efficiency in only three of the seven models in Table 3.3.

### **6.2.3: Threshold Effects of Institutional Quality on foreign capital inflows in sub-Saharan Africa (SSA)**

Evidence from objective three (Chapter Three) showed that institutional quality is threshold-specific across all foreign capital inflows. The results indicate that institutional quality could reduce FDI, remittances received, and ODA inflows, but only after it reaches thresholds of 0.332, -0.402, and -0.142, respectively. Except for remittances, where institutional quality exerts an adverse effect below and above the threshold, the impact of institutional quality is positive below the threshold for both FDI and ODA inflows. Trade magnifies both FDI and ODA inflows. Except for FDI inflows, the lag of foreign capital inflows significantly enhances current ODA and remittances inflows. Increases in real GDP growth reduce remittance inflows. This is probably because higher GDP growth may raise per capita income, reducing households' dependence on migrant remittances. Government expenditure is found to amplify FDI inflows.

### **6.2.4. Examining the moderating role of efficiency in the foreign capital-led growth hypothesis in sub-Saharan Africa**

Results from objective four (Chapter Five) showed that the impact of foreign capital inflows and efficiency varies in magnitude and direction. The results show that, except for remittances received, FDI and ODA inflows are negatively associated with economic growth. Unlike foreign capital inflows, FDI, ODA, and remittances all have a positive and highly significant impact on economic growth across all models. Remittances received weakly enhance growth in model 1 but negatively affect model 4. Regarding the moderating role of foreign capital efficiency, while foreign capital inflows primarily hurt economic growth, the efficiency of foreign capital dampens their adverse effects through a moderating or interaction mechanism. However, the positive effect of efficiency is not strong enough to offset the negative impact of foreign capital.

### 6.3 Recommendations

The empirical study undertaken highlights several key policy recommendations that have been suggested as follows;

First, to achieve optimal and sustainable economic growth, it is important to promote efficiency across the private and public sectors of recipient economies, as results indicate that efficiency can significantly affect economic growth in SSA. Therefore, this study recommends policies to improve the efficiency of foreign capital inflows to levels that will enhance the capacity to absorb the adverse effects or risks of the inflows. This can be done by using Investment Promotion Agencies (IPAs) across SSA to shift their Key Performance Indicators (KPIs) from the absolute dollar amount of FDI attracted to 'Efficiency-Adjusted' metrics. This involves granting tax holidays and incentives only to foreign investors who meet specific targets for technology transfer and local labor upskilling, thereby addressing the 'skills gap' identified as a barrier to efficiency in the Malmquist analysis.

Another crucial policy recommendation of this study is for governments in SSA to strengthen governance and undertake institutional reforms. Chapter Three's results clearly show the importance of institutional quality measured by the WGI factors. Therefore, governments should prioritize the digitization of public procurement and judicial processes to reduce human discretion, thereby directly improving the control of corruption, the rule of Law, and governance effectiveness, thereby improving institutional quality and achieving efficiency and growth.

Moreover, given the results in Chapter Four, where countries with weak institutions attract FDI and remittances and vice-versa, policymakers must initiate policies that will serve as a disincentive for resource-seeking foreign investors who are looking for short-term and high-return investments under poorly regulated environments, rather than focusing solely on the volume of FDI, policy should aim to prioritize the quality of these inflows. By focusing on attracting quality capital rather than quantity and on ensuring that improved governance translates into investments that contribute to inclusive growth, technology transfer, and sustainable development, investors with long-term goals will be attracted for mutual benefit. Also, given that high institutional quality might reduce informal remittance flows, policymakers should promote formal remittance channels by improving financial infrastructure and lowering transaction costs. This would ensure that remittances flow through regulated systems, contributing more effectively to financial inclusion and development.

In addition, policymakers must pay attention to technological innovation and workforce capacity building. As established, technology is a decisive factor in FDI and ODA efficiency. Therefore, policymakers should promote investment in technological advancement and workforce capacity building to improve productivity and efficiency of foreign capital inflows for economic development.

Furthermore, policymakers should develop initiatives that enable inefficient countries to learn from their relatively efficient peers as benchmarks. For instance, given the disparity in efficiency scores (e.g., Sierra Leone and Botswana vs. Sudan), the African Union, under the AfCFTA framework, should establish a Foreign Capital Efficiency Peer-Review Mechanism. This platform would allow lagging nations to adopt the specific regulatory frameworks of high-performing peers identified in this study to improve development.

To improve the human development impact of remittances, which currently stands at 65%, Central Banks should pursue regulatory reforms to reduce remittance transaction costs toward the SDG goal of 3%. Practical measures include removing restrictions on exclusive partnerships between Money Transfer Operators (MTOs) and certain banks and providing tax incentives for Fintech innovations that direct remittances into 'Diaspora Bonds' or health and education savings accounts, instead of immediate consumption.

The results show a considerable gap between the efficiency of capital inflows along the macrocosmic and human development growth paths. Therefore, policymakers should pay attention to policy initiatives that will balance the efficient use of foreign capital to achieve both the quantity and quality of life. While attaining a higher quality of life through human development is crucial for every population, its sustainability depends on sustained economic growth to support that quality without external aid.



## **6.4 Contributions, Limitations, and Further Research Recommendations**

### **6.4.1 Contributions**

This study contributed to the existing literature by examining the efficiency of foreign capital inflow and the role of institutional quality in economic development in sub-Saharan African countries. The following are the key contributions to the existing literature.

#### **6.4.1.1: Contribution of Objective One (Chapter Two): Utilization Efficiency of Foreign Capital Inflows in Economic Growth and Human Development.**

This paper uses the Data Envelopment Analysis (DEA) and the Malmquist Index approaches to evaluate the efficiency of foreign capital inflows across countries in SSA. Our key contribution to the efficiency literature is the development of comprehensive efficiency indices that incorporate both economic growth (quantity) and human development (quality) dimensions of economic development. We not only developed an efficiency index in these two dimensions, but we also extended the works of (Teplova and Sokolova, 2019) and Le and Wang, (2019), who constructed a global FDI index using the DEA and Malmquist Index at the worldwide level, by developing indices for ODA and remittance inflow efficiencies. This approach highlights a detailed understanding of how efficiently countries convert FDI, ODA, and remittances into development outcomes. In terms of scope, this study is the first to measure the efficiency of foreign capital inflows using the robust nonparametric Malmquist DEA approach in SSA. The empirical contribution highlights efficiency disparities among SSA countries, with countries like Botswana, Sierra Leone, and Gabon performing better in human development than their peers. This contributes to the policy debate by identifying benchmark countries for inefficient peers to emulate.

#### **6.4.1.2 Objective Two (Chapter Three): Institutional and Macroeconomic Determinants of Foreign Capital Utilization Efficiency**

This paper contributes to the existing literature on determinants of efficiency by advancing the understanding of how macroeconomic and institutional development factors affect the efficiency of FDI, ODA, and remittance inflows. By identifying the institutional and macroeconomic

determinants, the research will show how these factors influence a country's ability to effectively use foreign capital inflows. Moreover, this study is novel because, to our knowledge, no study has considered the determinants of foreign capital efficiency disaggregated into FDI, ODA, and remittance efficiencies. Aggregate foreign capital inflows may not capture the nuanced effects of government policies across their components. This contribution is particularly relevant to the SSA context, where institutional weaknesses are often cited as barriers to development. By providing empirical evidence on how improving these institutions can enhance the efficiency of foreign capital, the study offers practical insights for policymakers looking to strengthen governance to attract and better utilize foreign investments.

#### **6.4.1.3 Objective Three (Chapter Four): Threshold effect of Institutional quality on Foreign Capital Inflows.**

A key contribution of this study is the use of dynamic panel threshold models to analyze how institutional quality interacts with FDI, ODA, and remittances in SSA. This contribution responds to the call by Nuxumado and Makoni (2021) to look beyond merely assessing the effect of institutional quality on foreign capital inflows and to consider the institutional threshold effect on them. The works of Kurul, 2017 and Slesman et al. (2018) only looked at the impact of institutional quality on FDI inflows using global data. We extended their work by including the institutional threshold effect on ODA and remittance received in the sub-region. The novel finding that FDI and remittances increase below a certain institutional threshold but decline above it adds complexity to the existing literature, which generally assumes that better institutions always attract more capital.

#### **6.4.1.4 Objective Four (Chapter Five): The Moderating Role of Efficiency in the Foreign Capital Growth Hypothesis in SSA.**

potential of foreign capital inflows. It suggests that countries can significantly improve growth outcomes by enhancing their institutions and governance structures to ensure efficient resource

allocation and management. We have not found any empirical work considering the efficiency of capital use in the capital inflow-economic growth nexus. Moreover, this study allowed us to test the moderating role of efficiency in the foreign capital -economic growth nexus.

#### **6.4.2. Limitations of the study**

The study's results and policy suggestions could have been improved by including all the countries in sub-Saharan Africa. The efficiency rankings are relative to the countries in the sample, and they could change with the inclusion of new countries. Also, data for all countries were limited due to substantial missing values, hence the inclusion of only 35 SSA countries. The efficiency indices for the various capital inflows require regular updates as new data becomes available. Despite these limitations, the empirical evidence in the study provides some first-hand information on the efficiency of foreign capital inflows, their institutional and macroeconomic determinants, and their role in impacting economic development in SSA, which is useful for policymakers.

#### **6.4.3. Future research studies**

Further research could investigate how foreign capital inflows complement domestic capital to improve efficiency. The current focus is only on foreign capital inflows as a policy instrument. The use of macroprudential instruments to regulate the complementarity between foreign and domestic capital is critical for assessing the efficiency with which these countries' resources are utilized in SSA. Therefore, further research could explore the efficiency of gross capital formation in economic development in SSA countries. Macroprudential policy instruments in converting gross capital formation of countries in SSA. The role of efficiency in the productivity of SSA countries, as measured by the Malmquist Index, could also be examined in further studies. In light of changes in efficiency, additional research could assess the measurement and determinants of changes in foreign capital efficiency in SSA countries.

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## APPENDIX

A1: Correlation Matrix for Institutional Threshold Analysis

	gdpgro	govexp	popann~h	gcapform	fd	cpiorigi	techange	fdi	lnneto~d	remit	oda_eff	rem_eff	fdi_eff
GDPgro	1												
govexp	0.0066	1											
popanngrow	0.1998	-0.0943	1										
gcapform	0.0854	0.1743	0.0567	1									
fd	-0.0503	-0.109	-0.3261	0.0967	1								
cpiorigi	-0.0632	0.0245	0.0258	-0.0202	0.0049	1							
techange	-0.0238	0.0521	-0.0152	0.0318	0.0083	0.0173	1						
fdi	0.0613	0.2144	0.0128	0.4766	0.0484	0.0514	-0.0121	1					
lnnetodaaid	0.1655	0.1217	0.2554	0.0119	-0.194	0.19	0.0445	-0.0095	1				
remit	-0.0292	0.4624	-0.0752	-0.0499	-0.1378	0.0531	0.1207	-0.0257	-0.066	1			
oda_eff	0.0788	-0.0409	-0.0389	0.1818	-0.005	0.1504	0.0465	0.1573	0.0592	0.0763	1		
rem_eff	0.0925	-0.076	-0.022	0.2053	-0.0124	0.1468	0.0669	0.2198	0.0606	0.0539	0.9425	1	
fdi_eff	0.0826	-0.0887	-0.0298	0.1491	-0.0354	0.1279	0.0348	0.0771	0.0295	0.0542	0.9635	0.9337	1



A2: Correlation Matrix for Determinants of Efficiency

	CC	GF	PS	RQ	RL	VA	GDPG ro	Infl	FD	Trade	GovEx p	Exchra te	PCAI Q	GCapF orm	Tlabfo rce	DomC red	ODA_ Eff	REM_ Eff	FDI_ Eff	MobS ub	Lgnipc	YE
CC	1.000																					
GF	0.830	1.000																				
PS	0.662	0.613	1.000																			
RQ	0.805	0.916	0.633	1.000																		
RL	0.850	0.891	0.735	0.875	1.000																	
VA	0.623	0.684	0.597	0.702	0.752	1.000																
GDPG ro	0.005	0.011	-0.057	-0.012	-0.018	-0.007	1.000															
Infl	-0.090	-0.085	-0.166	-0.131	-0.123	-0.105	-0.091	1.000														
FD	0.586	0.703	0.038	0.671	0.619	0.610	-0.126	-0.049	1.000													
Trade	0.267	0.198	0.336	0.190	0.221	0.116	-0.117	-0.039	0.222	1.000												
GovEx p	0.129	-0.039	0.022	-0.060	0.023	0.099	0.090	0.000	-0.120	0.099	1.000											
Exchra te	-0.538	-0.544	-0.363	-0.471	-0.494	-0.365	0.063	-0.015	-0.540	-0.374	-0.063	1.000										
PCAI Q	0.897	0.927	0.780	0.923	0.955	0.809	-0.101	-0.097	0.670	0.247	0.026	-0.543	1.000									
GCapF orm	0.161	0.182	0.102	0.096	0.181	0.107	0.031	-0.003	0.147	0.326	0.130	-0.092	0.137	1.000								
Tlabfo rce	-0.173	-0.004	-0.475	-0.051	-0.122	0.033	0.150	0.110	0.137	-0.447	-0.094	0.157	-0.129	0.101	1.000							
DomC red	0.045	0.079	0.018	0.074	0.075	0.080	0.066	0.002	0.061	0.009	0.074	-0.010	0.065	0.028	0.022	1.000						
ODA_ Eff	0.254	0.290	0.284	0.280	0.382	0.262	0.045	-0.110	0.149	0.259	-0.115	-0.026	0.314	0.278	-0.155	0.002	1.000					
REM_ Eff	0.205	0.250	0.250	0.233	0.328	0.214	0.052	-0.108	0.129	0.279	-0.155	-0.037	0.266	0.297	-0.170	0.012	0.934	1.000				
FDI_ Eff	0.228	0.276	0.285	0.257	0.361	0.247	0.052	-0.103	0.121	0.268	-0.151	-0.020	0.301	0.235	-0.174	0.000	0.959	0.916	1.000			
MobSu b	0.181	0.201	0.117	0.222	0.225	0.216	-0.130	-0.107	0.350	0.197	-0.005	-0.142	0.185	0.197	-0.094	-0.008	0.378	0.322	0.282	1.000		
Lgnipc	0.495	0.613	0.472	0.614	0.577	0.438	-0.195	-0.111	0.711	0.411	-0.390	-0.491	0.590	0.218	-0.212	-0.010	0.477	0.473	0.471	0.452	1.000	
YE	0.340	0.388	0.322	0.376	0.377	0.259	-0.165	-0.079	0.542	0.408	-0.144	-0.305	0.375	0.106	-0.198	-0.029	0.390	0.351	0.359	0.540	0.681	1.000
LE	0.202	0.314	0.358	0.270	0.386	0.272	-0.112	-0.107	0.233	0.054	-0.098	-0.029	0.299	0.240	-0.084	0.002	0.526	0.486	0.469	0.554	0.363	0.418

