
**ADDIS ABABA UNIVERSITY**

**COLLEGE OF BUSINESS AND ECONOMICS**

**DEPARTMENT OF ECONOMICS**

# THE EFFECT OF REMITTANCE ON ECONOMIC GROWTH: THE MEDIATING ROLE OF FINANCIAL DEVELOPMENT: EVIDENCE FROM SUB-SHARAN AFRICA COUNTRIES

**BY: SENAYIT BEKELE**

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**ADVISOR: MENGESHA YAYO (P.h.D)**

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This is to certify that the thesis prepared by Senayit Bekele entitled: "**THE EFFECT OF REMITTANCE ON ECONOMIC GROWTH: THE MEDIATING ROLE OF FINANCIAL DEVELOPMENT: EVIDENCE FROM SUB-SHARAN AFRICA COUNTRIES**" submitted in partial fulfillment of the requirements for the degree Masters of Science in Economics: Specialization in policy analysis complies with the regulations of the University and meets the accepted standards concerning originality and quality.

Signed by the Examining Committee:

External Examiner Dr Teferi Mequaninte Signature _____ Date 28/08/2024

Internal Examiner Dr Alemu Lambamo Signature _____ Date 25/08/24

Advisor: Dr. Mengesha Yayo Signature _____ Date 25-08-2024

Declaration

I, Senayit Bekele declare that this thesis entitled "**THE EFFECT OF REMITTANCE ON ECONOMIC GROWTH: THE MEDIATING ROLE OF FINANCIAL DEVELOPMENT: EVIDENCE FROM SUB-SHARAN AFRICA COUNTRIES**"" is an outcome of my effort except those which are duly cited and quoted. This study has not been submitted for any degree in this University or any other University. It is offered for the partial fulfillment of the degree of Masters of Science in Economics: Specialization in policy analysis.

Declared by:

Name: Senayit Bekele

Signature _____

Date 25-08-2024

Confirmed by Advisor:

Name: Dr. Mengesha Yayo

Signature _____

Date 25-08-2024

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## List of Acronyms and Abbreviations

| | |
|---|---|
| ARDL | Auto regressive distributed lag |
| FDI | Foreign direct investment |
| GDP | Growth domestic product |
| GMM | Generalized method of moments |
| ODA | Official development assistance |
| OLS | Ordinary least squares |
| SSA | Sub - Saharan Africa |
| SEM | structural equation method |
| WDI | world development indicator |
| GCC | Gulf Cooperation Council |

# Abstract

*This study investigates the relationship between remittances and economic growth in SSA Countries, as well as the mediating role that financial development plays, using GMM and SEM methodologies. The study considers annual panel data from 15 countries over the years 2000–2022. The objective was achieved through the use of both descriptive and inferential analysis. The econometric study included both diagnostic and pre-estimation testing, including panel unit root and cointegration tests. The estimate's findings showed that trade openness, foreign direct investment, gross domestic saving, and remittances all significantly boost economic growth, whereas population growth and trade openness have comparatively negative effects. Furthermore, gross fixed capital formation has no effect on economic growth in SSA countries. The research indicates that remittances are likely to have a positive effect on the economic growth of sub-Saharan African nations and that this effect will become more pronounced with increased financial development.*

# CHAPTER ONE

# 1. INTRODUCTION

## 1.1. Background of Study

Remittances are an unavoidable consequence of migration and provide significant advantages as well as mitigating factors for emigrant nations experiencing a labor shortage (Olayungbo & Quadri, 2019). According to Kevin and Fabien (2021), there is a less complicated, quicker, and more cost-effective method for enabling international money transfers. Unfavorable economic conditions in the primary remittance source nations were the primary cause of the 2015 slowdown in remittance growth, according to Cazachevici, Havranek, and Horvath (2020)

Azizi,'s (2019) study emphasizes the critical role that overseas remittance play in fostering financial development in developing countries, using data from 124 countries between 1990 and 2015. The research highlights the persistent positive impact of remittances on financial growth, especially in regions with insufficient financial services. It also emphasizes how they support increased demand, investment and loan availability. Given that remittance are acknowledged as catalysts for wider economic development, policy makers are advised to implement measures that maximize their potential to enhance financial inclusion and stability, ultimately enabling sustainable growth and prosperity in these countries.

Throughout the past ten years, remittances as a percentage of total foreign money flows have grown. According to Giuliano and RuizArranz (2005), Islam and Alhamad (2022), and others, remittances have long been an important source of income for underdeveloped countries. The World Bank (2020) estimates that remittances to developing countries totaled $554 billion in 2019, $431.66 billion in 2015, and $430 billion in 2014. Experts have seen a recent surge in remittance inflows to developing countries, owing to their capacity to bridge the divide between economic growth and financial development (Sibindi, 2014).

When official development assistance (ODA) and foreign direct investments (FDIs) are insufficient to deliver the projected development in the region, remittances are seen as one approach to achieving the Sustainable Development Goals (SDGs) in Sub-Saharan Africa

(SSA). According to Akanle et al. (2022), present efforts in the region to alleviate poverty and develop funding solutions center on the role of remittances, considering their importance in reaching the SDGs.

International remittances have expanded dramatically in recent decades around the world. Remittances totaled $613 billion globally in 2017. Remittance flows recovered in all regions this year: 5.8% in South Asia, 5.8% in East Asia and the Pacific region, 8.7% in Latin America and the Caribbean, 9.3% in the Middle East and North Africa, 11.4% in Sub-Saharan Africa, and 20.9% in Europe and Central Asia. Global remittances increased 10% to $689 billion in 2018, with $528 billion going to developing nations (World Bank, 2018 a). Furthermore, overall remittances flows in 2019 totaled US$ 714 billion, accounting for nearly 1% of global production. In 2019, remittance inflows were greater than foreign direct investments in low- and middle-income countries (World Bank, 2020).

Given such an increasing trend, remittances have become major sources of income for many developing economies. It also represents a significant share of GDP. For instance, remittances represented 22% of GDP in 2017 in some African countries (World Bank, 2018 b). Global GDP growth slowed to 2.8% in 2019 from 3.5% in 2018 (IMF, 2020). According to a World Bank report, GDP growth in Sub-Saharan Africa increased from 1.5% in 2016 to an estimated 2.6% in 2017 (World Bank, 2018a) and 2.7% in 2018 (World Bank, 2019a). However, in 2020, output in Sub-Saharan Africa collapsed by an estimated 2.4% as a result of the COVID-19 pandemic.

The connection between financial development and economic growth (Sehrawat & Giri, 2018; Ouyang & Li, 2018; Nasir et al., 2019).The supply-leading and demand-following hypotheses have served as guiding principles in the body of empirical research already conducted to ascertain the relationship between financial development and economic growth. Ibrahim and Alagidede's 2018 empirical study supports the demand-following hypothesis, which holds that financial development propels economic success.

This study fills the gaps in the body of knowledge about how remittances affect economic growth and the mediating role of financial development in SSA counties from 2000 to 2022. The study uses the GMM and SEM methodologies.

## 1.2. Statement of problem

Remittances are a significant enough source of funding for investment in African nations to be considered both an alternative and necessary source (Adekunle, Williams, Omokanmi, & Onayemi, 2020). Remittances from migrants to recipient nations have surpassed foreign direct investment (FDI) as the second-largest source of external funding for African nations. In terms of absolute value and GDP percentage, it is roughly double the amount of public aid received and portfolio investment. Prominent scholars, decision-makers, organizations, and the general public examined the volume, scale, and extraordinary stability of remittance inflows to Africa and other developing nations, as well as the influence these inflows have on development along a number of parameters, including poverty.

Furthermore, remittances are more stable in nature than other forms of foreign financial transfers to underdeveloped countries. This is especially important for SSA countries, whose ODA has changed significantly over time. Remittances to sub-Saharan Africa are also less variable than FDI, which is generally regarded as the most reliable financial flow. While remittances to developing countries fell by 7% in 2020, this was significantly less than the drop in other capital flows (World Bank, 2021a). As a result, remittances contribute consistently and significantly to food security, human capital, and total GDP (FAO, 2020). Despite the growing importance of migrant remittances in external financial flows, the impact of remittances on economic growth in SSA has received insufficient attention.

Overall, remittances tend to be reasonably constant throughout the business cycle, and, compared to other private capital flows, they are less volatile and promote growth on a macro level. Remittances help recipient households in developing nations on a micro level by lowering the rate of extreme poverty and providing an extra source of income (World Bank, 2021). Furthermore, during the past ten years, remittance flows to developing nations have increased relative to other foreign flows. They are becoming significant revenue generators for many emerging countries, particularly those in the SSA. Nonetheless, it is frequently underappreciated how much remittances have increased in value to developing nations in recent years. Understanding the function and significance of remittances is especially important in the present

since the COVID-19 epidemic has caused sluggish economic growth in the world, particularly in SSA countries.

This study uses a range of methods, including the instrumental variable estimator (IV), ordinary least squares (OLS), and autoregressive distributed lag (ARDL), to review prior research on the impact of remittances on economic growth. The research by Ibrahim et al. (2020) and Saad & Ayoub (2019) employed the ARDL technique; nonetheless, the outcomes were inconsistent. With an emphasis on Nigeria specifically, Ibrahim et al. (2020) investigated the mediating roles of institutions in the relationship between growth and remittances. They found that remittances had the opposite long-term effect from their short-term benefits on economic growth. Remittances eventually had a positive impact on growth in all institutional quality criteria that were taken into consideration, according to their analysis, which highlighted the importance that institutions play in this relationship. Only institutional quality regulations were found to have a substantial short-term impact on remittances and growth.

This study uses a range of methods, including the instrumental variable estimator (IV), ordinary least squares (OLS), and autoregressive distributed lag (ARDL), to review prior research on the impact of remittances on economic growth. The research by Ibrahim et al. (2020) and Saad & Ayoub (2019) employed the ARDL technique; nonetheless, the outcomes were inconsistent. With an emphasis on Nigeria specifically, Ibrahim et al. (2020) investigated the mediating roles of institutions in the relationship between growth and remittances. They found that remittances had the opposite long-term effect from their short-term benefits on economic growth. Remittances eventually had a positive impact on growth in all institutional quality criteria that were taken into consideration, according to their analysis, which highlighted the importance that institutions play in this relationship. Only institutional quality regulations were found to have a substantial short-term impact on remittances and growth.

Remittances and financial growth are positively connected in developing countries, according to Pal, S., and Mahalik, M.K. (2023). This suggests that effective financial institutions are necessary to maximize the effects of remittances. Additionally, the paper highlights the significance of institutional quality as a moderating element, particularly in Europe and Central Asia, where there is a larger association between financial development and FDI inflows and

remittances. Therefore, by diverging from previous research, which primarily focuses on the impact of remittances on financial development (see, for instance, the works of Azizi (2020), Pal (2022), and Pandikasala et al. 2020), this study contributes to the body of knowledge.

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To maximize the benefits of remittances, it is essential to understand how they affect economic growth. Previous studies on this subject did not always yield consistent results. According to Smith, J., Johnson, K. (2019), M., and Williams, L. (2017), remittances have a detrimental effect on economic growth. Giuliano, P., Chami, R., Fullenkamp, C., & Jahjah, S. (2008); Ruiz-Arranz, M. (2009). Cuecuecha and Adams, R. H. (2010). According to Paulson, A., and Osili, U.O. (2008), remittances contribute positively to economic growth.

Olayungbo and Quadri (2020) This study may not have sufficiently examined the mediating role that financial development plays in this association between remittances and economic growth because it used a PMG and ARDL strategy and focused on the relationship between remittances, financial development, and economic growth in SSA African countries.

There is a significant information gap about the relationship between remittances, financial development, and economic growth in SSA nations, as the past debate has demonstrated. Research on this direct influence has produced conflicting results; some point to a negative effect, while others point to a positive one. By introducing financial development as a mediator, this study deepens our knowledge of the intricate relationship between remittances and economic growth through the application of structural equation modeling (SEM) and the Generalized Method of Moments (GMM).

## 1.3. Objectives of the Study

### 1.3.1. General objective

The main objective of this study is to examine the relationship between remittances, financial development, and economic growth in SSA countries.

### 1.3.2. Specific objective

- To assess the direct effects of remittances on economic growth.
- To assess the effect of remittances on financial development and their effect on economic growth.
- To examine the mediating role of financial development in the relationship between remittances and economic growth.

## 1.4. Research Question

The study address the following research questions:

- What is the direct effect of remittance on economic growth in SSA countries?
- What is the effect of remittances on financial development and their effect on economic growth in the SSA countries?
- How does financial development mediate the effect of remittances on economic growth in Sub-Saharan African countries?

## 1.5. Hypothesis of Study

The study address the following research Hypothesis:

H1: Higher level of remittance will impact on economic growth.

H2: Higher financial development tend to be associated with higher remittances.

H3: Higher remittance will result in higher financial development which will in turn positively impact the level of economic growth.

## 1.6. Significance Of The Study

This study make a significant contribution to the existing literature by providing new and robust evidence on the relationship between remittances, financial development, and economic growth in specifically chosen in SSA Countries. The findings of this study will have important policy implications, indicating potential considerations for key stakeholders based on the findings. Furthermore, the findings will provide significant insights for other individuals who are interested, encouraging them to conduct additional research on this critical subject. This contribution will be critical for furthering our understanding of the dynamics of remittances, financial development, and economic growth in the Sub-Saharan African environment.

## 1.7. Scope Of The Study

Using panel data gathered over a 22-year period, from 2000 to 2022, this study focused on investigating the relationship between remittances and economic growth, as well as the function of financial development in relation to economic growth in the SSA countries.

# CHAPTER TWO

# 2. LITERATURE REVIEW

## 2.1. Introduction

The study contributed by examined how remittances affect economic growth and financial development in the SSA Countries. The theoretical and empirical literature pertaining to the topic of study cover in this chapter. Numerous published studies have been conducted to determine the connection between remittances and economic growth in various countries. Various research methodologies and ideas have been employed in these investigations to specify the model. The theoretical literature is reviewed first in this section, then the empirical literature is reviewed, and the conceptual framework for the study is the last component of this chapter.

## 2.2. Theoretical Literature Review

### 2.2.1. Theoretical linkages between remittance and economic growth

One indirect way that remittances affect growth is through raising household personal income. An increase in remittances to households results in a rise in the total income of the consumer. But wise customers will split their entire income between savings and consumption. This suggests that while consumer savings expand along with spending, remittances also rise (Ahmad et al., 2019; Rahman et al., 2019).

As spending increases, customers' overall demand will eventually rise as well. In an effort to accommodate this demand, industrial enterprises will increase their production, which will spur economic growth. Consequently, a rise in remittances boosts personal income, which in turn promotes overall consumer spending, which boosts industrial output. On the other hand, consumers can deposit their extra money in financial institutions, which raises bank deposits, thanks to the increase in savings brought on by an increase in remittances.

Once more, these deposits are used by banks and other financial institutions to offer credit, allowing them to profit from interest. Additionally, entrepreneurs begin borrowing money from banks to expand their businesses or build new facilities. It is further enhanced by the financial

sector's capacity to increase the quantity of money available to the business community. Additionally, the increase in industrial productivity brought about by simpler access to capital promotes economic growth.

Remittances have the potential to directly and indirectly impact growth. In the literature, the direct approach is frequently divided into three groups. According to Gapen et al. (2009), these channels are labor force expansion, capital accumulation, and total factor productivity. Remittances, in the first place, speed up the rate of capital accumulation. In countries that receive remittances, the inflow of remittances boosts both human and physical capital and reduces the cost of borrowing money. Remittances provide the home with an alternate source of funding, relieving it of its financial obligations. In addition, driven immigrants have the option to make investments in their home economies, producing extra revenue.

Second, remittances have an impact on labor force expansion by helping people spend more leisure time and replacing lost labor income (Acosta et al., 2009). The influx of remittances may cause people in the labor force to restrict their efforts in finding a job, their amount of labor, and their involvement in risky enterprises, among other things. Remittances have a negative effect on growth as a result of their influence on the labor force growth rate. Third, the total factor productivity is also impacted by the remittance inflow. When the remittance is utilized effectively, particularly when a prudent investment choice is made, the rate of total factor productivity will rise, leading to eventual economic growth.

An increase in household personal income is one indirect way that remittances impact growth. The amount of money that households get in remittances increases, which raises their overall income. Nonetheless, sensible consumers will divide their entire income between savings and consumption. According to this, remittance growth increases both consumer savings and consumption (Ahmad et al., 2019; Rahman et al., 2019).

### 2.2.2. Theoretical linkages between financial and economic growth

According to Acemoglu(2012) and Gurley & Shaw(1955), there is well –established correlation between Financial development and economic growth in business .studies in economics have examined it (Akinci et al., 2014;Bist &Read ,2018;R.levine,1997).As economic expansion is a

complex problem that depends on numerous circumstances ,one should be wary of the assertion that financial progress would necessity lead to it. these variables comprise the particular empirical model used, the proxy for assessing the degree of financial growth, and the type of data analysis utilized, according to Nyasha and Odhiambo (2018).

Regarding the relationship between financial development and economic advancement, industry participants have reached varying findings (Bist & Read, 2018; Guru & Yadav, 2019; R. Levine, 1997; Odhiambo & Nyasha, 2022). The techniques can be classified into four types based on the form of the causal relationship: supply leading, demand following, feedback, and neutrality assumptions. The first option is the supply-led growth idea. It makes the case that better financial development policies will enable more people to have access to financial services, credit, and investment opportunities.

These variables are thought to be the main forces behind economic expansion. According to this theory, the financial industry has the potential to become the primary driver of economic growth, and contemporary financial systems may act as a catalyst for it. The economic growth rate dramatically rose as a result of the banking and financial services sector's expansion and the associated rise in capital inflows.

Financial development drives economic progress rather than the other way around, according to results by Taddese Bekele and Abebaw Degu (2021), Bist and Read (2018), Guru and Yadav (2019), Durusu Ciftci et al. (2017), and Taddese Bekele and Abebaw Degu (2021). On the other hand, inverse causality, also known as the demand-following theory, has a strong case that highlights how financial development follows economic growth rather than contributing to it. According to this view, economic progress drives the need for financial institutions, assets, and services, not the other way around. The financial sector grows faster as a result.

For example, Rajan and Zingales (1998) proposed that financial development is advanced, investment possibilities are created, and credit demand is encouraged by economic expansion. Omoke (2009) utilized Granger causality tests to examine the empirical correlation between financial development and economic growth within the Nigerian environment. He concluded that the idea that financial development, as shown by domestic credit, private credit, and broad money, creates economic expansion was false based on Granger causality studies. Given that the

results demonstrate that financial development is primarily caused by economic growth, the more likely scenario is growth-driven financial development.

Adeyeye et al. (2015), Akinci et al. (2014), and Haque et al. (2022) all provided validation for the demand-following theory. Richer countries tend to consume more financial services, which could account for the broad association between growth and financial development. The third approach is the feedback hypothesis, which postulates a two-way causal relationship between financial development and economic growth. Almassri et al. (2020), H. M. Nguyen et al. (2022), Abbas et al. (2022), Pradhan et al. (2017), Swamy and Dharani (2019), Saqib, 2022; Vo et al., 2022; P. T. Nguyen and Pham (2021); Manta et al., 2020; Jung (1986), (1999); and Walde Rufael (2009) all endorsed the idea that financial development and economic growth are mutually cause-and-effect partners.

This theory's proponents stress the need for a trustworthy and efficient financial system to promote economic growth. Growth in the economy can also propel the financial industry forward by raising the demand for financial services and boosting the profitability of financial intermediaries.

This strategy's proponents argue that a healthy financial sector may maximize the benefits of trade openness for the economy and increase GDP at the federal level. Therefore, a rise in the country's economic growth can stimulate the expansion of the financial sector, raising the demand for financial services. Cogent Economics & Finance, Mengesha & Berde (2023) Furthermore, the population as a whole will gain from the rising demand for financial services, which will also positively affect financial development (Faisal et al., 2019; Shahbaz et al., 2018).

The fourth possibility is the neutrality hypothesis, which highlights the lack of a causal relationship between either of the switches (financial development or economic growth). Menyah et al. (2014), Nyasha et al. (2016), Opoku et al. (2019), Odhiambo and Nyasha (2022), and Okuyan (2022) all corroborate this notion. A country's internal and external dynamics impact the outcome, and current research suggests that this link is complex and context-dependent, according to a number of theoretical frameworks. Additionally, the particular model and dataset that were used may have had an impact on the outcomes (Samargandi et al., 2015).

There isn't much research on this subject, and what is known about it adopts a limited definition of financial development, which might not provide us with a clear picture of the occurrence or suggest any particular course of action. It is therefore necessary to use robust empirical methodologies to close the research gap and demonstrate the causal relationship between remittances, economic progress, and financial development. This study will seek to close this knowledge gap, offering a more thorough understanding of the relationship and possibly guiding policy to support financial development and economic progress.

## 2.3. Empirical Literature review

The theoretical literature has no consensus on the possible effect of remittances on economic growth as a mediating role of financial development. This triggers economists to conduct a careful empirical investigation of the effect of remittances on economic growth. Different studies have been done related to the effect of remittances and fiscal development on growth. The section that follows will discuss the empirical studies undertaken on the subject in general and in SSA countries in particular.

### 2.3.1. Empirical Evidence from Developing Countries

In this subsection, the study presents a review of related empirical studies conducted in developing countries. Saad & Ayoub (2019) tried to investigate the effects of remittances and governance on economic growth in ten MENA countries using annual data from the period 2002 to 2017 and found a negative impact of the remittance on growth. In addition, they found that the effect of remittances on economic growth depends on the quality of governance. Their study reveals that a country with better institutional quality (absence of corruption and better property rights) could encourage investing and contribute to economic activity. Therefore, in this case, remittances have a positive impact on economic growth.

The well-known "supply-leading hypothesis" describes the circumstances in which advancements in finance are unable to appreciably accelerate economic growth. These two hypotheses also suggested a reversal of causality for both variables. Bist (2018) conducted a panel study to investigate the relationship between financial development and economic growth in a sample of 16 low-income countries from both African and non-African regions, with an emphasis on reverse causality. In a study by Sethi and Acharya (2018), the possibility of an

association between the variables under examination was investigated by looking at a sample of 31 industrialized and developing nations.

Remittances from foreign migrant workers have been suggested to have the potential to boost national economies through increased investment and consumption. The authors of the study are Kevin and Fabien (2021). The primary purposes of the remittances that the families of migrant workers in developing nations send home are investments in real estate, household costs, and the acquisition of livestock, particularly in rural areas. Remittances, however, are mostly spent for consumption in rural regions due to a lack of adequate financial services; relatively little is invested profitably (Askarov & Doucouliagos, 2020).

Furthermore, the assertion made by Askarov and Doucouliagos (2020) suggests that if remittances are mostly utilized for personal expenses, they have no impact on economic growth. Furthermore, William (2017) points out that there is a claim that the degree of democracy in developing countries affects how much of an influence remittances have on economic growth. States with higher degrees of democracy usually gain more from remittance inflows than do those with lower levels of democracy, according to the study's conclusions, which included an analysis of data from 109 developing countries.

Eggoh et al. (2019) find that remittances significantly contribute to economic growth in underdeveloped nations. Moreover, their research indicates that the impact is more strongly influenced by the extent of financial growth and investment than by the sheer volume of consumption and remittance transactions.

Furthermore, the assertion made by Askarov and Doucouliagos (2020) suggests that if remittances are mostly utilized for personal expenses, they have no impact on economic growth. Furthermore, William (2017) points out that there is a claim that the degree of democracy in developing countries affects how much of an influence remittances have on economic growth. States with higher degrees of democracy usually gain more from remittance inflows than do those with lower levels of democracy, according to the study's conclusions, which included an analysis of data from 109 developing countries.

According to Eggoh et al. (2019), remittances significantly boost the economic growth of underdeveloped nations. Furthermore, they demonstrate that this effect is more influenced by the level of financial expansion and investment than by actual consumption and remittances.

Bangake et al. (2020), another study in the final strand, examined the connection between remittances, financial development, and economic growth in 76 developing nations, including Nigeria, using data from 1975 to 2013. The results of their Panel Threshold Regression (PTR) model showed that for financial development levels between 20% and 50%, remittances and growth had a positive association. However, the research found that in nations with highly developed financial systems, remittances had relatively little impact on GDP. Furthermore, between 1996 and 2020, Ofori et al. (2022) evaluated the effect of financial development and remittances on income equality in 48 African nations, including Nigeria.

By using measures like the Palma ratio and the net Gini index to measure income inequality, the researchers found that investing in the banking industry in Africa could result in a more equitable distribution of income. According to the study findings it's critical to meet two minimal requirements before fully utilizing remittance to advance economic equality in Africa 23.05 for financial access and 3.02 for financial institutions efficiency. The study findings generally concur that there must be particular thresholds level financial development in order to optimize the positive economic effects of remittance.

**Empirical Evidence from Sub-Saharan Africa**

The SSA has carried out research on the impact of remittances on economic growth. In a study published in 2019, Olayungbo and Quadri examined how remittances affected growth in 20 sub-Saharan African nations between 2000 and 2015. They discovered that there are unidirectional causal correlations between GDP and remittances, as well as between financial development and GDP. Nonetheless, there was no correlation between remittances and the SSA countries' financial development. They used a VAR Granger causality test in conjunction with a pooled mean group and mean group/ARDL model. Moreover, they contend that financial development and remittances have been shown to have major positive short- and long-term benefits for economic growth. In agreement with Quadri & Olayungbo (2019),

Remittances can be utilized, according to Oumansour et al. (2019), to demonstrate that among a sample of 34 African countries Furthermore, trade openness might be a useful conduit for remittances that influence economic growth. In light of the aforementioned, it is plausible to assume that remittances, through investment, trade liberalization, and political stability, significantly and favorably influence economic growth.

The results demonstrate that remittances have a negligible effect on economic expansion. Using the GMM approach, Asongu and Odhiambo (2022) investigated value-added and remittances across economic sub-sectors in SSA from 1980 to 2014.

Many scholarly studies have examined the connection between financial development and economic growth (Sehrawat & Giri, 2018; Ouyang & Li, 2018; Nasir et al., 2019). The supply-leading and demand-following hypotheses have served as guiding principles in the body of empirical research already conducted to ascertain the relationship between financial development and economic growth. Ibrahim and Alagidede's 2018 empirical study supports the demand-following hypothesis, which holds that financial development propels economic success.

The situation where financial innovations do not significantly speed up economic growth is known as the "supply-leading hypothesis." Additionally, a reversal of causality for both variables was suggested by these two hypotheses. With a focus on reverse causality, Bist (2018) carried out a panel study to examine the connection between financial development and economic growth in a sample of 16 low-income nations from both African and non-African regions. In order to determine if the parameters under investigation were connected, Sethi and Acharya (2018) examined a sample of 31 industrialized and developing countries.

On this topic, more time series research has also been done; Adu-Darko and Aidoo (2022) carried out one such study. Rehman and Hysa have also emphasized the positive association that exists between financial development and economic advancement (2021). Nevertheless, no discernible significant association was found between the GDP-to-broad money stock (M2) ratio and the rate of economic expansion. Economic growth has been found to be positively connected with an increase in domestic credit extended to the private sector.

Remittances from foreign migrant workers have been suggested to have the potential to boost national economies through increased investment and consumption. The authors of the study are Kevin and Fabien (2021). The primary purposes of the remittances that the families of migrant workers in developing nations send home are investments in real estate, household costs, and the acquisition of livestock, particularly in rural areas. Remittances, however, are mostly spent for consumption in rural regions due to a lack of adequate financial services; relatively little is invested profitably (Askarov & Doucouliagos, 2020).

Empirical research on the connection between inclusive growth and remittances is scarce. While some research indicates that remittances have an impact on income inequality and economic growth, other research finds no such impacts. In particular, some recent empirical studies raise concerns about the possibility that remittances, if mostly beneficial to high-income households, could impede societal progress. For instance, Yadeta and Hunegnaw (2021) discover that remittances impede Ethiopia's economic expansion.

According to a Peprah et al. (2019) study, remittances and financial development have a bigger combined impact than they do alone, suggesting that they work in tandem. Remittances and financial development both support economic growth in the short and medium terms, but their combined influence inhibits growth, according to Olayungbo and Quadri's (2019) research on a panel of 20 sub-Saharan African nations. Rehman and Hysa (2021) looked into how remittances and financial development affected economic growth in six Western Balkan countries.

**Summary of the Literature Review**

| Title | Author and Year | Sample Year | Objectives | Variables Employed | Methodology | Outcomes |
|---|---|---|---|---|---|---|
| Remittances are a driver of economic growth. Empirical data derived from the CEE nations. | Azizi (2014) | 1995–2011 | The primary goal of the research is to investigate remittances as a factor in economic development using empirical data from the CEE nations. | CEE ( Central and Eastern Europe ) countries | Panel regression | Remittances contribute positively to economic expansion.The relationship between remittances and economic growth is bidirectional. |

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| Examining the Intersection of ICT, Remittances, and Economic Development: A Vietnam Case Study | Kumar, Vu(2014) | 1980–2012 | The primary goal is to investigate the relationship between remittances, output, and information and communications technology (ICT). | Vietnam | Granger causality and autoregressive distributed lag (ARDL) co-integration | Bidirectional causality between remittances and economic growth |
| Examining the relationship between remittances and economic expansion: a Bangladeshi study | Kumar, Stauvermann(2014) | 1979–2012 | The study's primary goal is to investigate the hotly contested relationship between remittances and Bangladesh's economic expansion. | Bangladesh | Cointegration of the ARDL and Granger causality test | Longterm positive, reciprocal causality |
| The correlation between cross-sectional reliance and remittance growth in the economy. | Salahuddin, Gow (2015) | 1977–2012 | This study looks at the connection between migrant remittances and economic growth in some of the world's top recipient nations, including Bangladesh, India, Pakistan, and the Philippines. | Bangladesh, India, Pakistan and the Philippines | Panel cointegration analyses and regression using the Pooled Mean Group (PMG) | Long-term benefits offset statistically negligible short-term effects. |
| Do remittances encourage Common Market and Caribbean Community economies to grow? | Lim, Simmons(2015) | 1990–2012 | The study looks into how significant remittance flows are to the Caribbean Community and Common Market (CARICOM) economically. | Caribbean Community and Common Market | Panel co-integration test | Long-term economic growth and remittances do not significantly correlate. |
| Tunisia's remittances and economic growth: reciprocal causal relationships | Jouini (2015) | 1970–2010 | The purpose of the paper is to look into the relationships that cause economic growth and remittances to Tunisia. | Tunisia | ARDL co-integration | There is a bidirectional causal relationship between remittances and growth in the near term, but no long-term impact on economic growth. |

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| Evidence from a PMG-ARDL method on remittances, financial development, and economic growth in sub-Saharan African nations | Olayungbo, D.O. and Quadri, Ahmod (2019) | 2000 to 2015 | The study intends to investigate the causal linkages between these factors and offer empirical data on the effects of financial development and remittances on regional economic growth. | 20 sub-Saharan African countries | PMG and ARDL Model | Remittances have a major and favorable effect on the economic development of sub-Saharan African nations. |
| The relationship between remittances and financial development and economic progress. | Nagoeb-ur-Rehman;hysa, Eglantina (2021) | 2000 to 2017 | This study uses panel data model analysis to investigate the impact of financial development and remittances on economic growth in six Western Balkan nations (WBC). | Western Balkan countries (WBC) | GMM analysis to estimate the model and test the hypotheses. | Remittances and financial development are beneficial to the economy. |
| Financial development, economic growth, and remittances in Africa. | Esman Morekwa Nyamongoa,∗, Roseline N. Misati b,1, Leonard Kipyegonb,2, Lydia Ndirangua,2012 | 1980–2009 | The aim of This study examines the impact of financial development and remittances on economic growth across a panel of 36 African nations. | 36 countries in Africa | Models with pooled, fixed, and random effects that combine two-stage and conventional least squares. | The results of this study indicate that financial development amplifies the beneficial and significant impact that remittances have on economic growth in African nations. |
| Does the relationship between financial development and remittances affect Sub-Saharan Africa's economic growth? | Christiana Afriyie Manu1, Peter Arhenful1 and Mathew Owusu-Mensah1(2021) | 1980 to 2021. | This paper's primary goal is to examine the connection between remittances, financial development, and economic expansion in sub-Saharan African nations. The purpose of the article is to i | 42 Sub-Saharan Africa countries. | ARDL | The results of the empirical research suggest that the relationship between remittances and economic growth and financial development is substitutive. |

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| | | | nvestigate how financial develo pment affects th e connection bet ween remittance s and regional e conomic growth . | | | |
| The sub-Saharan analys is: Can financi al development affect economi c growth? | Karabo Pearl Mabusela and Andrew Phiri(2019) | 1980 to 2014. | .The study's goa l is to ascertain how financial d evelopment affe cts economic gr owth in a subset of subSaharan African nations. | 5 sub sharan African countrie s | ARDL Model | The study's primar y conclusions sho wed that, in the ch osen nations, finan cial development a nd economic grow th are correlated b oth in the short an d long terms. |
| Remittances an d financial dev elopment: inter action effects and thre sholds towards inclusive growt h in Africa. | Ofori, Isaac K. and Gbolonyo, Emmanuel Y. and Dossou, Marcel A. T. and Nkrumah, Richard K. and Nkansah, Emmanuel(20 23) | 1996-2020 | This research ai ms to investigat e the impact of r emittances and f inancial develop ment on econo mic growth in si x Western Balk an countries. | 42 African countrie s | GMM estimator | Remittance has positive effect inclusive growth. |
| What lessons c an the CEMAC region learn a bout remittanc es and economi c growth? | Louis Bernard Tchekoumi & Patrick Danel Nya(2023) | 1990-2018 | The primary go al is to investiga te the connectio n between econ omic growth in the countries of the CEMAC are a and migrant re mittances. | CEMAC zone | GMM estimator | remittances have a positive and signi ficant impact on e conomic growth, |
| An empirical i nvestigation fr om sub-Saharan Africa on the relation ship between fi nancial inclusi on and econom ic growth | Chuka Ifedior a, Godwin Im o Ibe, Samuel Manyo Takon , Eze Festus E ze, Kenechuk wu Onochie O ffor, Anthony Eboselume A | 2012 to 2018. | The primary go al of the researc h is to use panel data from Sub-Saharan Africa (SSA) to investi gate how financ ial inclusion aff ects economic g | 22 sub-Sahara African (SSA) | The study employs the system Generalize d Method of Moments (GMM). | It was found that while the usage di mension of financi al inclusion increa ses economic gro wth but not signifi cantly, the availabi lity, penetration, a nd composite dim |

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| | geme, andJosaphat U. J. Onwumere (2022) | | rowth. | | | ensions of financial inclusion (all indicators taken together) significantly and positively impact economic growth. This was determined using a composite index of financial inclusion in addition to individual financial inclusion indicators. |
| Does financial market development really drive migrant remittances' flow in Sub-Saharan Africa? | Olapeju Ikpesu(2023) | Period 2000–2020. | The study's goal is to determine whether the growth of the banking and equity markets in Sub-Saharan Africa (SSA) actually contributes to the remittance flow of migrants. | based on data obtained from 27 SSA countries | . The pool mean group (PMG) and the mean group (MG) are two examples of the dynamic heterogeneous panel data technique used in this study. | The study's conclusions showed that one of the main factors influencing migrant remittance flows in the SSA region is the development of the financial markets, particularly the stock and banking sectors .Furthermore, the research findings indicate that the SSA region's migrant remittance flows are also influenced by macroeconomic variables, including the real interest rate, unemployment rate, global growth, emigration, and economic growth. |
| Financial growth and remittance inflows: evidence from Sub-Saharan Africa's top recipient | Ficawoyi Donou-Adonsou John CarrollUniversity 1 John Carroll Boulevard (2020) | 1980-2016 period | In order to examine the relationship between remittances and financial development in the top Sub-Saharan African | Top 10 remittance recipient countries in Sub-Saharan Africa. | The study used the panel cointegration technique and accounts for cross- | To be more precise, according to the pooledmean group estimates, financial development is aided by a one percentage point rise i |

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| nations | | | recipient nations, this article employs a panel co integration approach. | | sectional dependence because all of the sample countries are ECOWAS members and may be impacted by a common factor. | n remittance inflows by a greater amount than one percentage point.Furthermore, the findings bolster the notion that remittances and longterm financial progress are causally related in both directions.Furthermore, the longterm relationship between remittances and financial development is negatively impacted by remittance pricing. |
| The effect of foreign capital inflows on subSaharan African nations' economic growth | Belesity Bekalu Ayenew (2022) | 2009 to 2019 | The study's goal is to find out how foreign financial inflows affect the economic expansion of sub-Saharan African nations. | 31 sub-Saharan African | A two-step GMM system was used in the study because of its practical benefit when applied to the dynamic panel data set. | The finding shows that only foreign direct investment has significant and positive contribution to economic growth. Official development assistance and external debt affect economic growth negatively, and they are statistically significant. Remittance inflow affects economic growth negatively, but it is statistically insignificant |

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| What effects does the nonlinear relationship between financial inclusion and economic growth have on the West African Economic and Monetary Union (WAEMU) in sub-Saharan Africa? | Fabrice-Gilles Ndombi Avouba, A.IBN-Saïd Akougbe & Christel le Ines Leticia Ndombi Ondze(2023) | 2014–2018 | The purpose of the paper is to ascertain whether financial inclusion and economic growth in the WAEMU zone have a non-linear relationship. | Eightmembercountriesoftheo WAEMUzone (Benin, Burkina Faso,GuineaBissau,Mali, Niger,Senegal,TogoandCôted'Ivoire).8eightmembercountries | | It becomes clear that growth and the "use" component of financial inclusion have a nonlinear connection.As a result, the rate of bank penetration and the Union's economic growth have a non-linear U-shaped relationship. |
| Migrant remittances, financial market development, and per capita real growth in sub-Saharan Africa | Olapeju Akorede Ikpesu (2023) | 2000 – 2020 | The study aims to investigate the impact of financial market development and migrant remittances on sub-Saharan Africa's (SSA) real per capita growth. | 27 sub sharan African countries | The pool mean group (PMG) was deployed in analyzing the data | The results of the study showed that migrant remittances foster and sustain regional growth in the SSA.The study also indicated that the rise of the stockmarket had a positive effect on growth in the SSA region.The analysis also discovered that there does not seem to be a positive correlation between the growth of the banking industry and SSA growth.A few policy proposals are also included in the report for the region to consider. |

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| Can financial development influence economic growth: The sub-Saharan analysis | Thobeka Ncanywa1 Karabo Mabusela1(2019) | 1980-2014 | Determining the impact of financial development on economic growth in a subset of subSaharan African countries was the primary goal of the study. | Five selected sub-Saharan African countries. | The panel autoregressive and distributive lag models used in this study were able to establish a connection between economic growth and financial development. | The findings showed that financial development and economic growth in the chosen countries have a relationship, both short- and longterm.Over an extended period, the private sector's bank credit and liquid liabilities have a favorable impact on economic growth, whereas gross domestic savings have an adverse effect. |

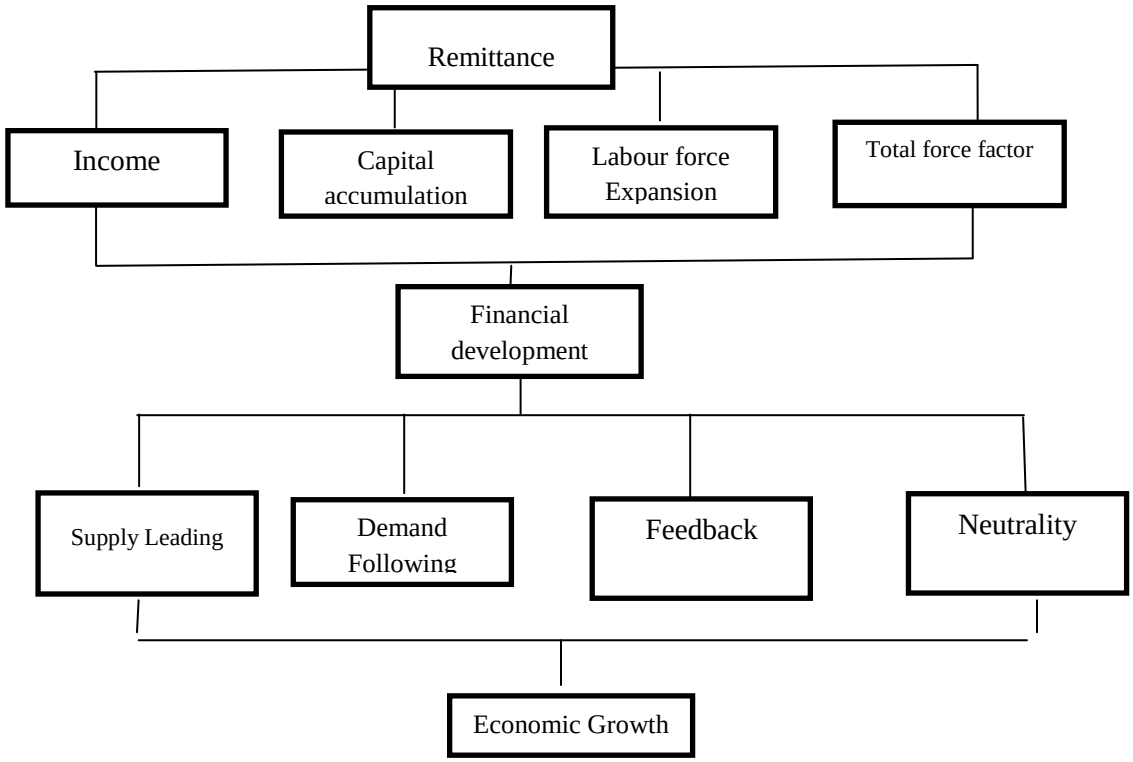
**The gap in the Literature**

There is disagreement in the theoretical and empirical literature about how remittances affect economic growth. The SSA countries have not given enough importance to this empirical study on how remittances affect economic growth, with financial development acting as a mediating component. Therefore, it is difficult to claim that earlier studies have specifically looked at how remittances affect economic growth in Sub-Saharan Africa. Furthermore, foreign direct investment is one of the key factors in the examination of the relationship between remittances and growth, as the literature has shown (Meyer & Shera, 2017; Azam et al., 2013). Nevertheless, foreign direct investment variables are not included as regressors in the majority of research carried out in SSA countries. As an example, consider the research done by Learnmore (2012), Ahamada & Coulibaly (2013), and Balde (2009). By addressing this gap and offering fresh data on the growth effect of remittances, this study will add to the body of literature. In light of the significance and explosive growth of remittance flows in the SSA countries, the current study sets itself apart from earlier research by integrating the impact of remittances on economic growth and the mediating role of financial development. It does this by utilizing recent data, spanning the years 2000 to 2022, and analyzing it using the GMM and SEM methods.

Generally, the GMM and SEM methods are used in this study to examine how remittances affect economic growth and the mediating function that financial development plays in SSA Africa co untries between 2000 and 2022.

## 2.4. Conceptual frame work

What the research study hopes to find is depicted in the conceptual framework. Relevant factors are identified, and their relationships are illustrated. The primary aims of the investigation, which are the significant variables and the essential hypothesized relationship between them, are explained either graphically or narratively (Kothari, 2020). Better understanding the study's concepts and identifying likely connections between them are the main objectives of a conceptual framework. This was used as a framework for analyzing the research's conclusions (Saldana, Miles, & Huberman, 2014). Additionally, it demonstrates the relationship between the dependent and independent variables.




Sources: prepared by the author

# CHAPTER THREE

# 3. METHODOLOGY

## 3.1. Research Design

Both descriptive and econometric data analysis techniques were used in this investigation. Using panel data gathered between 2000 and 2022. This study looked at the relationship between remittance and economic growth in 15 SSA countries, accounting for the mediating role of financial development. The GMM and SEM models are used in this study.

## 3.2. Data Type and Source

The relevant information was acquired from secondary data sources for the study. Using the World Bank's World Development Indicators (WDI), a panel data collection covering SubSaharan Africa between 2000 and 2022 be used to show GDPPC, remittances, financial development, GDP, trade openness, foreign direct investment, gross fixed capital creation as a percentage of GDP, population growth, and gross domestic savings.

## 3.3. Population and sampling technique

Using panel data gathered between 2000 and 2022, this study looked at the relationship between remittances and economic growth in 15 SSA countries, accounting for the mediating role of financial development. The sample comprises nine countries from West Africa (Benin, Burkina Faso, Cote d'Ivoire, Ghana, Mali, Niger, Senegal, Sierra Leone, and Togo); three countries from South Africa (Botswana, Eswatini, and South Africa); and three countries from East Africa (Kenya, Tanzania, and Sudan). The consistency and accessibility of the data were taken into consideration when selecting these countries.

## 3.4. Model Specification

### Empirical Model

The Generalized Method of Moments (GMM) approach recommended by Arellano and Bover (1995) and Blundell and Bond (1997) is used in this study to estimate a dynamic panel data model. This method tackles the endogeneity issue that plagues static panel data models by employing lag variables as instruments. Models with predefined variables can be estimated using

the system GMM estimator, which makes use of both a level equation and a first difference equation (Arellano and Bover, 1995).

The relationship between remittances, financial development, and growth can be specified in a production function as follows:

$$GDP_{it} = \beta_0 + \beta_1 Rem_{it} + \ +\beta_2 CREDIT_{it} + \beta_3 (REM_{it} * CREDIT_{it}) + +\beta_4 (REM_{it} * DC_{it}) + \mu_t + \eta_t$$

Financial development is generally indicated by two variables, which are domestic credit provided by the financial sector (% of GDP) and domestic credit to the private sector (% of GDP). Where represents the GDP growth rate, represents remittance (% of GDP), represents domestic credit to the private sector (% of GDP), and represents the magnitude of domestic credit provided by banks to the private sector (% GDP).

This would also suggest that the recipient economies' ineffective or nonexistent financial development is replaced by remittance inflows. On the other hand, a positive and substantial coefficient would suggest that remittance inflows boost GDP in more financially developed nations. With i = 1, 2,...N and t = 1, 2,...TT, the subscripts I and t denote the cross-sectional (unit) dimension and the temporal dimension, respectively.

This work compares the static OLS model with the dynamic Generalized Method of Moments model. The dynamic panel model is utilized because some explanatory variables have a strong correlation with the dependent variable's historical values and because other unobservable factors have an impact on both the dependent variable and the explanatory variables. However, endogeneity and unobservable heterogeneity are ignored by static models, leading to imprecise estimation. An empirical study will employ a 22-year panel data set from 15 SSA countries.

First, we assess the impact of remittances on economic development using ordinary least squares (OLS).For comparative analysis, we remove from our first model the variables related to financia l development and the relationship between remittances and financial development.

$$GDP_{it} = \beta_0 + \beta_1 GDP_{i,t-1} + \ \beta_2 Rem_{it} + \beta_3 X_{it} + \mu_t + \eta_t + \ \varepsilon_{it}$$

Where Rem is equal to remittances over GDP, t is a time-specific effect, ηi is an unobserved country-specific fixed effect, and ε is the error term. The matrix of control variables indicated in the preceding section shows the logarithm of the initial level of GDP per capita. We aim to determine whether remittances have a statistically significant marginal impact on growth.

In a second set of regressions, we examine the effect of remittances on growth through financial development. We aim to explore the notion that the degree to which remittances influence growth could depend on the financial soundness of the receiving countries. To do this, we interact the remittance variable with a measure of financial depth in order to evaluate the significance of the interacted coefficient. Stated differently, a negative coefficient would suggest that remittances are more successful in countries with less developed financial systems if there is evidence of substitutability between remittances and financial instruments. Conversely, a positive interaction would imply that the growth effects of remittances are more advantageous to deeper financial systems, encouraging the complementarity of remittances with other financial flows.

The regression to be estimated is the following:

$$GDP_{it} = \beta_0 + \beta_1 GDP_{i,t-1} + \beta_2 Rem_{it} + \beta_3 FinDev_{it} + \beta_4(Rem_{it}.FinDev_{it}) + \beta_5 X_{it} + \mu_t + \eta_t + \varepsilon_{it}$$

Endogeneity concerns are not addressed in our initial sets of OLS regressions, either with or without the interaction with financial development. However, theoretically, it is both possible and feasible that higher growth rates will result in an increase in both the amount of remittances and the effectiveness of financial development. As a result, the impact of both variables and their interactions with growth would be overstated.

A lot of effort has gone into finding effective financial development tools. Variables that are not susceptible to reverse causation, including the historical development of a nation's legal systems and creditor rights, are frequently employed in the literature (La Porta et al., 1997). We are unable to utilize these variables in a panel architecture due to their inability to change over time. As a result, in accordance with Arellano and Bover (1995), we address the endogeneity problem by examining panel system Generalized Method of Moments regressions (GMM).

GMM estimators are built on differencing regressors to account for unobserved effects, utilizing the panel aspect of the data. Considering impacts that are time-specific, we obtain:

$$GDP_{i,t} - GDP_{i,t-1} = \beta_{1(}GDP_{i,t-1} - GDP_{i,t-2)} + \beta(X_{i,t} - X_{i,t-1}) + (\varepsilon_{it} - \varepsilon_{i,t-1})$$

And the collection of explanatory variables is now represented by, which also includes the interaction term, financial development, and remittances. In order to account for the endogeneity of the X columns and the association between the new error term and the dependent variable's lagged difference, the estimation process necessitates the use of an instrumental variable approach. While it is generally difficult to find strictly exogenous instruments, lagged values of the right-hand side variable can be used to create internal, predefined instruments. In particular, second- and higher-order lags of the columns of X can be employed as instruments in the estimation of if one is willing to assume that E[$\varepsilon_{it}$/ $X_{i,s}$] = 0 for all t>s (but not otherwise).

If $\varepsilon_{it}$ it is serially uncorrelated, this criterion is probably met, in which case the endogenous variables' second- and high-order delays also serve as useful tools. One can build a GMM estimator with these internal tools. There are several problems with this method, which is used to calculate the so-called difference estimator. First, the long-run cross-country data found in the variable levels is eliminated by differencing the equation. Second, the lagged values of X's columns will be a poor indicator of their differences if they show persistence over time.

Using appropriately lagged differences between the dependent and independent variables as instruments, an alternative GMM estimator that solves these issues can be built under additional assumptions. To be more precise, once-lagged differences of regressors are appropriate instruments if ε is serially uncorrelated. It is possible to build a system GMM estimator that performs better than the difference estimator by combining the level and first-difference requirements (see Arellano and Bover, 1995; and Blundell and Bond, 1997).

## 3.5. Theoretical Framework

The neoclassical Solow model from 1956 serve as the foundation for the standard model used in this investigation. The Solow model is predicated on the idea that in a particular economy, labor, capital, and technology work together to support production. However, as Mankiw Gregory,

Romer, and Weil (1992) point out, the model's shortcomings are apparent in its inability to account for the variations in wealth among nations. In light of this, a number of studies have presented actual data indicating that factors other than labor and capital may also contribute to growth. Remittances, foreign direct investment and the expansion of the banking sector are a few examples of these variables (King & Levine, 1993; Mincer, 1984; Okwu, Oseni, & Obiakor, 2020; Pradhan, Upadhyay, & Upadhyaya, 2008).

As mentioned earlier, Mankiw Gregory et al. (1992) modified the Solow model to include human capital.Using discrete temporal approximations and human capital added to the classic CobbDou glas production function, they arrive at their simplified general growth regression model

$$\Delta Iny_t = Iny_o + x_t' \beta + \varepsilon_t$$

Where the matrix of variables that have an effect on growth is represented by, the stochastic term capturing the effect of the omitted variables is denoted by $\varepsilon_t$. Due to the freedom afforded Researchers in the empirical analysis of growth frequently use this regression form to test the effect of other factors on economic growth.

Given the premise that growth can be explained by other variables, we adopt the Solow model modified by Mankiw et. al. (1992), where GDP growth is assumed to also be explained by the set of control variables we have employed in our study. In an effort to reflect the objective of our research in the panel structure of our dataset, we rewrite the equation.

$$\Delta Iny_t = \gamma\, Iny_{it-1} + InRem_{it} + InFINDEV_{it} + x_t' \beta + \varepsilon_t$$

$$\varepsilon_t = \mu_{it} + v_{it} \text{ and } \gamma < 1$$

Where lnREM and lnFINDEV, the log of each country's remittances in our sample and the log of each proxy that makes up the variable for the development of the financial sector, respectively, represent our variables of interest. The country effect and the idiosyncratic error component are represented by $\mu_{it}$ and $V_{it}$ and, respectively, while time is represented by t. The nations are denoted by$x_t'$.

### 3.5.1. Data description and measurement

To look into the mediating function of financial development in the relationship between remittances and economic growth, the study will draw from the economic literature, which identified a number of factors as contributing factors to economic growth. Although a variety of factors influence economic growth, trade openness, and foreign direct investment, gross fixed capital formation as percentage of GDP, population growth, Gross domestic Savings and remittances were considered in this study. Here is a more thorough explanation and definition of the previously mentioned variables.

**Dependent Variable**

Gross domestic product per capita (GDPPC): measures overall national production. Most economic growth literature uses GDP as a proxy for economic growth measures in various forms (e.g., GDP, GDP growth, real GDP growth, GDP per capita growth, GDP per capita). This study, like Sobiech (2015), Chami et al. (2003), Olayungbo & Quadri (2019), Zouheir & Imen (2014), and Abdullaev (2011), used the log of GDP per capita as a proxy for quantifying economic growth as the dependent variable.

**Explanatory variable**

The descriptions and measurements of the dependent and explanatory variables that the model includes in this paper are explained as follows:

**Financial development** is generally indicated by domestic credit allocated to the private sector to GDP and the magnitude of domestic credit provided by banks to the private sector to GDP as a measure of an economy's financial development.

**Remittance** The current study released remittances net inflow after Adarkwa (2015) and Williams (2018). The coefficient associated with remittances is not known, according to published research. Remittances are probably going to be good for economic growth.

**Trade openness refers** to the calculation of trade activities' value, taking into account both commodities and services imported and exported, in relation to the total GDP of a nation. In

order to quantify how open an economy is and how much of an impact it has on a nation's economic development, it also describes the degree of interaction that a nation has with the outside world. Trade openness is measured by the import-export ratio to GDP. Trade openness has a conflicting impact on economic growth, according to empirical research. Economic trade openness has a significant favorable impact on economic growth, according to Zouheir and Imen (2014), Meyer and Shera (2017), and Ishaq and Ali (2020).

**Gross Fixed Capital Formation as a percentage of GDP (GFCF):** is used as a proxy for domestic investment due to the absence of data for the capital stock for most SSA countries. The study conducted by Learnmore (2012) showed that investment in physical capital has a positive and statistically significant impact on economic growth. A positive effect on economic growth is expected.

**Population Growth (POP): Foreign Direct Investment (FDI)** refers to financial resources flowing into a foreign country with the goal of obtaining a large ownership position (at least 10% voting stock) in a commercial entity operating in that economy by an investor from another economy. Net inflows as a percentage of GDP (FDI) refer to an external source of capital that is often regarded as the principal source of new technology and expertise, allowing the recipient country to benefit from the experience of others. According to the literature, FDI has a favorable effect on growth. For example, research such as Azam et al. (2013), Chami et al. (2003), and Ishaq & Ali (2020) claims that foreign direct investment promotes economic growth..

**Gross Domestic Savings (GDS):** The portion of revenue that remains after consumption is saved. It is by far the most significant source of funding for economic investments in a nation.GDP less final consumption expenditure (total consumption) is the formula for calculating gross domestic savings. According to the findings of the Adjei et al. (2020) study, gross domestic savings have a favorable effect on economic expansion. According to the current analysis, economic growth is predicted to benefit from gross domestic savings.

**Estimation techniques**

An endogeneity issue with regard to the variable arises when the lag of the dependent variable is included in a model as one of the independent variables. Because of this, estimates produced by

ordinary least squares (OLS) regression are inconsistent. To address the endogeneity issue, the difference generalized method of moments and system method of moments estimators are used.

To assess the mediating role of financial development in the nexus between financial development and economics, Roodman (2009a, 2009b), which is the extension of Arellano and Bover (1995), was used. The reason for using Roodman (2009a, 2009b) is that it controls for cross-sectional dependence and also restricts the proliferation of instruments (Boateng et al., 2018; Tchamyou & Asongu, 2017). The two-step generalized method of moments was used because it is consistent with heteroscedasticity.

The first difference generalized technique of moments typically yields biased and erroneous results, as demonstrated by the findings of Alonso-Borrego and Arellano (1999) and Blundell and Bond (1998). Blundell and Bond (1998) suggested, however, that the first-difference generalized method of moments be substituted with the system generalized method of moments' panel data estimation approach. Because it integrates the generalized method of moment's difference and level approaches, the system-generalized method of moments was adopted in this study.

Two presumptions are necessary for the generalized method of the moment's estimator to be consistent. The error term should not show serial correlation, according to the first assumption, and the over identifying limits are legitimate, according to the second. Arellano and Bond (1991), Arellano and Bover (1995), and Blundell and Bond (1998) proposed two specification tests, the second of which looks for the presence of the second-order serial correlation, to confirm if these two hypotheses are true.

**Robustness of the mediation analysis**

A robustness test was carried out using structural equation modeling (MedSeM) mediation analysis following the application of the GMM estimation technique to examine the association between financial development and economic growth. MedSem does a mediation study and uses Stata's structural equation modeling function to estimate a model. “MedSem" employs two strategies as its cornerstones. First, Iacobucci et al. (2007) adapted the well-known Baron and Kenny approach for application with structural equation modeling.

One instrument in this strategy for detecting indirect effects is the Sobel test. If there is no significant correlation between the dependent variable (economic growth) and the independent variable (remittances) and the Sobel's z test is significant, then there is full mediation. Partial mediation occurs when there is a significant relationship between the independent and dependent variables and the Sobel's z test. On the other hand, partial mediation happens when the Sobel's z test is not significant yet there is a substantial correlation between the independent and dependent variables. Additionally, partial mediation is evident when there is no significant link between remittances and economic growth, as well as the Sobel's z test (Iacobucci et al., 2007).

The Zhao et al. (2010) method is the second strategy. The indirect effect test findings are produced using a Monte Carlo resampling technique in this method. There is full mediation if the Monte Carlo z test is significant and there is no significant link between the independent and dependent variables. Nonetheless, a complementing partial mediation exists when the link between the independent and dependent variables and the Monte Carlo z test are both significant and have the same sign in their coefficients. Alternatively, there is competitive partial mediation when the link between the independent and dependent variables and the Monte Carlo z test are both significant and their coefficients point in the opposite direction (Zhao et al., 2010).

**Method of Estimation**

Numerous economic factors interact in ways that are unforeseen. The inclusion of the lagged dependent variable, which shows that the influence of the dependent variable's previous periods tends to continue into the current period, sets them apart from other right-side regressors. Panel data is a type of data consisting of observations made over time on the same units. Numerous events can be investigated with the help of this kind of data. One of the many difficulties in working with panel data is the potential for endogenous data.

This implies a possible relationship between the error term and the dependent variable. Estimates could be biased as a result. The possibility of serial correlation in panel data increases the difficulty of working with the data. This suggests that there can be a time-dependent correlation among the model's faults. This may also result in inaccurate estimations.

System GMM is the best estimate technique for panel data analysis, according to James J. Heckman, Sergio Urzua, and colleagues' 1999 publication, "System GMM Estimation with Cross-Section and Time Series Data." The authors of this work contended that system GMM may be used to estimate models with both cross-sectional and time-series data and that it is a more reliable estimator than ordinary GMM estimators.

First, endogeneity issues are avoided by taking into account causation in the independent variable, which might originate from the dependent variable and vice versa and may be related to the error term. Second, the time-invariant, individual-specific fixed effects of the error term are taken into account by the GMM in relation to the explanatory factors. It also takes into consideration the possibility of autocorrelation brought on by a lagged dependent variable, which is an additional benefit. According to Mileva (2007), panel data with a big N and a short T can also benefit from GMM.

Nowadays, system GMM is a widely used estimate method in panel data studies. When estimating models with dynamic effects where the dependent variable is impacted by its own historical values, it is quite helpful. The model uses a number of tools to address endogeneity issues. Group effects can also be controlled by System GMM by including group dummies in the model. For the reasons listed above, system GMM is a more appropriate estimation method for this dataset.

## 3.6. Diagnostic Tests

### 3.6.1. Arellano-Bond test for serial correlation

A statistical test called the Arellano-Bond test searches for serial correlation in mistakes derived from a generalized method of moments (GMM) model. Serial correlation is problematic in GMM models because it can produce estimates that are skewed. A Lagrange multiplier test that relies on the assumption that errors in the GMM model are serially uncorrelated is the Arellano-Bond test. The GMM estimates may be biased if the Arellano-Bond test is significant, which indicates that the errors have a serial correlation. The investigator conducted this test.

**The multicollinearity test:**

Describes a scenario when two or more explanatory variables have a strong relationship with one another. It can be challenging to discern the influence of a single explanatory variable from the effects of others when the independent variables have a high degree of correlation (Koop, 2009). When there is an exact or almost perfect linear relationship between the explanatory variables, this is referred to as multicollinearity (Gujarati, 2004). Because so many economic variables are interdependent, multicollinearity is an inherent property of economic variables rather than a condition that exists or does not exist. Thus, the question is one of degree rather than existence (Gujarati, 2004). The multicollinearity of this investigation was tested using the Pearson pairwise correlation matrix**.**

**Heteroskedasticity test:**

A fundamental tenet of the conventional linear regression model is that each disturbance term's variance is a constant, equal variance. We refer to this as the homoscedasticity assumption. The Heteroskedasticity issue arises from the error term's condition of non-constant variance. The Heteroskedasticity test aids in determining whether or not the model's error variances are constant. There are numerous Heteroskedasticity tests available. Among them are the Breusch-Pagan-Godfrey (BPG) test under the homoscedasticity null hypothesis, the White test, the Goldfeld-Quandt test, the Glejser test, and the Park test.

The alternative hypothesis should be accepted, and the homoscedasticity null hypothesis should be rejected if the probability value is less than five percent. The Heteroskedasticity issue produces a model with erroneous t-statistics and p-values, which eventually results in a misleading conclusion (Gujarati, 2004). Breusch-Pagan-Godfrey (BPG) The test was used in this investigation to determine whether Heteroskedasticity was present.

## 3.7. Method of Data Analysis

### 3.7.1. Descriptive analysis

The descriptive analysis will comprise a thorough statistical examination of all the study's variables. It is employed to investigate long-term patterns in financial development, remittances,

and economic growth. Consequently, the remittance's general summary will be included in this study. From 2000 to 2022, the financial and economic development of the SSA countries' economies will be examined, paying special emphasis to the previously mentioned significant elements. To assess the nature of the variables among the SSA countries, descriptive statistics will be used to calculate the mean, standard deviation, maximum, and lowest values of the variables included in the study.

### 3.7.2. Inferential Analysis

The econometric model is used for extensive empirical analysis in addition to the descriptive analysis. The econometric method is used to demonstrate how much each element impacts economic growth. To meet the study's aims, a system GMM method will be used in this research.

#### 3.7.2.1. Causality and Model Selection Test

##### 3.7.2.1.1. Unit root test for panel data

It is critical to determine the direction of causality among our primary variables of GDP, financial development, remittances, trade openness, and foreign direct investment. Before proceeding with econometric analysis, it is critical to determine if the data series is stationary or not. The Levin, Lin, and Chu test was employed in the study to check for unit root.

##### 3.7.2.1.2. Panel-data Co-integration Tests

The next step is to determine whether or not the nonstationary variables are cointegrated after performing the stationary status of the variables in the panel unit root test. The existence of long-term links between variables is tested using cointegration approaches. The literature contains a number of co-integration tests. Pe

droni (1999), Kao (1999), Westerlund (2005), Hanck (2007), Banerjee and Carrion-i-Siletre (2006), Gengenbanch et al. (2006), Larsson et al. (2001), Groen and Kleibergen (2003), Anderson et al. (2006), and Breitung (2005) are a few among them. The Westerlund test was used to conduct panel data co-integration tests in this investigation.

# CHAPTER FOUR

# 4. RESULTS AND DISCUSSION

The findings from the descriptive and inferential analyses are presented in this chapter. The trends and overall results of the study's primary variables of interest in 15 SSA countries from 2000 to 2022 were reported in the descriptive analysis. The required pre-estimation tests, such as cointegration tests, as well as other diagnostic tests, are part of the econometric analysis. Following successful completion of the required testing, system GMM models are estimated to examine the impact of remittances on economic growth, and the SEM Method is used to examine the mediating role of financial development in SSA countries between 2000 and 2022. The main results from the GMM and SEM models are then interpreted and discussed.

## 4.1. Descriptive Results and Analysis

The analysis in this section focuses on the patterns of economic growth and remittances in a sample of sub-Saharan African nations from 2000 to 2022.

### 4.1.1. The Trend of Economic Growth in SSA Countries

The GDP growth tendency for the sample of SSA nations under examination fluctuated over the last two decades under review, as seen in the figure below. GDP growth in the tested nations decreased from 5% in 2003 to 4.5% in 2005, although it increased to 5.3% in 2006. Due to the global financial crisis and recession, the GDP growth rate decreased after the year 2006 and reached values of 5.2 percent, 4.8 percent, and 2.9 percent in 2007, 2008 and 2009, respectively.

Despite the fact that the GDP grew more slowly throughout the crisis, it was nonetheless strong. Due to rising domestic demand, economic growth in SubSaharan Africa surged after the global fi nancial crisis, from 2.9 percent in 2009 to 5.8 percent on average in 2010 (World Bank, 2011). H owever, in 2011, it again dropped to 5.0 percent.

Consistent increases had been observed in the GDP growth pattern of the sample of SSA nations, especially in 2012 and 2013. Due to increases in the working-age population, the building of capital stocks, elevated domestic demand, and high commodity prices, it reached an extremely

high 5.9 percent growth rate in 2013 over the studied periods (World Bank, 2018c). But starting in 2013, the trend of decline persisted until 2015, at which time the growth rate hit 2.9%.

This might be the result of declining agricultural productivity, low investor confidence in the face of ambiguous policies, and the severe decrease in oil prices that has severely impacted SubSaharan Africa's oil exporters, who provide almost half of the region's total output. In addition, as mining, services, and agricultural activity continued to decline, the economies of Guinea, Liberia, and Sierra Leone the nations most impacted by the Ebola outbreak remained fragile (World Bank, 2015).

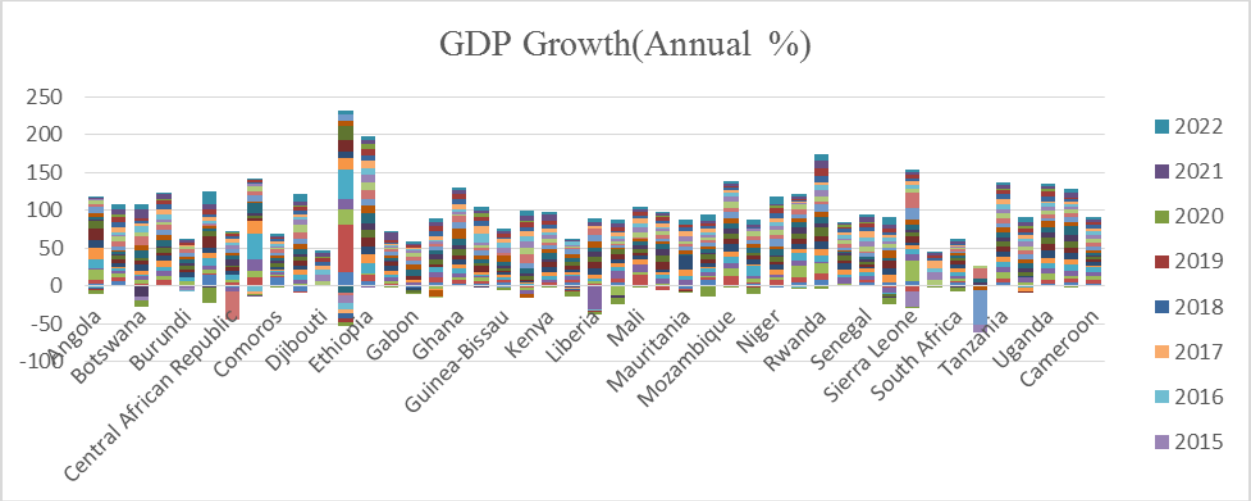



**Figure 1: Trend of GDP growth in a sample of SSA countries**

### 4.1.2. Remittances Trend in Sub-Saharan African Countries

The remittance growth rate in the sample nations shows a declining trend from 2010 to 2012, from 15.4% to 0.4 percent, indicating a 15% reduction, as seen in the above chart.Still, from 0.4 percent in 2012 to 4.6 percent in 2015, its growth rate increased. The recipient nations' institutional environments may have contributed to this increase, as these variables may interact to make remittances appropriate for development goals (Lartey & Mengova 2015). Furthermore, in 2016, this tendency fell once again to a negative 6.9 percent.

This is a result of the economic weakness in the countries that send the remittances; additionally, the decline in commodity prices, particularly the price of oil, has affected the countries that recei

ve the remittances, and the currencies of many of the countries that source the remittances, partic ularly Russia, have depressed remittance flows in terms of US dollars (World Bank, 2016).

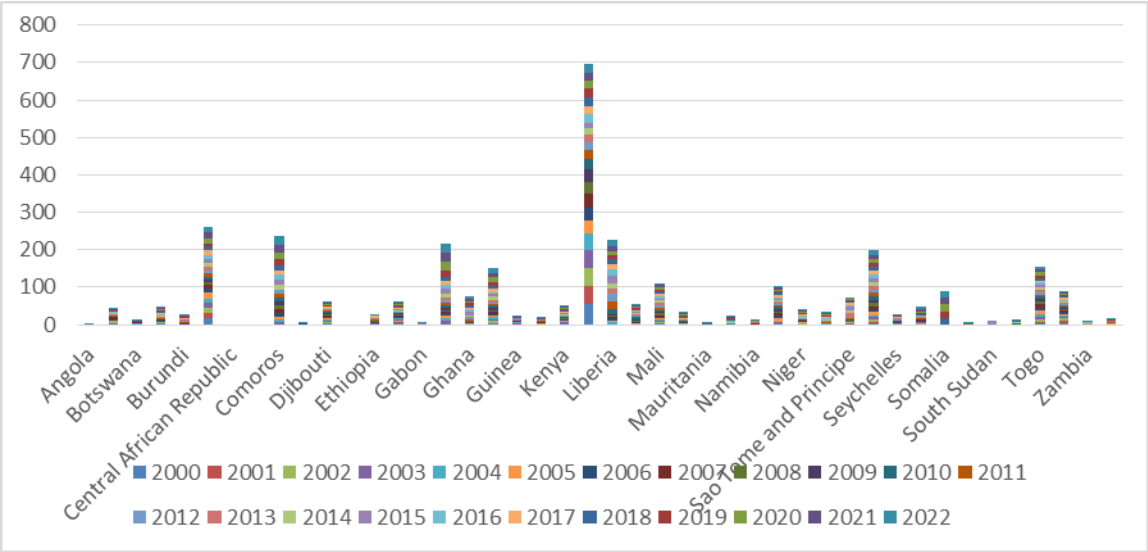



**Figure 2: Trend of remittances growth rate in the sample SSA countries.**

Following that, remittance flows to South Africa saw sharp increases, with the highest growth rate being in 2017 (12.4%), when they hit US$1580 million. Higher economic growth in the United States, a resurgence in remittance outflows from many Gulf Cooperation Council (GCC) nations, and the strengthening of the Russian economy were the primary drivers of this extraordinary increase in remittances (World Bank, 2019). But as of right now, the pattern of the remittance growth rate shows a fall from 12.4 percent in 2017 to a negative 16.4 percent in 2020.

The COVID-19 pandemic in major destination countries, such as the US, China, and the EU, may have contributed to the sharp decline in remittances in the region (Terzo, 2020; Ratha et al., 2020). This pandemic may have also decreased migrant workers' capacity to conduct business, find employment, and send money home during that time (IMF, 2021). Furthermore, sluggish exports are a major reason why advanced economies' economic development is stalling (World Bank, 2019). Remittance flows to developing nations (those with low and middle incomes) were predicted by the World Bank to decline by 7.0 percent in 2020 (World Bank, 2021).

In conclusion, over the course of the study period, the trend of the remittance growth rate in the sample of SSA nations varies from year to year. The primary reasons for the decline in remittance inflow might be attributed to many crises, including the COVID-19 pandemic crisis, the global financial crisis (2007–2008), and the increases in food and gasoline prices in 2007–2008.

## 4.2. Econometric Result and Analysis

Descriptive summery statistics have been covered in this subsection .The distribution an variability of various variables are observed using descriptive statics.it offers the variables characteristics of fifteen nations in sub Saharan Africa from 2000 to 2022.for each of eight variables under examination, it provides the mean (average ), maximum and lowest values ,standard deviation and thee total number of observations.

**Table 1*:* Summary of descriptive statistics**

```
. summarize GDPPC REM fin_dev FDI gds gfcf TO pop_growth
```

| Variable | Obs | Mean | Std. Dev. | Min | Max |
|---|---|---|---|---|---|
| GDPPC | 345 | 1744.222 | 1892.37 | 138.7139 | 8737.041 |
| REM | 345 | 5.74e+08 | 8.37e+08 | 2435105 | 4.98e+09 |
| fin_dev | 345 | 29.7845 | 29.01234 | .0022333 | 150.4737 |
| FDI | 345 | 2.830493 | 2.952262 | -.3165487 | 32.41435 |
| gds | 345 | 14.89647 | 8.847387 | .0241074 | 42.49251 |
| gfcf | 345 | 20.21929 | 6.57817 | 1.09681 | 42.68696 |
| TO | 345 | 59.13486 | 24.72584 | 2.698834 | 175.798 |
| pop_growth | 345 | 2.495297 | .8042356 | .3872785 | 5.785413 |

**Source: Author‘s Estimation**

The dataset's summary statistics show a wide variety of economic metrics. The Gross Domestic Product per Capita (GDPPC) exhibits notable fluctuations, with a mean of $1744.222 and a range of $138.7139 to $8737.041. Remittance (REM), ranging from 2.435105 x 10^6 to 4.98 x 10^9 units, with an average of 5.74 x 10^8 units. Financial Development (fin_dev), which illustrates the various states of financial systems, shows a broad range from 0.0022333 to 150.4737 with a mean of 29.7845. The data on foreign direct investment (FDI) shows a mean of

2.830493 and a wide standard deviation of 2.952262, indicating significant variation over the course of the observations.

Gross Domestic Savings (GDS) and Gross Fixed Capital Formation (GFCF) exhibit notable fluctuations, with respective means of 14.89647 and 20.21929 and wide variations. Commerce Openness (TO) shows significant variation, with a mean of 59.13486 and a range of 2.698834 to 175.798, indicating different levels of participation in international commerce. The population growth rate (pop_growth) shows a steady but varying pattern of growth over the course of observations, with a mean of 2.495297% and a standard deviation of 0.8042356%.

### 4.2.1. Regression Results

#### 4.2.1.1. Pre-estimation Test

##### 4.2.1.1.1. Unit root test

Examining the series for no stationarity or the existence of unit roots should be the first step in the analysis of econometric panel data. Before using the cointegration technique, this test is necessary in order to improve the estimation of each variable's integration order and determine the number of times the variable needs to be differenced in order to produce a stationary series.

The Levin, Lin, and Chu test panel unit root is used to determine the variable's order of integration in the study. Two hypotheses form the basis of the test: The alternative hypothesis that there is no unit root is compared against the null hypothesis that there is a unit root (non-stationary). The test results are displayed in the table below.

**Table 2: The summary of panel unit root test**

| | Levin-Lin-Chu unit-root test | | |
|---|---|---|---|
| **Variables** | Statistic | p-value | Stationarity |
| In of real GDP per capita | -6.5577 | 0.0000 | I(0) |
| In of remittances | -4.7150 | 0.0000 | I(0) |
| FDI to GDP ratio | -8.3272 | 0.0000 | I(1) |
| gross domestic saving | -6.6349 | 0.0000 | I(1) |
| gross fixed capital formation to GDP ratio | -1.9096 | 0.0000 | I(0) |
| population growth | -3.7435 | 0.0049 | I(0) |
| In of financial development | -3.2152 | 0.0007 | I(0) |

The majority of the variables, including GDPPC, remittances, gross fixed capital creation, population growth, and financial development, are stationary at a certain level, according to the panel root test results presented in Table 2. due to a p value below the 5% threshold of significance. As a result, the alternative hypothesis was accepted at this level, and the null hypothesis that the panel has a unit root was rejected. FDI and GDS, on the other hand, are not stationary at this level. Nevertheless, these variables become stationary at the first difference (that is, they have an integrated order of one I(1)).

**Panel Data Co-Integration Test**

It is crucial to verify whether or not there is cointegration between the dependent and independent variables (also known as no stationarity variables) in addition to the stationarity test mentioned above. A long-term link between two or more non stationary variables is called cointegration. Usually, when variables are differentiable to achieve stationarity, the long-run features are lost. Given that the dependent variables (GDPPC) remained stationary at the initial difference (I(1)), cointegration needs to be verified in this specific model. The Westerlund panel cointegration test was used to determine this, and the results are shown in the table below. If the probability value is less than 0.05 ( the 5% significance threshold), the Westerland cointegration test's decision rule is to reject the null hypothesis that there is no cointegration. In summary, this result suggests that there is a long-run association in the model. Table Blow illustrates this. The Westerland panel cointegration test indicates that the probability value is (0.031), which is less than a 5% level of significance. As a result, we can reject the null hypothesis that there is no cointegration and accept the alternative hypothesis that some panels have co-integrated.

```
. xtcointtest westerlund ln_GDPPC ln_REM ln_gds ln_gfcf ln_pop_growth ln_FDI ln_TO

Westerlund test for cointegration
─────────────────────────────────

Ho: No cointegration                        Number of panels       =     15
Ha: Some panels are cointegrated            Avg. number of periods = 22.933

Cointegrating vector: Panel specific
Panel means:          Included
Time trend:           Not included
AR parameter:         Panel specific
──────────────────────────────────────────────────────────────────────────────
                                        Statistic        p-value
──────────────────────────────────────────────────────────────────────────────
 Variance ratio                           2.7361          0.0031
──────────────────────────────────────────────────────────────────────────────
```

**Regression result and discussion**

The system GMM estimation results (Arellano and Bovver, 1995; Blundell and Bond, 1998) about the impact of remittances on the economic development of the SubSaharan African nations from 2000 to 2022 are shown in this section. The current study used two system GMM models to examine the relationship between remittances and economic growth, as well as the mediating role of financial development on the impact of SSA countries with high remittance recipients on economic growth after removing financial development from the SEM model.

***Table 3*** **estimated result of the effect of remittance on economic growth**

Dynamic panel-data estimation, one-step system GMM

| | | | | | | |
|---|---|---|---|---|---|---|
| Group variable: countrycode1 | | | | Number of obs | = | 344 |
| Time variable : Year | | | | Number of groups | = | 15 |
| Number of instruments = 29 | | | | Obs per group: min | = | 22 |
| F(6, 337) | = | 9125.08 | | avg | = | 22.93 |
| Prob > F | = | 0.000 | | max | = | 23 |

| ln_GDPPC | Coef. | Std. Err. | t | P>\|t\| | [95% Conf. | Interval] |
|---|---|---|---|---|---|---|
| ln_REM | .0990228 | .0259748 | 3.81 | 0.000 | .0479297 | .1501158 |
| ln_FDI | .5816038 | .149193 | 3.90 | 0.000 | .2881369 | .8750707 |
| ln_gfcf | .085559 | .1135903 | 0.75 | 0.452 | -.1378764 | .3089943 |
| ln_TO | -.2125029 | .1056199 | -2.01 | 0.045 | -.4202602 | -.0047456 |
| ln_gds | .1504153 | .0430189 | 3.50 | 0.001 | .0657958 | .2350348 |
| ln_pop_growth | -1.444559 | .0922946 | -15.65 | 0.000 | -1.626105 | -1.263013 |
| _cons | 6.186623 | .8196096 | 7.55 | 0.000 | 4.574427 | 7.798818 |

The results on the impact of remittances on economic growth are shown in Table 3, which indicates that the annual panel data has a high proportion of remittance recipient countries. The panel data is strongly balanced based on the system GMM estimation results. During the study period, five out of the six explanatory variables showed a significant relationship with SSA countries.

Remittances, as shown in Table 3, have a positive and statistically significant impact on economic growth at the 5% significance level. Therefore, assuming all other factors stay the same, a one-unit increase in the countries' remittances leads to a 9.9% increase in economic growth. Remittance inflows boost economies in high-remittance recipient nations by providing incentives to diversify investments, which in turn promotes economic growth. This result

supports the notion that remittances are meant to promote economic growth, which is in line with earlier findings from Learn More (2012), Olayungbo & Quadri (2019), Ishaq & Ali (2020), Adjei et al. (2020), and Zouheir & Imen (2014). Furthermore, these explanations are consistent with the development of mentalist and neoclassical theory, which argues that remittance flows and the experience, skills, and knowledge that migrants would gain overseas before returning would be extremely beneficial to developing countries' economic development (De Haas, 2007). Although this conclusion aligns with the initial hypothesis, it deviates from the findings of earlier research by Williams (2017), Adarkwa (2015), Sobiech (2015), and Chami et al. (2005).

In the SSA countries, there is a positive and statistically significant correlation between economic growth and foreign direct investment at the five percent significance level. Keeping the other explanatory variable in the model constant, an increase of one unit in foreign direct investment results in a 0.581 percent growth in the economy. The present outcome validates the conclusions reached by Meyer and Shera (2013) and Azam et al. (2013) about the beneficial impact of foreign direct investment on economic growth. However, the data published by Agbelenko & Kibet (2015), Azam et al. (2013), and Ishaq & Ali (2020) indicate that the influx of foreign direct investment was insufficient to stimulate the economy. This finding runs counter to their findings.

At a 5% significance level, trade openness is found to be negatively correlated with economic growth, with coefficient values of 0.2125. Trade openness can have a negative impact on economic growth because it increases competition, which makes domestic industries more susceptible to more efficient foreign producers. It can also cause structural changes in the economy, which can cause short-term disruptions as resources shift from less competitive to more competitive sectors. Additionally, economies that heavily rely on foreign markets run the danger of experiencing growth slowdowns during global downturns due to exposure to external shocks and variations in demand.Shahbaz, M., Cassola, N., & Mahalik, M. K. (2018) are confirmed by this outcome. Find that trade openness significantly hinders economic growth. This suggests that more trade openness may sometimes hinder rather than promote economic progress.

At a 5% significance level, population growth, which is comparable to the expected sign, is found to be negative and significantly impacts economic growth. Its coefficient value is 1.444. Population growth diminishes output in developing countries where capital is scarce and its supply is inelastic by diminishing the per capita availability of capital. This results in even reduced output. This outcome is in line with the findings of the three earlier research projects carried out by Meyer & Shera (2017), Balde (2009), and Zghidi & Abida (2015). This discovery, however, runs counter to Learnmore's (2012) documentation that population growth contributes positively to economic growth.

Greater gross domestic saving is thought to stimulate economic growth, as evidenced by the positive and substantial coefficient of gross domestic saving. Since domestic investment is financed by domestic savings, which has an impact on economic growth. Table 3 shows that, when all other parameters stay the same, a 1% increase in gross domestic savings leads to a 15.04% percent rise in economic growth. This increment is statistically significant, and the outcome is in line with the predicted sign. This result demonstrates that gross domestic savings play a role in boosting economic growth. It does not, however, agree with the findings of the most recent study carried out by Adjei et al. (2020).

**Robustness analysis of the mediation results**

By adjusting for financial development (fin_dev) and ignoring the direct impact of remittance (In_REM) on economic growth (In_GDPPC), this mediation study recommends concentrating on the indirect impact the indirect impact of remittance in economic growth through financial development the coefficient of 0.0827295 indicates that remittance have a favorable influence on financial on financial development , indicating a positive and significant impact on the latter additional proof that remittances and economic growth are entirely mediated through their impact on financial development is provided by the fact that, with certain limitations, the coefficient of 1 for financial development on economic growth supports partial mediation . the error terms provided variances represent the unexplained variability of the dependent and mediating variables, the results suggest that financial development acts as a mediator between remittance and economic growth, with remittance having a positive effect on financial development ,which in turn stimulate economic growth.

**Table 4. Structural equation model**

| | OIM Coef. | Std. Err. | z | P>\|z\| | [95% Conf. | Interval] |
|---|---|---|---|---|---|---|
| Structural | | | | | | |
| ln_GDPPC <- | | | | | | |
| ln_REM | .165459 | .0329987 | 5.01 | 0.000 | .1007828 | .2301353 |
| _cons | 3.826122 | .6380399 | 6.00 | 0.000 | 2.575586 | 5.076657 |
| fin_dev <- | | | | | | |
| ln_REM | 6.755878 | 1.024753 | 6.59 | 0.000 | 4.7474 | 8.764357 |
| _cons | -100.4826 | 19.81391 | -5.07 | 0.000 | -139.3171 | -61.64802 |
| var(e.ln_GDPPC) | .7729096 | .0588483 | | | .6657625 | .8973009 |
| var(e.fin_dev) | 745.3728 | 56.75172 | | | 642.0431 | 865.3324 |

**Effect of Financial Development on Economic Growth (ln_GDPPC):** In the equation predicting ln_GDPPC, there is an additional term related to fin_dev (financial development). The coefficient for fin_dev in the ln_GDPPC equation is not explicitly provided in the snippet, but it suggests that financial development itself contributes to economic growth.

**Mediating Role Interpretation:** To determine if financial development mediates the relationship between remittances and economic growth, we typically look at how including fin_dev changes the direct effect of ln_REM on ln_GDPPC. If the direct effect of ln_REM on ln_GDPPC decreases in magnitude (or becomes non-significant) after including fin_dev in the model, it suggests that part of the effect of remittances on economic growth is mediated through financial development. Without seeing the specific coefficient for fin_dev in the ln_GDPPC equation, we rely on the indirect effect via the pathway.

**Assessment of Model Fit:** The log likelihood (-2689.5096) and the LR test statistics (chi2 (1) = 168.16, Prob > chi2 = 0.0000) suggest that the model fits the data significantly better than a saturated model (a model with perfect fit), indicating that the included variables (including ln_REM) are meaningful predictors of the outcomes.

**Given the coefficients and their statistical significance:** Remittances (ln_REM) positively influence both financial development (fin_dev) and economic growth (ln_GDPPC).Financial

development (fin_dev) likely plays a mediating role because it is influenced by remittances and, in turn, affects economic growth.

Therefore, the provided table and coefficients suggest that financial development mediates at least part of the relationship between remittances and economic growth in the structural equation model. This mediation indicates that remittances not only directly contribute to economic growth but also indirectly through enhancing financial development.

**Table 5 Mediation analysis of structural equation model**

| **Estimates** | **Sobel** | **Monte Carlo*** |
|---|---|---|
| Indirect Effect | .0827295 | .0011862 |
| Standard Error | .0329987 | .02000090 |
| Z. Value | 2.5070533 | 16.86172 |
| P. Value | .01217423 | 0.000 |
| Confidence Interval | 0.01805205,0 .14740695 | 0.017676 , 0.0223258 |

The relationship between remittance (In_REM), financial development (fin_dev), and economic growth (In_GDPPC) is illustrated by the structural equation model you supplied .it is evident from the significant coefficient for In_REM on In_GDPPC (coef=0.165459,p<0.001) that remittance boost economic growth .furthermore, the In_REM coefficient on fin_dev has statistical significance (coef=6.755878,p<0.001), indicting a positive correlation between remittance and financial development

In light of the findings of the Sobel test, the indirect impact of remittances on economic growth via financial development is now being investigated. The estimated influence of remittances on economic growth, mediated via financial development, is indicated by the calculated indirect effect (0.0827295). As evidenced by the low p value (0.01217423) and the 95% confidence interval (0.01805205, 0.14740695) excluding zero, this indirect impact is statistically significant.

The Monte Carlotest's z statistic, which is roughly 16.98, denotes a very high degree of significance. This implies that it is extremely unlikely that the observed mediation effect happened by accident. The z statistic's p value is practically zero, providing very strong evidence against the null hypothesis that there is no mediation effect. Confidence Slopes: For the mediation effect, the lower bound is roughly 0.0176922, and the upper bound is approximately 0.0223096. The 95% confidence range does not include zero. This implies that there is a high degree of confidence in the genuine mediation effect not being null.

Considering the non zero confidence intervals, the highly significant z statistic, and the insignificant p value, it can be said that remittances and economic growth are some what mediated by financial development, indicating that remittances have an indirect impact on economic growth in addition to their direct impact through their influence on financial development.

Generally the effect of remittances on economic growth is "partially mediated through financial development," mean that while remittances have a direct positive impact on economic growth by themselves (independent effect), part of this impact is also channeled through the improvements in the financial development (mediating effect).

In other words, financial development acts as an intermediary or facilitator that enhances the economic impact of remittances. It does not completely replace the direct effect of remittances but rather enhances it by providing better opportunities for the effective utilization of remittance funds.

## 4.3. Diagnostic Tests

To ensure that the system GMM estimation result may be used for policy implications, a few diagnostic tests are essential. The system GMM model is subjected to several significant tests, including those measuring auto correlation and multicollinearity.

**Multicollinearity Test**

When two or more independent variables employed in a regression analysis have a significant or high correlation , this is known as multicollinearity. One of the main issues with linear regression

analysis is the correlation between the exploratory variables, as independent variables ought to be independent. When a researcher tries to figure out how well each explanatory variable can be used most effectively to predict the dependent variable in the model, this issue can result in misleading results (Gujrati 2004). The study uses the correlation test, which is described in the appendices, to determine whether multicollinearity exists between the variables.

One variable's connection with itself is indicated by the correlation coefficient on the main diagonal, but pairwise correlations between the variables are indicated by the correlation coefficient off the main diagonal. Since every variable has a perfect correlation with itself, the correlation coefficients along the table's major diagonal are all equal to 1, indicating that there is no meaningful correlation between the variables. As stated differently, there is no issue with multicollinearity among the study's variables.

**Heteroskedasticity Test**

The heteroscedasticity issue produces a model with erroneous t-statistics and p-values, which eventually results in a misleading conclusion (Gujarati, 2004). The Breusch-Pagan-Godfrey (BPG) test was used in this investigation to determine whether heteroscedasticity was present. According to the heteroskedasticity test of this study given in the appendix, the p value is 0.1008, which is greater than 0.05, which means the null hypothesis is accepted and there is no heteroscedasticity problem in the model.

# CHAPTER FIVE

# 5. SUMMARY, CONCLUSION, AND RECOMMENDATION

This chapter summarizes the study's findings and draws a conclusion from them. It also offers policy recommendations based on the study's key findings and suggests topics for additional research.

## 5.1. Summery

According to reviews of the literature, remittances' impact on economic growth has not been conclusively demonstrated by theoretical or empirical research. According to some research, remittances boost investments, which in turn promote economic growth (Giuliano and Ruiz-Arranz, 2009). According to other research, remittances have a detrimental impact on economic growth because they result in less work being done (Chami et al., 2005). There appears to be no correlation between the two factors, according to the findings of the other set of investigations. This study estimates the mediating function of financial development on the economic growth effect of remittances. In order to achieve this primary objective, the study specified the following specific goals: The remittance trend, financial development, and economic growth in the SSA countries were first discussed. Second, figure out how remittances affect the economic expansion of SSA. Finally, investigate the relationship between financial development and remittances' impact on economic growth. To achieve the aforementioned objective, the current study employed descriptive and inferential analysis on data collected from 15 SSA countries between 2000 and 2022 in SSA nations, going beyond the direct relationship between remittances and growth.

In light of the study's goal, GDP per capita, which stands for economic growth, was the dependent variable. The explanatory variables included trade openness, population growth, foreign direct investment, remittances, gross fixed capital formation, gross domestic saving, and financial development. For the whole analysis of this article, the study used domestic credit to the private sector (% of GDP) and domestic credit to the private sector by banks (% of GDP), which are measures of financial development. Based on a neoclassical growth model, the inferential analysis used the system generalized method of moments (system-GMM) method and the SEM model.

The aforementioned model is employed to investigate the premise that remittances have a major impact on the economic growth of SSA nations that receive a high volume of remittances, as well as the potential mediating function of financial development in enhancing the effectiveness of remittances in fostering regional economic growth. Prior to evaluating the link between the variables, make sure the study's instrument, the acquired data, and the problems with multicollinearity and correlation are legitimate.

The system GMM estimation results showed that while population growth and trade openness have a significant negative impact on economic growth in SubSaharan African countries, remittances, foreign direct investment, trade openness, and gross domestic savings have a significant positive impact on the economies of SSA countries. Nevertheless, the economies of the SSA nations are unaffected by gross fixed capital formation. Furthermore, the empirical research takes into account how financial development functions as a mediator in the explanation of the connection between remittances and economic growth.

The findings suggested that financial development acted as a mediator in the relationship between remittances and economic growth in Sub-Saharan African nations. Overall, the estimation result showed that trade openness, GDP per capita, population growth, remittances, and gross domestic saving all had a significant impact on the economies of the SSA countries. However, gross fixed capital formation was found to have a statistically insignificant impact on the overall analysis's economic growth.

## 5.2. Conclusion

In 15 SSA countries between 2000 and 2022, the impact of remittance on economic growth and the mediating function of financial development on this effect have been examined in the current research. Based on the information pertaining to the study objective, the study came to various conclusions. The results indicate that remittances positively impact economic growth, implying that remittance s contribute to the expansion of the SSA economy. This is a significant finding.

Furthermore, the estimation results show that in SSA countries, financial development plays a mediating role in the economic growth effect of remittances. The data indicates that a high

degree of financial development increases the effectiveness of remittances, implying that having strong financial development is a prerequisite for using remittances successfully.

In SSA countries with high remittance levels, the relationship between remittance and economic growth is moderated, as the estimation results show, by financial development, as evidenced by domestic credit from banks to the private sector and by domestic credit from banks to the private sector itself. This shows that countries with strong financial infrastructure have greater remittance performance. Specifically there is a stronger positive correlation between remittance good effect on economic growth and higher level of financial development .this suggest that remittance contribute considerably more to economic growth when there is a robust financial development system in place, acting as as stimulus .the results show how crucial strong financial development is to remittance benefit maximization.

## 5.3. Recommendation

The results of this study demonstrate that remittances have a beneficial impact on economic growth in SSA nations over the course of the study's sample period and that this impact improves with improved financial development. It is advised that the governments of the recipient's country make efforts to enhance financial development overall or by fortifying it, in addition to providing incentives to boost remittance flows, in light of these findings. This is required in order for these transfers to be used effectively, which boosts economic growth.

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# APPENDIX 1

**Appendix: 1)** List of sub - Saharan Africa countries used in the study

Benin ,Botswana, Burkina Faso, Cote d'Ivoire, Eswatini, Ghana, Kenya , Mali, Niger, Senegal, Sierra Leone, South Africa, Tanzania, Togo, Sudan.

# Appendix 2. STATA Result

```
. xtset countrycode1 Year
       panel variable:  countrycode1 (strongly balanced)
        time variable:  Year, 2000 to 2022
                delta:  1 unit

.


. summarize GDPPC REM fin_dev FDI gds gfcf TO pop_growth
```

| Variable | Obs | Mean | Std. Dev. | Min | Max |
|---|---|---|---|---|---|
| GDPPC | 345 | 1744.222 | 1892.37 | 138.7139 | 8737.041 |
| REM | 345 | 5.74e+08 | 8.37e+08 | 2435105 | 4.98e+09 |
| fin_dev | 345 | 29.7845 | 29.01234 | .0022333 | 150.4737 |
| FDI | 345 | 2.830493 | 2.952262 | -.3165487 | 32.41435 |
| gds | 345 | 14.89647 | 8.847387 | .0241074 | 42.49251 |
| gfcf | 345 | 20.21929 | 6.57817 | 1.09681 | 42.68696 |
| TO | 345 | 59.13486 | 24.72584 | 2.698834 | 175.798 |
| pop_growth | 345 | 2.495297 | .8042356 | .3872785 | 5.785413 |

## Co-integration test

```
. xtcointtest westerlund ln_GDPPC ln_REM ln_gds ln_gfcf ln_pop_growth ln_FDI ln_TO

Westerlund test for cointegration
--------------------------------

Ho: No cointegration                        Number of panels      =     15
Ha: Some panels are cointegrated            Avg. number of periods = 22.933

Cointegrating vector: Panel specific
Panel means:          Included
Time trend:           Not included
AR parameter:         Panel specific
------------------------------------------------------------------------------
                                        Statistic        p-value
------------------------------------------------------------------------------
 Variance ratio                           2.7361         0.0031
------------------------------------------------------------------------------
```

## Unit root test

```
. xtunitroot llc ln_GDPPC

Levin-Lin-Chu unit-root test for ln_GDPPC
-----------------------------------------

Ho: Panels contain unit roots               Number of panels  =     15
Ha: Panels are stationary                   Number of periods =     23

AR parameter: Common                        Asymptotics: N/T -> 0
Panel means:  Included
Time trend:   Not included

ADF regressions: 1 lag
LR variance:     Bartlett kernel, 9.00 lags average (chosen by LLC)
------------------------------------------------------------------------------
                     Statistic      p-value
------------------------------------------------------------------------------
 Unadjusted t         -8.7181
 Adjusted t*          -6.5577        0.0000
------------------------------------------------------------------------------
```

```
. xtunitroot llc ln_REM

Levin-Lin-Chu unit-root test for ln_REM
---------------------------------------

Ho: Panels contain unit roots               Number of panels  =     15
Ha: Panels are stationary                   Number of periods =     23

AR parameter: Common                        Asymptotics: N/T -> 0
Panel means:  Included
Time trend:   Not included

ADF regressions: 1 lag
LR variance:     Bartlett kernel, 9.00 lags average (chosen by LLC)
------------------------------------------------------------------------------
                     Statistic      p-value
------------------------------------------------------------------------------
 Unadjusted t        -7.3174
 Adjusted t*         -4.7150        0.0000
------------------------------------------------------------------------------
```

```
. xtunitroot llc d.ln_gfcf

Levin-Lin-Chu unit-root test for D.ln_gfcf
------------------------------------------

Ho: Panels contain unit roots               Number of panels  =     15
Ha: Panels are stationary                   Number of periods =     22

AR parameter: Common                        Asymptotics: N/T -> 0
Panel means:  Included
Time trend:   Not included

ADF regressions: 1 lag
LR variance:     Bartlett kernel, 9.00 lags average (chosen by LLC)
------------------------------------------------------------------------------
                     Statistic      p-value
------------------------------------------------------------------------------
 Unadjusted t       -13.3329
 Adjusted t*         -6.3527        0.0000
------------------------------------------------------------------------------
```

```
. xtunitroot llc d.ln_gds

Levin-Lin-Chu unit-root test for D.ln_gds
```

Ho: Panels contain unit roots — Number of panels = 15
Ha: Panels are stationary — Number of periods = 22

AR parameter: Common — Asymptotics: N/T -> 0
Panel means: Included
Time trend: Not included

ADF regressions: 1 lag
LR variance: Bartlett kernel, 9.00 lags average (chosen by LLC)

| | Statistic | p-value |
|---|---|---|
| Unadjusted t | -16.2771 | |
| Adjusted t* | -8.1264 | 0.0000 |

```
. xtunitroot llc ln_pop_growth

Levin-Lin-Chu unit-root test for ln_pop_growth
```

Ho: Panels contain unit roots — Number of panels = 15
Ha: Panels are stationary — Number of periods = 23

AR parameter: Common — Asymptotics: N/T -> 0
Panel means: Included
Time trend: Not included

ADF regressions: 1 lag
LR variance: Bartlett kernel, 9.00 lags average (chosen by LLC)

| | Statistic | p-value |
|---|---|---|
| Unadjusted t | -6.3163 | |
| Adjusted t* | -2.5808 | 0.0049 |

```
. xtunitroot llc d.FDI

Levin-Lin-Chu unit-root test for D.FDI
--------------------------------------

Ho: Panels contain unit roots               Number of panels  =     15
Ha: Panels are stationary                   Number of periods =     22

AR parameter: Common                        Asymptotics: N/T -> 0
Panel means:  Included
Time trend:   Not included

ADF regressions: 1 lag
LR variance:     Bartlett kernel, 9.00 lags average (chosen by LLC)
------------------------------------------------------------------------------
                     Statistic      p-value
------------------------------------------------------------------------------
 Unadjusted t       -16.1105
 Adjusted t*         -8.3272        0.0000
------------------------------------------------------------------------------

.

. xtunitroot llc In_fin_dev

Levin-Lin-Chu unit-root test for In_fin_dev
-------------------------------------------

Ho: Panels contain unit roots               Number of panels  =     15
Ha: Panels are stationary                   Number of periods =     23

AR parameter: Common                        Asymptotics: N/T -> 0
Panel means:  Included
Time trend:   Not included

ADF regressions: 1 lag
LR variance:     Bartlett kernel, 9.00 lags average (chosen by LLC)
------------------------------------------------------------------------------
                     Statistic      p-value
------------------------------------------------------------------------------
 Unadjusted t        -7.2778
 Adjusted t*         -3.2152        0.0007
------------------------------------------------------------------------------

.
```

```
. xtunitroot llc d.ln_TO

Levin-Lin-Chu unit-root test for D.ln_TO
```

Ho: Panels contain unit roots — Number of panels = 15
Ha: Panels are stationary — Number of periods = 22

AR parameter: Common — Asymptotics: N/T -> 0
Panel means: Included
Time trend: Not included

ADF regressions: 1 lag
LR variance: Bartlett kernel, 9.00 lags average (chosen by LLC)

| | Statistic | p-value |
|---|---|---|
| Unadjusted t | -13.0461 | |
| Adjusted t* | -6.0532 | 0.0000 |

# STRUCTURAL EQUATION MODEL

Structural equation model  Number of obs = 345
Estimation method = ml
Log likelihood = -1059.0807

( 1) [ln_GDPPC]fin_dev = 1

| | OIM Coef. | Std. Err. | z | P>\|z\| | [95% Conf. | Interval] |
|---|---|---|---|---|---|---|
| Structural | | | | | | |
| ln_GDPPC <- | | | | | | |
| fin_dev | 1 | (constrained) | | | | |
| ln_REM | .0827295 | . | . | . | . | . |
| _cons | 3.826122 | .6380399 | 6.00 | 0.000 | 2.575586 | 5.076657 |
| fin_dev <- | | | | | | |
| ln_REM | .0827295 | .0329987 | 2.51 | 0.012 | .0180533 | .1474058 |
| var(e.ln_GDPPC) | .414617 | . | | | . | . |
| var(e.fin_dev) | .3582926 | .0588483 | | | .2596754 | .4943616 |

## Sobel z-test

```
. scalar indirect_effect = b_fin_dev * b_ln_REM

. scalar SE_indirect_effect = sqrt((b_ln_REM^2) * (SE_fin_dev^2) + (b_fin_dev^2) * (SE_ln_REM^2))

. scalar z_value = indirect_effect / SE_indirect_effect

. scalar p_value = 2 * (1 - normal(abs(z_value)))

. scalar lower_CI = indirect_effect - (1.96 * SE_indirect_effect)

.
. scalar upper_CI = indirect_effect + (1.96 * SE_indirect_effect)

. di "Indirect effect: " indirect_effect
Indirect effect: .0827295

.
. di "Standard error of the indirect effect: " SE_indirect_effect
Standard error of the indirect effect: .0329987

.
. di "z-value: " z_value
z-value: 2.5070533

.
. di "p-value: " p_value
p-value: .01217423

.
. di "95% Confidence Interval for Sobel test statistic: (" lower_CI ", " upper_CI ")"
95% Confidence Interval for Sobel test statistic: (.01805205, .14740695)
```

Dynamic panel-data estimation, one-step system GMM

| | | | |
|---|---|---|---|
| Group variable: countrycode1 | | Number of obs | = 344 |
| Time variable : Year | | Number of groups | = 15 |
| Number of instruments = 29 | | Obs per group: min | = 22 |
| F(6, 337) | = 9125.08 | avg | = 22.93 |
| Prob > F | = 0.000 | max | = 23 |

| ln_GDPPC | Coef. | Std. Err. | t | P>\|t\| | [95% Conf. | Interval] |
|---|---|---|---|---|---|---|
| ln_REM | .0990228 | .0259748 | 3.81 | 0.000 | .0479297 | .1501158 |
| ln_FDI | .5816038 | .149193 | 3.90 | 0.000 | .2881369 | .8750707 |
| ln_gfcf | .085559 | .1135903 | 0.75 | 0.452 | -.1378764 | .3089943 |
| ln_TO | -.2125029 | .1056199 | -2.01 | 0.045 | -.4202602 | -.0047456 |
| ln_gds | .1504153 | .0430189 | 3.50 | 0.001 | .0657958 | .2350348 |
| ln_pop_growth | -1.444559 | .0922946 | -15.65 | 0.000 | -1.626105 | -1.263013 |
| _cons | 6.186623 | .8196096 | 7.55 | 0.000 | 4.574427 | 7.798818 |

Instruments for orthogonal deviations equation
  Standard
    FOD.(ln_REM ln_TO ln_pop_growth ln_gfcf ln_gds)
  GMM-type (missing=0, separate instruments for each period unless collapsed)
    L(1/22).ln_GDPPC collapsed
Instruments for levels equation
  Standard
    ln_REM ln_TO ln_pop_growth ln_gfcf ln_gds
    _cons
  GMM-type (missing=0, separate instruments for each period unless collapsed)
    D.ln_GDPPC collapsed

Arellano-Bond test for AR(1) in first differences: z = -2.69 Pr > z = 0.007
Arellano-Bond test for AR(2) in first differences: z = -1.31 Pr > z = 0.191

## Multicollinearity Test

```
. . pwcorr ln_GDPPC ln_REM ln_gds ln_gfcf ln_pop_growth ln_FDI ln_TO
```

| | ln_GDPPC | ln_REM | ln_gds | ln_gfcf | ln_pop~h | ln_FDI | ln_TO |
|---|---|---|---|---|---|---|---|
| ln_GDPPC | 1.0000 | | | | | | |
| ln_REM | 0.2606 | 1.0000 | | | | | |
| ln_gds | 0.4100 | 0.1475 | 1.0000 | | | | |
| ln_gfcf | 0.1358 | 0.1286 | 0.4326 | 1.0000 | | | |
| ln_pop_gro~h | -0.6967 | -0.0013 | -0.1279 | 0.1841 | 1.0000 | | |
| ln_FDI | -0.0838 | 0.0618 | 0.0799 | 0.1607 | 0.0753 | 1.0000 | |
| ln_TO | 0.3336 | -0.1697 | 0.1054 | 0.2580 | -0.4069 | 0.1221 | 1.0000 |

## Heteroskedasticity

```
. estat hettest

Breusch-Pagan / Cook-Weisberg test for heteroskedasticity
         Ho: Constant variance
         Variables: fitted values of ln_GDPPC

         chi2(1)      =     2.69
         Prob > chi2  =   0.1008
```

## Monte Carlo test

```
. regress ln_GDPPC ln_REM fin_dev
```

| Source | SS | df | MS | Number of obs = | 345 |
|---|---|---|---|---|---|
| | | | | F( 2, 342) = | 127.69 |
| Model | 122.302729 | 2 | 61.1513646 | Prob > F = | 0.0000 |
| Residual | 163.783028 | 342 | .478897742 | R-squared = | 0.4275 |
| | | | | Adj R-squared = | 0.4242 |
| Total | 286.085757 | 344 | .831644642 | Root MSE = | .69202 |

| ln_GDPPC | Coef. | Std. Err. | t | P>\|t\| | [95% Conf. | Interval] |
|---|---|---|---|---|---|---|
| ln_REM | .0303353 | .0275625 | 1.10 | 0.272 | -.0238781 | .0845488 |
| fin_dev | .0200009 | .0013647 | 14.66 | 0.000 | .0173167 | .0226851 |
| _cons | 5.835864 | .5206158 | 11.21 | 0.000 | 4.811852 | 6.859876 |

```
.
```

```
. bootstrap, reps(1000): regress ln_GDPPC ln_REM fin_dev
(running regress on estimation sample)

Bootstrap replications (1000)
----+--- 1 ---+--- 2 ---+--- 3 ---+--- 4 ---+--- 5
..................................................    50
..................................................   100
..................................................   150
..................................................   200
..................................................   250
..................................................   300
..................................................   350
..................................................   400
..................................................   450
..................................................   500
..................................................   550
..................................................   600
..................................................   650
..................................................   700
..................................................   750
..................................................   800
..................................................   850
..................................................   900
..................................................   950
..................................................  1000

Linear regression                               Number of obs     =        345
                                                Replications      =       1000
                                                Wald chi2(2)      =     418.60
                                                Prob > chi2       =     0.0000
                                                R-squared         =     0.4275
                                                Adj R-squared     =     0.4242
                                                Root MSE          =     0.6920

------------------------------------------------------------------------------
             |   Observed   Bootstrap                         Normal-based
   ln_GDPPC |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
------------------------------------------------------------------------------
      ln_REM |   .0303353   .0325459     0.93   0.351    -.0334535    .0941241
     fin_dev |   .0200009   .0011862    16.86   0.000     .0176761    .0223258
       _cons |   5.835864   .6312975     9.24   0.000     4.598544    7.073185
------------------------------------------------------------------------------
```

```
. bootstrap, reps(1000): regress ln_GDPPC ln_REM fin_dev
(running regress on estimation sample)

Bootstrap replications (1000)
----+--- 1 ---+--- 2 ---+--- 3 ---+--- 4 ---+--- 5
..................................................    50
..................................................   100
..................................................   150
..................................................   200
..................................................   250
..................................................   300
..................................................   350
..................................................   400
..................................................   450
..................................................   500
..................................................   550
..................................................   600
..................................................   650
..................................................   700
..................................................   750
..................................................   800
..................................................   850
..................................................   900
..................................................   950
..................................................  1000

Linear regression                               Number of obs      =       345
                                                Replications       =      1000
                                                Wald chi2(2)       =    418.60
                                                Prob > chi2        =    0.0000
                                                R-squared          =    0.4275
                                                Adj R-squared      =    0.4242
                                                Root MSE           =    0.6920

------------------------------------------------------------------------------
             |   Observed   Bootstrap                         Normal-based
    ln_GDPPC |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
      ln_REM |   .0303353   .0325459     0.93   0.351    -.0334535    .0941241
     fin_dev |   .0200009   .0011862    16.86   0.000     .0176761    .0223258
       _cons |   5.835864   .6312975     9.24   0.000     4.598544    7.073185
------------------------------------------------------------------------------

.
. bootstrap, saving(results, replace) reps(1000): regress ln_GDPPC ln_REM fin_dev
(running regress on estimation sample)

Bootstrap replications (1000)
----+--- 1 ---+--- 2 ---+--- 3 ---+--- 4 ---+--- 5
..................................................    50
..................................................   100
..................................................   150
..................................................   200
..................................................   250
..................................................   300
..................................................   350
..................................................   400
..................................................   450
..................................................   500
..................................................   550
..................................................   600
..................................................   650
..................................................   700
..................................................   750
..................................................   800
..................................................   850
..................................................   900
..................................................   950
..................................................  1000

Linear regression                               Number of obs      =       345
                                                Replications       =      1000
                                                Wald chi2(2)       =    465.45
                                                Prob > chi2        =    0.0000
                                                R-squared          =    0.4275
                                                Adj R-squared      =    0.4242
                                                Root MSE           =    0.6920

------------------------------------------------------------------------------
             |   Observed   Bootstrap                         Normal-based
    ln_GDPPC |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
      ln_REM |   .0303353   .0325786     0.93   0.352    -.0335176    .0941883
     fin_dev |   .0200009   .0011779    16.98   0.000     .0176922    .0223096
       _cons |   5.835864   .6304458     9.26   0.000     4.600213    7.071515
------------------------------------------------------------------------------
```

```
.
. use results, clear
(bootstrap: regress)

.
. gen Mediation_Effect = _b[fin_dev]

.
. gen Mediation_SE = _se[fin_dev]

.
. gen z_stat = Mediation_Effect / Mediation_SE

.
. gen p_value = 2 * normal(-abs(z_stat))

.
. gen lower_CI = Mediation_Effect - 1.96 * Mediation_SE

.
. gen upper_CI = Mediation_Effect + 1.96 * Mediation_SE

.
. di "Monte Carlo z-test for Mediation Effect:"
Monte Carlo z-test for Mediation Effect:

.
. sum Mediation_Effect Mediation_SE z_stat p_value lower_CI upper_CI
```

| Variable | Obs | Mean | Std. Dev. | Min | Max |
|---|---|---|---|---|---|
| Mediation_~t | 1000 | .0200009 | 0 | .0200009 | .0200009 |
| Mediation_SE | 1000 | .0011779 | 0 | .0011779 | .0011779 |
| z_stat | 1000 | 16.97989 | 0 | 16.97989 | 16.97989 |
| p_value | 1000 | 0 | 0 | 0 | 0 |
| lower_CI | 1000 | .0176922 | 0 | .0176922 | .0176922 |
| upper_CI | 1000 | .0223096 | 0 | .0223096 | .0223096 |