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Financial Inclusion and Economic Growth in Selected Sub-Saharan African (SSA) Countries

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ABSTRACT

This study aimed at investigating the relation between financial inclusion and growth in selected sub-Saharan African (SSA) nations. The importance of the study stems from the growing recognition of financial inclusion as a key driver of inclusive economic development and poverty reduction, yet mixed empirical evidence on its actual impact, particularly on economic growth, calls for deeper investigation. The study employed panel data for the period 2011 to 2021 and engaged the Levin, Lin Chiu (LLC) and Im, Pesaran and Shin (IPS) unit root tests. The Unit root test results revealed mixed integration at orders I (0) and I (1). Sequel to this, the unit autoregressive distributed Lag (ARDL) co-integration estimation technique was used to test long-run dynamics and short-run estimates derived via the Error Correction Mechanism (ECM).

The results indicate that there is variability in the impact of various financial sector development measures on growth within the SSA region. Financial inclusion, as measured by proxies for access, including the density of automated teller machines (ATMs) per 100,000 adults and bank branches in commercial banks (CBs) per 100,000 adults, positively influences economic growth. Conversely, financial inclusion, as measured by financial usage, as indicated by proxies such as the proportion of outstanding deposits in the Central Bank (CB) relative to Gross Domestic Product (GDP), and outstanding loans (CB) as a percentage of GDP, had a negative impact on economic growth. Granger causality testing further identified a unidirectional causality from economic growth to financial inclusion access measured through commercial banks (CB) per 100,000 adults. The findings from this study indicate that financial inclusion access increases and boosts economic growth, rather than financial inclusion usage. It is recommended that policies in the SSA region should encourage financial inclusion as a policy for inclusive growth. This can be facilitated by enhancing physical access to banking services, establishing and enforcing regulations that protect consumers and ensure the stability of financial institutions and by advancing digital financial services to broaden access. Additionally, aligning financial inclusion initiatives with wider development objectives can help maximise their impact on economic growth.

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Keywords: Financial inclusion, economic growth, Sub-Saharan Africa (SSA)

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Table of Contents

LIST OF TABLES

LIST OF FIGURES

LIST OF APPENDICES

ABBREVIATIONS AND ACRONYMS

ADF- Augmented Dickey-Fuller

ATM-Automated Teller Machines

EAC- East African Community

ECM-Error Correction Model

FII- Financial Inclusion index

FE-Fixed Methods

GDP- Gross Domestic product

GNI-Gross National Income

GLS-Generalized Least Squares

GMM- Generalized Method of Moments

HDI- Human Development Index

IPS- Im, Pesaran and Shin

IMF-International Monetary Fund

LLC- Levin Lin and Chu

OLS-Ordinary Least Squares

PP- Phillips-Perron

SACU- Southern African Customs

SADC- Southern African Development Community

SSA- Sub Saharan Africa

VAR- vector autoregression

VECM- Vector Error Correction Model

WAEMU- West African Economic and Monetary Union

CHAPTER ONE
INTRODUCTION AND RESEARCH ISSUE

1.1. INTRODUCTORY BACKGROUND

Initiatives aimed at making financial services formally available, accessible, and inexpensive to every part of society constitute the process of improving the level of financial inclusion (Triki & Faye, 2013). Financial inclusion is an aspect of financial sector development linked to enhanced growth, as finance serves as the lifeblood of an economic entity. (Gupte et al., 2012; Hassan et al., 2011; Beck et al., 2000). Financial services come in two ways: formally and informally. Financial services are deemed to be formal if they are provided by institutions that are regulated by the government and are subject to banking regulatory oversight by the central bank. While informal financial services are usually illegal and operate outside government supervision. The financial system is made up of intermediaries like banks, capital, money market and stock markets, mutual funds, advisory firms, insurance, and brokerage firms (National Treasury, 2011).

Financial inclusion is considered a popular policy instrument since it is a necessary component towards eliminating inequality and improving the quality of life of low-income people at an individual level. Proportionally, underdeveloped countries have a larger portion of excluded people, as there is universal account ownership in economies with high income (Demirguc-Kunt & Singer, 2017). The lack of formal financial service accessibility leads to the inability to acquire assets, to generate and sustain livelihoods, to manage risk, and to control consumption. Inclusive growth can only happen when all the sections of society are brought to be at par with other sections in terms of economic development (Thathsarani et al., 2021).

The Sub-Saharan Africa (SSA) region is characterised by high population growth, with people living below the poverty line and high rates of educational exclusion (Triki & Faye, 2013). The region has shown exponential growth in the past decade (Adesina, 2016). Following a setback in growth in 2020 due to COVID-19, which negatively affected growth across the globe, SSA growth improved from the downward trend of 2021 to 4.7. %. SSA is affected by issues of widespread inequality between and within countries, coupled with high poverty levels, and the region has shown that the growth of the region's economy alone cannot eradicate these issues. Therefore, there is a need to implement other solutions to solve poverty and inequality issues.

In SSA, growth has often been associated with inequality and the unequal sharing of benefits. The region is crippled with the highest levels of income inequality where the fruits of growth

are in the hands of few individuals. Sub-Saharan Africa (SSA) generally exhibits high levels of income inequality, with South Africa often cited as having the highest, reflected in a Gini coefficient of around 0.67 (Sulla, Zikhali & Cuevas, 2022). The SSA has a high Gini index when compared to the other regions. Within the SSA, the Southern African Customs Union (SACU) remains the region with the most unequal countries globally, for example, South Africa, Botswana, and Lesotho (Sulla et al., 2022).

Poverty has not reduced proportionally with the increments in growth in the region. Poverty remains widespread in the SSA countries, with Schoch and Lakner (2020) reporting that 40% of the population in the region was living under the US$1.90-a-day poverty rate in 2018. The issues of the increasing number of citizens, inequality, and, at times, weak growth in SSA have led to the sustenance of poverty. Among countries with prevalent poverty levels are Angola, with a national poverty line being 41% in 2019, Benin at 40.1 % in 2015, Burkina Faso at 36.7 % in 2019 and Burundi with a national poverty line of 64.9% in 2013 (Schoch & Lakner, 2020).

Similarly, financial exclusion has also been found to have a severe effect on the economy and residents (Wentzel et al., 2016). Exclusion exacerbates poverty, increases income disparity, and causes slow expansion of the economy. Those who are financially excluded may not succeed in obtaining formal financial services, which include savings accounts, transaction accounts, and insurance. Wentzel et al. (2016) revealed that financial inclusion is explained by the degree of education, age, the principal income source of income, and the number of dependents.

Financial inclusion has gained popularity among policymakers, banks and international financial institutions such as the IMF and World Bank, which have established an objective of global financial access by 2020. Individuals worldwide ought to be able to access fundamental financial instruments or products that enable them to save money, send and receive payments, and manage their financial affairs (World Bank, 2025). Expanding financial services seems to have the ability to eliminate poverty and stimulate economic development, as explained by Ain et al. (2020), who stated that one of the key strategies for improving economic growth is financial inclusion. This is because it boosts growth through a developed financial sector, which mobilises funds and allocates them to deficit units.

Policymakers have adopted financial inclusion as one of their developmental policies to boost growth, relieve poverty, and minimise income inequality. This is due to an upsurge in scholars focusing on financial inclusion's importance and its contribution to economic growth. Most

findings have shown that financial inclusion provides the most efficient method of reducing poverty and boosting growth. Scholars such as Erlando et al. (2020); Balele (2019); Abrahams (2017); Iqbal and Sami (2017); Sharma (2016); and Sharma and Kukreja (2013) emphasize the significance of financial service or product access, usage, penetration, and quality in promoting inclusive growth. Access goes beyond the physical proximity of the financial institution to include the cost and affordability of the financial service or product. According to Sharma and Kukreja (2013), inclusive financing is primarily concerned with financial services provision at prices that are affordable to all segments of society.

1.2. RESEARCH PROBLEM

SSA has been viewed as having experienced moderate and even faster economic growth over the last decade (Babajide et al., 2015). However, such growth has not been inclusive and has been associated with high-income inequality, poverty, plus unemployment, with most people lacking entry to be able to borrow and invest (Ain et al., 2020). The SSA is experiencing unequal growth, with major cities receiving a larger part of the country's wealth (Ghanem et al., 2020). South Africa, Namibia, and Botswana are among the most uneven countries, with a Gini index greater than 0,60. Following them are Cameroon, Zambia, Lesotho, and Comoros, which also have high inequalities with a Gini index of 0,53 - 0.59. Poverty levels have decreased from 56% in 1990 to 40% in 2018, and while this may be considered an improvement, severe poverty is higher in SSA compared to other areas (Schoch & Lakner, 2020). Many African communities continue to be out of reach of official financial services (Simatele, 2021), even though financial inclusion is regarded as the most effective approach to address non-inclusive growth (Triki & Faye, 2013).

The growing body of research, including that conducted by scholars including Ratnawati (2020); Demirguc-Kunt (2017), and Cámara and Tuesta (2014) acknowledges the significant impact that financial inclusion can have, firstly on an individual level and secondly, on the growth of a nation. Numerous SSA countries quickly adopted and committed to financial inclusion initiatives such as the Alliance for Financial Inclusions ‘Maya Declaration’ and Making Access Possible (MAP), and governments have aligned with non-government entities such as Finmark Trust to promote financial inclusion. SSA countries adopted financial inclusion with the hope that it would aid economic growth and raise the quality of life of consumers by lowering poverty levels and income inequality. The objective of inclusive finance has been partially achieved through digitalisation in financial services, which has

improved access beyond traditional bank branch channels. Account ownership for individuals aged 15 and above has increased from 42.6% in 2017 to 55.1% in 2021 (Demirguc-Kunt, 2022). Yet the SSA region still has poverty levels of 35.1 %, and universal account ownership has not been achieved. Even though there has been a slight improvement in poverty levels from 56% in 1990 to 40% in 2018. While this may be considered an improvement, severe poverty is higher in the SSA sub-region when compared to other areas (Schoch et al., 2020).

In the SSA region, studies such as Ndlovu (2017), Ajide (2017), Ajide (2020), Domeher (2022), and Jima et al. (2023) have come to a similar conclusion about financial inclusion and economic growth. Financial inclusion has been recognised as a development policy priority and a key to economic growth in developing economies. These studies have placed much emphasis on the measurement of financial inclusion and so noted that there's no single indicator that captures financial inclusion perfectly. As such, most researchers are grouping these financial inclusion indicators into a composite index for easier interpretation. This study will investigate the financial inclusion and economic growth and will make use of single financial inclusion indicators. This is important considering that a blanket approach of composite indexes often lead to discrepancies.

This research then aims to study whether financial inclusion promotes economic growth, focusing on the decelerated growth and determining if increments in financial inclusion have been able to bring about the desired outcome in the selected countries of the region.

1.3. RESEARCH OBJECTIVES

One fundamental objective of this research is to determine if financial inclusion promotes economic growth in selected SSA nations. The specific objectives are to:

- Determine the influence of access to financial services on the economic growth of SSA nations.
- Ascertain the influence of the usage of financial services on the economic growth of SSA nations.
- Establish the impact of the availability of financial services on the economic growth of SSA nations.
- Identify the causality between financial inclusion access and economic growth in selected SSA countries.
- Identify the causality between financial inclusion usage on economic growth in the selected SSA countries.

- ❖ Identify the causality between financial inclusion availability on economic growth in the selected SSA countries.
- ❖ To draw conclusions and provide policy suggestions based on the study's results.

1.4. HYPOTHESIS OF THE STUDY

The following hypotheses shall be tested in this study:

H_0 Financial Inclusion does not have a significant impact on economic growth in selected SSA.

H_1 Financial Inclusion does have a significant impact on economic growth in selected SSA.

H_0: There is no causality between financial inclusion and economic growth in selected SSA.

H_1: There is causality between financial inclusion and economic growth in selected SSA.

1.5. JUSTIFICATION FOR THE STUDY

This study will supplement past research concerning financial inclusion and economic growth in SSA countries. While prior research has firmly established the link between financial inclusion and economic development, such as Swamy (2010), who emphasized that expanding financial access for low-income populations is a critical step toward poverty reduction and inclusive growth, much of the work in SSA has been limited in scope.

Notable contributions by authors like Evans and Olaniyi (2015) Abrahams (2017), Balele (2019), Albiman et al. (2022), Ifediora et al (2022), Jima and Makoni (2023) and Adedokun and Ağa (2023), have often relied on older or static datasets, which may not effectively reflect the evolving dynamics of financial inclusion.

This study distinguishes itself by employing more recent data—specifically the 2021 Global Financial Index—allowing for a contemporary analysis of the financial inclusion-growth nexus. The use of updated datasets enables the generation of timely and relevant insights for policymakers, potentially improving the quality of strategic planning and decision-making. This research is especially valuable for policymakers and business leaders in SSA, as it offers a modern understanding of how financial inclusion impacts economic growth in the current context.

Previous studies in the region have largely focused on the general relationship between financial inclusion and growth, often neglecting to investigate the causal mechanisms underpinning this relationship. For instance, Opoku et al. (2024) and Ofori-Abebrese et al. (2020) assessed the impact of financial inclusion on welfare using cross-sectional data and employed ordinary least squares (OLS) methods. Similarly, Bashiru et al. (2023) analysed the drivers of financial inclusion from 2000 to 2017, while Jima and Makoni (2023) explored causality in the context of financial stability and growth. Despite these contributions, there remains a gap in the literature that rigorously explores both the relationship and causality between financial inclusion and economic growth in SSA. This study seeks to fill that gap by investigating not only the correlation but also the direction of causality between financial inclusion and economic growth. Understanding this cause-and-effect relationship is crucial for the formulation of effective policies and the efficient allocation of financial and development resources.

Additionally, this research highlights the role of financial inclusion in achieving the Sustainable Development Goals (SDGs). According to the World Bank (2025), financial inclusion is a key driver for achieving seven out of the 17 SDGs. For example, financial inclusion directly supports SDG 1 (No Poverty) by giving individuals access to credit, savings, insurance, and payment services, helping them manage risks and invest in future opportunities. It also supports SDG 8 (Decent Work and Economic Growth) by enabling broader participation in the economy, particularly through entrepreneurship. Moreover, SDGs 5 (Gender Equality) and 10 (Reduced Inequality) are advanced by integrating underserved populations into the formal financial system and empowering women with greater economic control and independence.

Given these objectives, the findings of this study will offer critical insights for policymakers, strategists, and regulatory authorities in SSA. It aims to enhance understanding of the key drivers in the financial inclusion-growth nexus and their implications for sustainable development. Beyond its policy relevance, the study's greatest contribution lies in its potential to improve the quality of life for individuals across the region. It also enriches the academic discourse by identifying gaps in current research and suggesting areas for future exploration

1.6 ORGANIZATION OF THE STUDY

There are six different chapters in the study. Chapter One contains the study's background, problem statement, objectives, and significance. The second chapter provides an overview of the financial sector and examines the growth trends of the selected SSA nations. The theoretical framework and empirical literature are detailed in the third chapter. Chapter four is centred on providing the empirical analysis and it shows the methodology, data sources and estimation techniques. Chapter five shows the interpretation of the results. In Chapter six, the summary, conclusions, policy recommendations and studies delimitations are presented.

CHAPTER TWO

AN OVERVIEW OF FINANCIAL INCLUSION AND ECONOMIC GROWTH IN THE SELECTED SUB-SAHARAN AFRICAN COUNTRIES

2.1 INTRODUCTION

Chapter two looks at the overview of financial inclusion, the trends, the patterns of growth in SSA and various country-specific trends in the region. The chapter initially analyses the overall macroeconomic environment in the region, focusing on the countries that are included in the study with readily available data. The study then follows up with an analysis of relevant sectors, such as the banking sector and financial markets in the region, focusing on the key factors that contribute to inclusion in the sector. The last section of the study looks at the overall link between the macroeconomic variables and inclusion in the financial sector of the region, as well as the summary and conclusion.

2.2 ECONOMIC GROWTH IN SELECTED SSA COUNTRIES

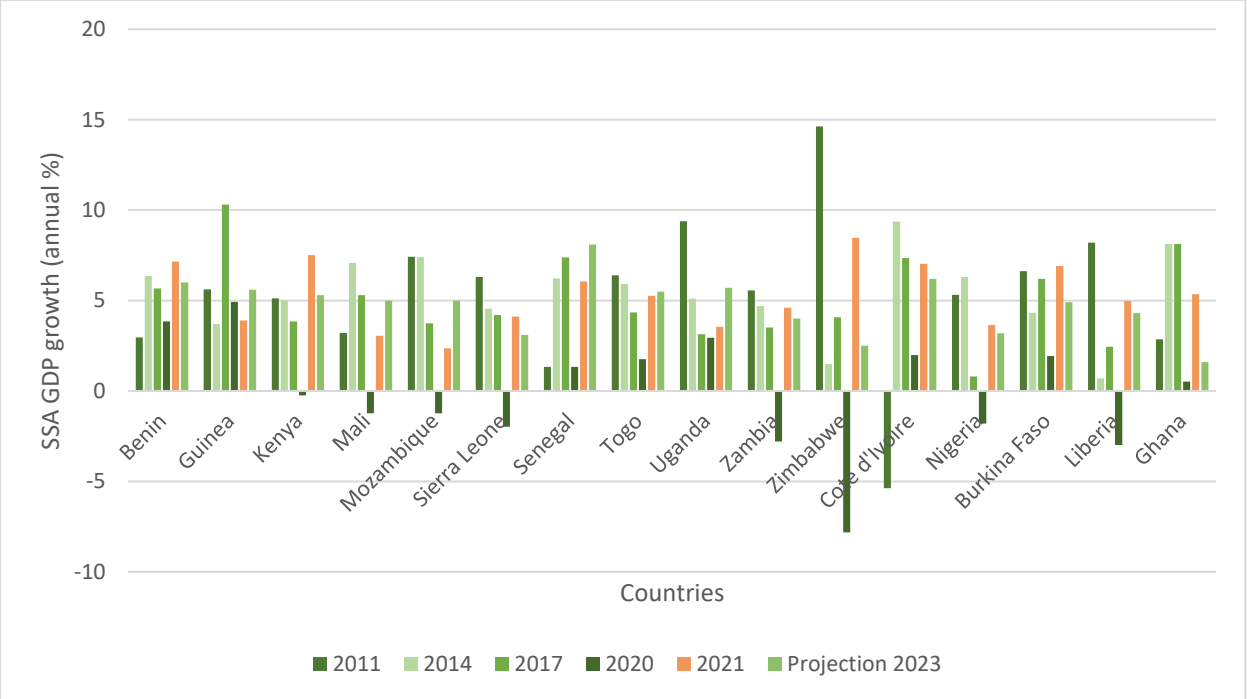
The growth of the economy can be analysed from three main accounting systems, which are the product method, expenditure method and the income method, and all these are derived from the circular model. Studies that investigate the issues of economic growth measure using GDP argue that it provides an overview of the growth in economic activity in the economy, and when measured in real terms, it accounts for inflation. The population in the SSA region is estimated to have been 1.5 billion people by the year 2024, and the trajectory has continued to be on the rise. The increase in population is of significant concern, as such rises need to match the levels of productivity to maintain the income per capita in the region to avoid an increase in poverty levels in the region (Sinha & Getachew, 2024).

In 2019, SSA experienced an annual growth rate of 2.9%, but this figure contracted in 2020 due to the COVID-19 lockdown period. However, growth rebounded during 2021, with the region recording a 4.7% GDP growth rate. In the following period, the year 2022, a lower growth rate was observed in the economy of the region, from an estimated 4.7% growth in the year 2021 to an estimated growth of 3.6%, which is approximately 1.1% lower than the previous (IMF, 2022a). One major factor contributing to this decline was the political instability in the regions that involve major trades of grain and fertiliser, such as Ukraine and Russia, which disrupted many countries in terms of their fiscal consolidation. The political instability in these regions created an artificial shortage of grain, fuel and other essential products, leading to a demand-pull inflation in SSA. Therefore, given the increase in inflation rates, governments in the region have implemented several measures to curb it and prevent the

erosion of currency values and their impact on vulnerable communities. World Bank (2023) states that the strategies that were implemented to curb inflation caused the fiscal deficit to widen in the region to 5.2% from 4.8% of GDP in the year 2021,

Within the SSA region, Botswana and Rwanda are ranked among the countries with the highest GDP growth rates. Botswana recorded a growth rate of 11.4% % in the fiscal year of 2021 (Kegakgametse & Mokhurutshe, 2022). The Rwanda Development Board reported that Rwanda's GDP growth was 10.9% in the same year (Ashimwe, 2022). Botswana's growth is primarily driven by a 78% increase in the value added to diamond trades, along with significant contributions from mining, quarrying, wholesale, and retail activities. The IMF, in its projections of the performance of SSA countries, state that the fastest-growing countries will experience accelerated growth in 2023 (IMF, 2022b). Specifically, Rwanda's GDP grew by 82% in 2023, surpassing predictions of 6.7% growth, while Botswana is projected to achieve a 4.2% growth rate. Additionally, Niger is estimated to have a growth rate of 7.3% in 2023.

Figure 2.1 Overview of Gross Domestic Product (GDP) Performance in the SSA Region



Source: Researchers' compilation using data from World Bank, 2021

Figure 2.1 presents the GDP growth of lower-income nations in the SSA from 2011 to 2021 and given that this growth can also be used to explain the performance of an economy, it is hence termed 'economic' growth. The graph indicates that most of the selected countries

experienced moderate growth between 2011 and 2017. In 2011, many of these economies were thriving, with some notable exceptions, including Senegal, Ghana, and Côte d'Ivoire, which recorded low growth rates. The African Development Bank Group reports that Côte d'Ivoire experienced the lowest GDP growth that year, with a 6% decline, due to political crises that resulted in significant human rights violations, loss of life, and population displacement, heavily impacting the economy ("Côte d'Ivoire: Country Brief", 2011).

Since 2011, Zimbabwe has experienced periods of contraction and recovery. In 2020, as in most countries, Zimbabwe's growth was a negative 7.82%. However, in 2021, Zimbabwe's real GDP growth moderated to 8.47%, signalling a 16.29% increase from 2020. (World Bank, 2023). Uganda followed with the second-highest growth rate at 9.4%. In 2017, Guinea recorded the highest GDP growth among the countries, followed by Côte d'Ivoire and Kenya. The year 2020 saw a sharp decline in GDP for many countries, including Mali, Mozambique, Sierra Leone, Zambia, Zimbabwe, Côte d'Ivoire, Liberia, and Nigeria, primarily due to the COVID-19 pandemic. Government measures such as lockdowns, travel bans, and the shutdown of non-essential activities had severe economic impacts, resulting in a 1.9% contraction in GDP for the SSA region, marking its worst performance on record (Selassie & Hakobyan, 2021).

The health crisis, coupled with other macroeconomic instability issues in the region, led to a crisis of shortage of goods and services due to dependence on imports in the SSA region. This import commodity dependence in the region led to demand-pull inflationary pressures due to the movement restrictions on people and goods. In 2021, economic growth rebounded strongly, with the region achieving 4.1% growth (Selassie, 2022). Zimbabwe again showed notable growth in 2021, with an annual increase of 8.4%, heavily reliant on its services and industry sectors (IMF, 2022b). The IMF reports that key factors that contributed to Zimbabwe's growth in 2021 included a strong performance in the agricultural sector, increased mining and energy production, and buoyant activity in construction and manufacturing agriculture (IMF, 2022b).

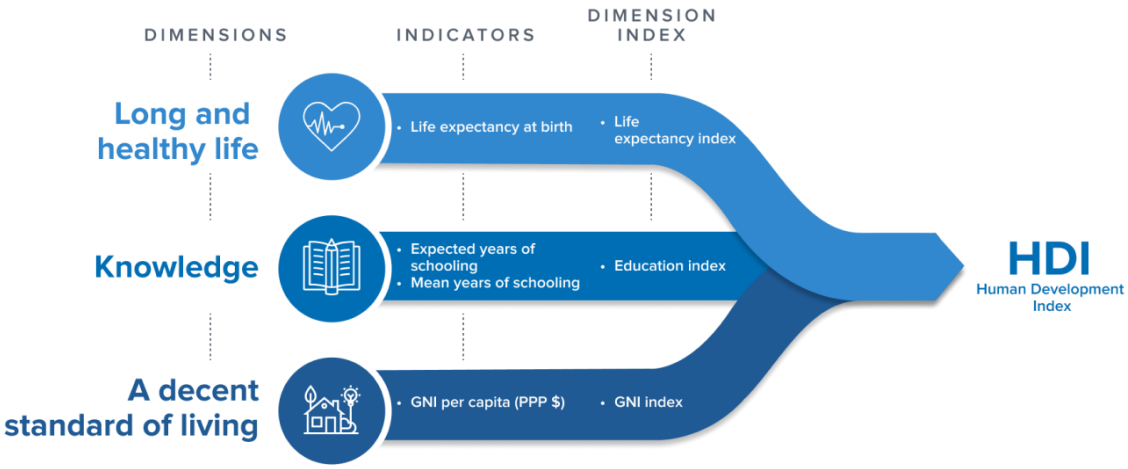
Projections for 2023 suggest decreased growth for most selected countries, with SSA's growth estimated to decelerate to 2.9% (World Bank, 2024). This downgrade is attributed to already high, but persistently declining inflation rates, coupled with the general inferior performance of the global economy and the overindebted populace on both the domestic and global levels. The reactionary strategies by central banks to curb inflationary pressures using contractionary monetary policies, e.g. repo rate, to counter political instabilities such as the Ukraine-Russia war that continue to hinder economic activity (IMF, 2023). In 2022, average annual inflation

in SSA was estimated at 14.5% year-on-year, the highest among all regions except the Middle East and North Africa.

2.3 HUMAN DEVELOPMENT INDEX IN SELECTED SSA COUNTRIES

The Human Development Index (HDI) serves as a statistical measure gauging sustained advancement across three fundamental dimensions of societal well-being: longevity and contentment in life, access to resources, and attainment of a satisfactory living standard (UNDP, 2020).

Diagram 2.1. Human Development Index (HDI)



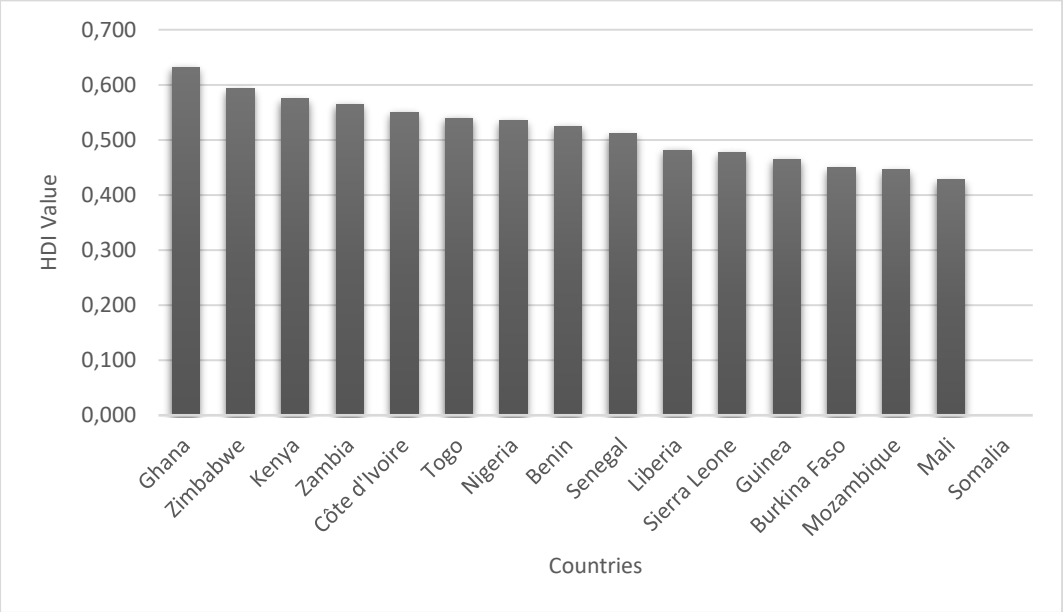
Source: UNDP, 2020

According to Diagram 2.1, the HDI provides a measure for analysing the standard of living in each country based on the life expectancy of the general populace and can index the general health levels of society. The diagram also shows that HDI incorporates knowledge measures as they contribute to income per capita level, productivity, and the general well-being of the populace. Its inception aimed to underscore the importance of prioritizing human capabilities over mere economic growth when evaluating a nation's development (UNDP, 2020).

Over recent years, countries in the SSA region have been improving in their Human Development Index ranking. In 1990, Niger exhibited the lowest HDI value in the SSA region at 0.216. The UNDP (2020) further explains that the low value of the HDI of Niger constituted a profile of 41.9 years, 2.1 years and 1132 of life expectancy, schooling years and income per capita respectively. Conversely, South Africa recorded an HDI value of 0.632 in the same year, with a life expectancy of 63.4 years and a GNI per capita of 10901. In the latest HDI report for 2021/22, Ghana is classified as having achieved remarkably high human development.

Additionally, other countries in the region, such as Seychelles with an HDI value of 0.785, South Africa with 0.713, Gabon with 0.706, and Botswana with 0.693, are also considered to have high human development. However, most SSA countries remain within the low human development spectrum, with an HDI below 0.55. An HDI of 0.896 or higher indicates extremely high human development (UNDP, 2020).

Figure 2.2 Trends of human development index in the selected SSA region



Source: Researcher's compilation using data from UNDP, 2020

Figure 2.2 illustrates the HDI for SSA countries that have been selected based on the availability and accessibility of the data in 2021, serving as a measure of their average levels of standards of living (UNDP, 2020). Following the human development categorisation, Ghana stands out with the highest index score of 0.632, indicative of medium human development. Between 1990 and 2021, Ghana's HDI increased from 0.460 to 0.632, marking a notable 37.4 percent improvement. Over recent decades, Ghana has made significant strides in development, witnessing rising incomes, reduced poverty rates, and advancements in health, education, and gender equality (Elmaleh et al., 2021). However, this progress has been marred by growing inequality and a slower pace of poverty reduction in recent times (Atta-Ankomah et al., 2023).

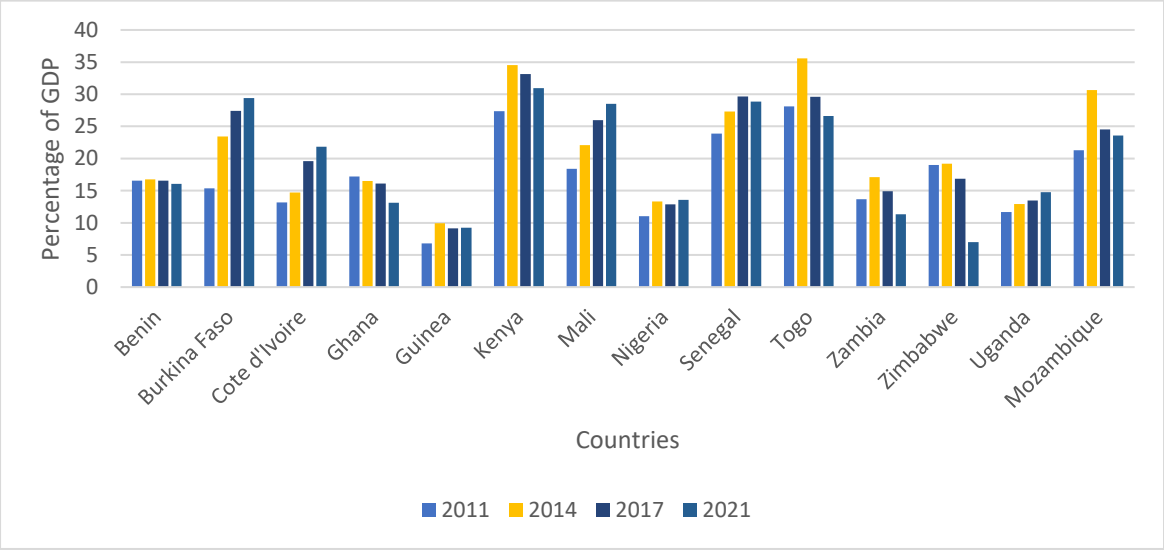
Conversely, all other countries depicted in Figure 2.2 exhibit low levels for HDI. Countries having HDI scores equal to or below 0.518 are categorised as having low human development. The overall human development index for the SSA region was recorded at 0.547 in 2021. The

COVID-19 pandemic and conflicts such as the war in Ukraine have exacerbated human suffering globally. For the first time, the global HDI value experienced consecutive declines, reflecting the adverse impact of these crises. In 2021, many countries witnessed ongoing decreases in their HDI, regressing to levels seen in 2016 and reversing substantial progress towards the Sustainable Development Goals (SDGS). Notably, Mali ranks lowest on the HDI scale with a score of 0.428, indicating significant development challenges. The country's economy heavily relies on low-income sectors, rendering it susceptible to fluctuations in commodity prices. Moreover, rapid population growth, coupled with the influence of climate change on agriculture and food security, exacerbates poverty and contributes to Mali's low HDI (Tucker, 2023).

2.4 DOMESTIC CREDIT TO THE PRIVATE SECTOR IN SELECTED SSA COUNTRIES

Domestic credit to the private sector as a proportion of GDP, which can also be called the ratio of private sector claims to GDP. Khan et al (2016) state that the ratio of private sector claims to GDP can be used as a proxy for the level of banking presence. It is considered the most appropriate gauge of financial development because it specifically measures credit that has been granted to the private sector, excluding credit allocated to governments and public enterprises. This focus on the private sector reflects a more effective allocation of resources within the economy, as private entities are often better equipped to utilise funds efficiently and generate productive outcomes compared to the public sector (Ahiakpor et al., 2023).

Figure 2.3 Trends of domestic credit to the private sector in the SSA region



Source: Researchers' compilation using data from World Bank, 2021

Figure 2.3 depicts the development of selected SSA countries in the financial sector, measured by using a proxy of credit to the private sector for the years 2011 to 2021. Based on this representation, Kenya emerges with the most advanced financial sector, followed by Togo, Senegal, and Burkina Faso. Conversely, Guinea exhibits the least developed financial sector.

Kenya's financial system stands out as notably developed for a country of its income level, surpassing many other SSA nations. It ranks as the third largest in the region and significantly contributes to economic growth and employment generation (Cyton, 2023). The structure of the banking system in Kenya seems to be fragmented when compared to other SSA countries that have few dominant banking institutions. The country had a financial sector which was well-developed and also a well-banked population as compared to countries of equally same economic profile (Mlachila et al., 2013). Kenya's financial landscape is primarily bank-led, a factor contributing to the double-digit growth of assets in 2021 (Central Bank of Kenya, 2022). Kenya’s financial market can be described in Table 2.1.

Table 1.1 Structure of the Kenyan financial system

Type of institution	Number of institutions
Commercial banks	38
Mortgage Finance	14
Foreign Banks	10
Investment banks	8
Bureau de change	72
Remittance	19

Source: ***Researcher’s compilation using data from Cytonn, 2023***

In Togo, the financial sector is shaped by 12 deposit money institutions, accounting for over 80% of the sector. Efforts to enhance economic activity include a notable 14.3% increase in loans to the private sector, reaching 32.8% of debt as a proportion of GDP, which has been allocated to the private sector by the banks (African Development Bank, 2023).

2.5 OVERVIEW OF FINANCIAL INCLUSION IN THE SSA REGION

Financial inclusion can be explained as the increase in the proportion of the population that is participating in the financial sector, and the definition of participation can be measured through breadth, the calibre of loans and the accessibility of loans and bank services. The proxies of

inclusion include the supply of financial services measures, such as penetration, whilst demand-side measures look at accessibility and utilisation (Ratnawati,2020). Ratnawati (2020) explains that the goal of optimal inclusion in the sector can be achieved through a variety of the scope of services offered by the banking sector, such as Fintech. Furthermore, a country has to improve quality and accessibility to the unserved or underserved populace in the banking sector.

2.5.1 FINANCIAL INCLUSION MEASUREMENT - FINANCIAL ACCESS

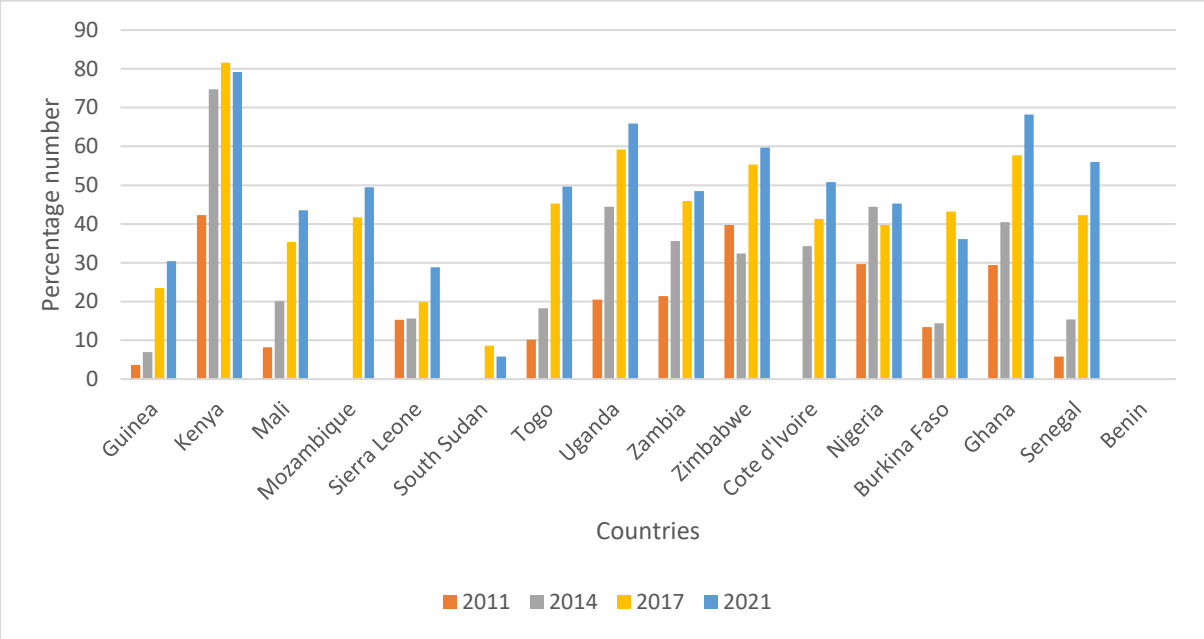
2.5.1.1. ACCOUNT OWNERSHIP

Opening and having a bank, fintech and financial market account serves as a pivotal initial stride toward achieving financial inclusion (Demirguc-Kunt et al., 2018). Enhanced financial inclusion, facilitated by improved access and utilisation of banking and financial market services, contributes to a substantial positive impact on human development in SSA (Djekonbe et al., 2022). World Bank (2025) explains that for an individual to be financially included, one has to be registered with an institution that is regulated, for example, a bank or a credit union. In the past decade, SSA has witnessed remarkable progress in account ownership and usage, propelled by mobile money services. Between 2011 and 2021, the region experienced the swiftest growth in account ownership, with ownership rates more than doubling from 23% in 2011 to 55% in 2021 (Chalwe-Mulenga & Coetzee, 2022). In 2014, account ownership in the region stood at 34.3%, increasing to 42.6% in 2017 and further rising to 55.07% in 2021. Notably, countries like South Africa and Uganda contributed significantly to this trend, with the number of bank accounts increasing by 25% from 2011 to 2021. Uganda, in particular, observed a more than threefold increase in its ownership rate, from 20% to 66% (Chalwe-Mulenga & Coetzee, 2022).

Figure 2.4 illustrates account ownership trends in the selected SSA region during the 2011 to 2021 period. Kenya emerges as the frontrunner in account ownership, with its notable financial inclusion rate ascribed to mobile money's success in providing easily accessible financial services to the unbanked population (Johnson, 2012). Additionally, Ghana, Uganda, and Zimbabwe also improved their levels of inclusion by having an account in 2021. In the selected countries, financial inclusion was initially quite low in 2011. However, as the idea of financial inclusion gained popularity as a policy tool, significant improvements in account ownership were observed in 2014, 2017, and 2021. Particularly noteworthy were the substantial increases

in account ownership witnessed in countries like Senegal, Togo, and Mali between 2017 and 2021, indicating the effectiveness of financial inclusion strategies in driving growth.

Figure 2.4 Trends of account ownership in the SSA region



Source: Researcher's compilation using data from World Bank, 2021

Many governments in the region began adopting inclusion as a strategy to alleviate poverty, simultaneously stimulating the growth of the economy, leading to remarkable growth in account ownership levels. Asif et al (2023) state that increased participation in the banking sector by the general populace can be attributed to the improvement in the accessibility dimension using technology. This phenomenon is especially prominent in SSA countries, where the region leads globally with 33% of adults participating and owning a mobile money account. Demirguc-Kunt et al (2022) state that the prominence is highly identified when compared to the global proportion of only 10% of the banking population that owns a mobile money account. Such accounts are prevalent in several countries, such as Zimbabwe, Cameroon, Guinea, and Benin. In some of these economies, the proportion that is banking with mobile bank accounts surpasses those with traditional financial institution accounts (Raithatha, 2022). In Kenya, most account owners have both a traditional financial institution account and mobile money banking (Raithatha, 2022).

The trend of SSA's increase in inclusion primarily stems from the expanding ownership of mobile money accounts, as shown in Figure 2.5. Mobile money has a massive impact on

general account ownership in SSA. The graph shows that account ownership is 55%, while mobile money ownership makes up most of this total. Mobile money makes up 33% of account ownership. Furthermore, for people who have saved with mobile money, shown to be 15%.

Figure 2.5 Summary of Account Ownership for the SSA Region (2021)

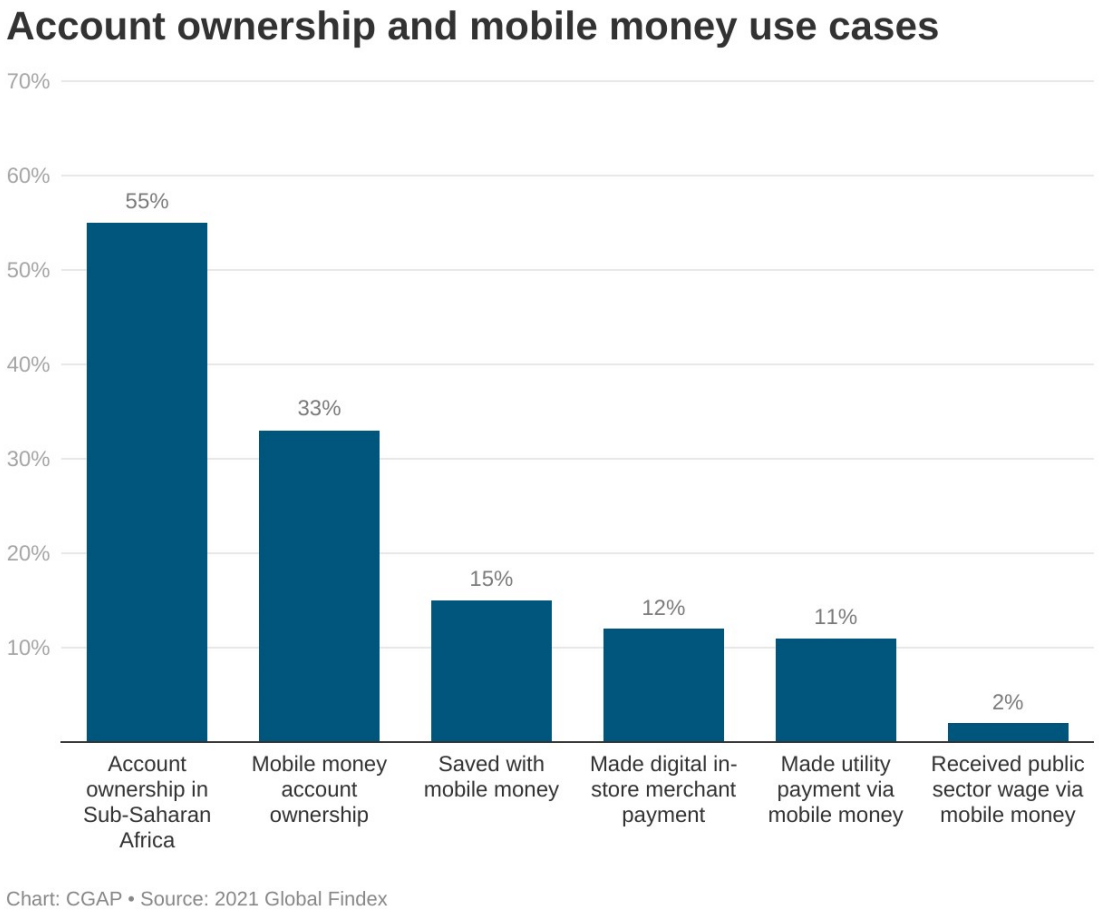
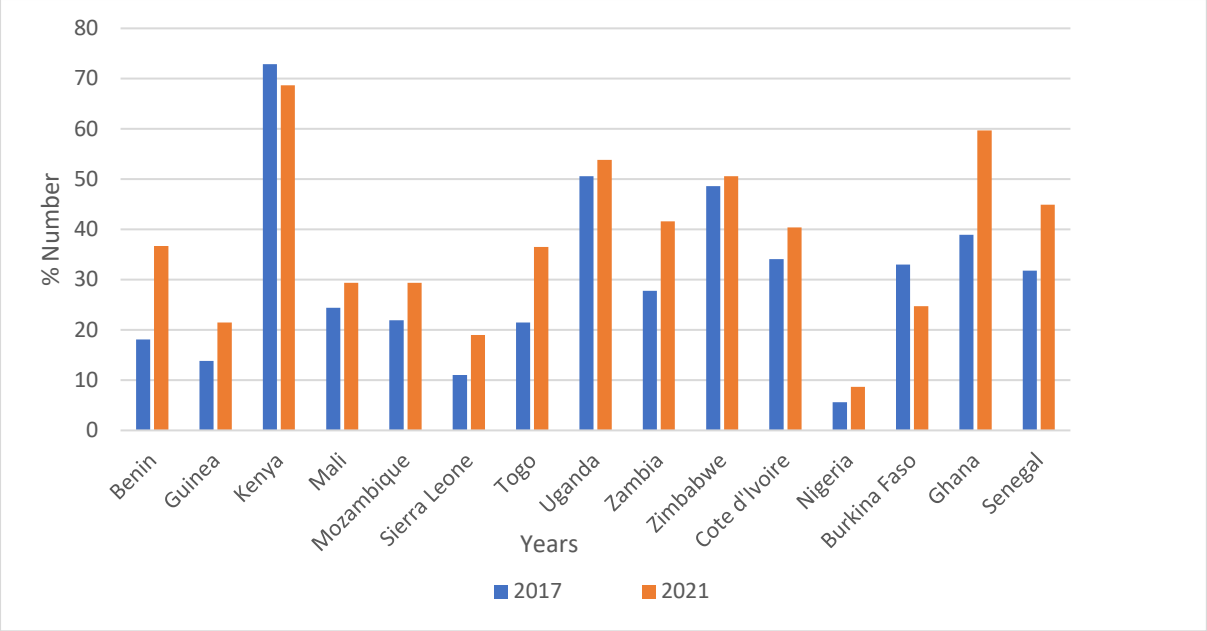


Figure 2.6 illustrates mobile banking usage in selected countries from 2017 to 2021. The ownership of mobile money accounts experienced substantial double-digit growth between 2017 and 2021. The data reveals that Kenya leads on mobile money, followed by Uganda and Zimbabwe. Kenya has four main mobile money providers: Safaricom M-Pesa, Airtel Money, Orange Money, and Essar Cash. However, Safaricom's M-Pesa dominates the market. Established in 2007, M-Pesa offers financial services to millions of Kenyans who have mobile phones but are financially excluded from banks (Hare, 2022). Between 2008 and 2010, access to mobile money contributed to a reduction in poverty in Kenya by two percent, helping approximately 194 000 families to move into the next quantile from the poverty line, with the most significant impact seen in female-headed households (Hare, 2022).

Figure 2.6 Trends of mobile money account ownership in the SSA region



Source: Researcher's compilation using data from World Bank, 2021

Ghana also saw a substantial increase in mobile money accounts, growing from 38.9 million in 2017 to 59.7 million in 2021 (Hare, 2022). In Uganda, digital financial services such as M-Cash, MTN Uganda, Airtel Uganda, UTL, Africell, EzeeMoney, and Micropay drive financial inclusion. In 2009, the Bank of Uganda approved MTN Uganda's partnership with Stanbic Bank(U) Limited to offer mobile money services (AFFI, 2019). Ghana's introduction of electronic money issuer (EMI) guidelines by the Bank of Ghana significantly contributed to the growth of mobile money. Similarly, the WAEMU countries, including Senegal, Togo, and Benin, have seen increased financial account ownership driven by the adoption and mobile money use between 2017 and 2021.

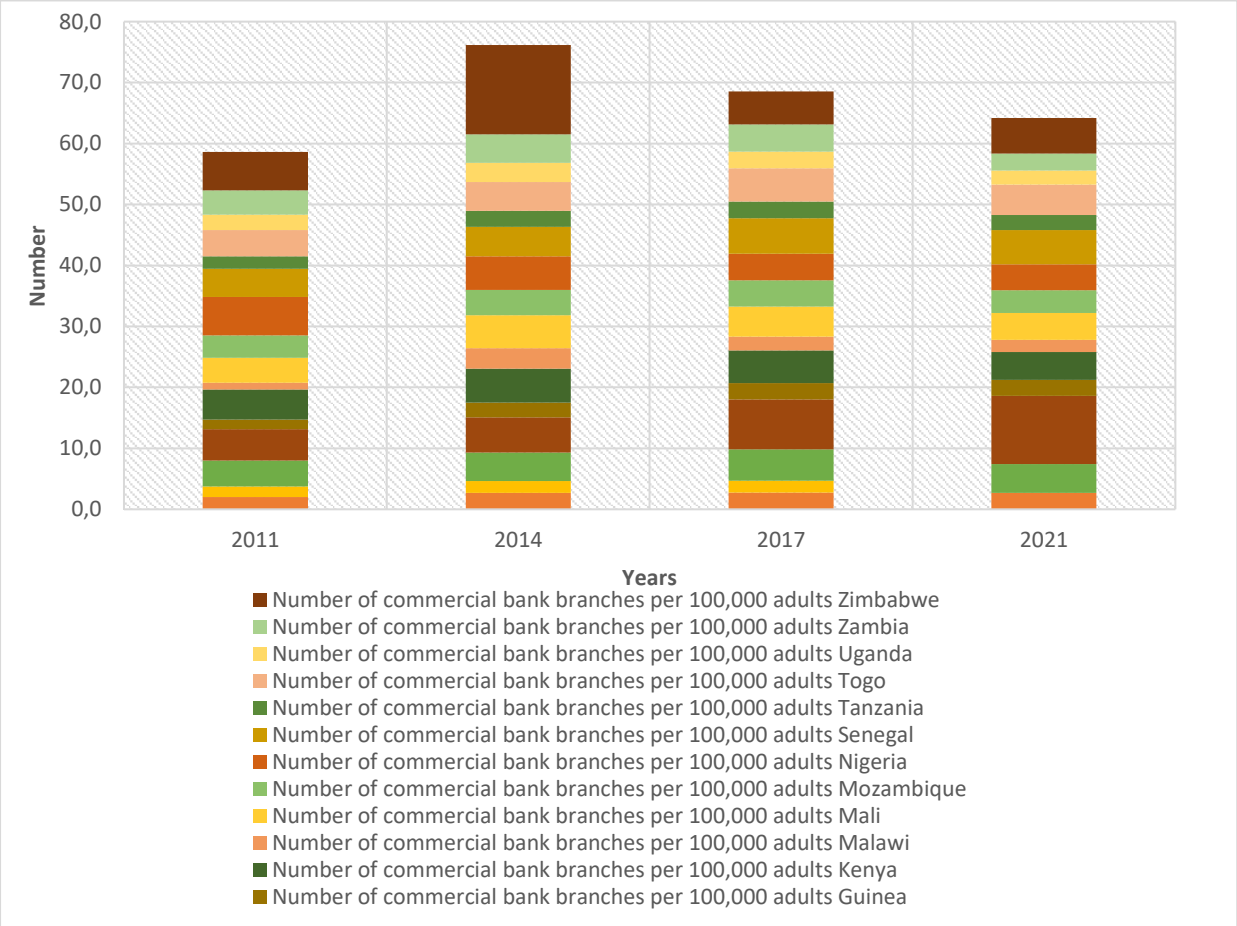
2.5.1.2. NUMBER OF CB BRANCHES IN SSA

Figure 2.7 displays the commercial bank branches in selected SSA countries in terms of their number per 100 00 adults. In 2021, Ghana had the highest number, with 11.17, followed by Zimbabwe with 5.82. In 2017, banks were a major part of Ghana's financial sector, holding a significant amount of the country's assets. The growth of Ghana's CB branches is linked to the Pillar II policy strategy, which is a strategy that is designed to increase the availability and

usage of innovative financial products and services for the financially excluded population by enhancing the proximity of financial access points (Bank of Ghana,2020).

Conversely, Malawi had the lowest proportion, with only 2.00, which shows that Malawi's financial system is small, underdeveloped, and dominated by a few institutions offering limited services. The country's economy is primarily rural, with only about 17.98% of the population residing in urban areas (Country Brief Malawi, 2023). Furthermore, only 25 percent of adults in Malawi use banking services, with the sector controlled by two banks (International Trade Administration, 2024).

Figure 2.7 Trends in the number of CB branches (per 100,000 adults) in SSA



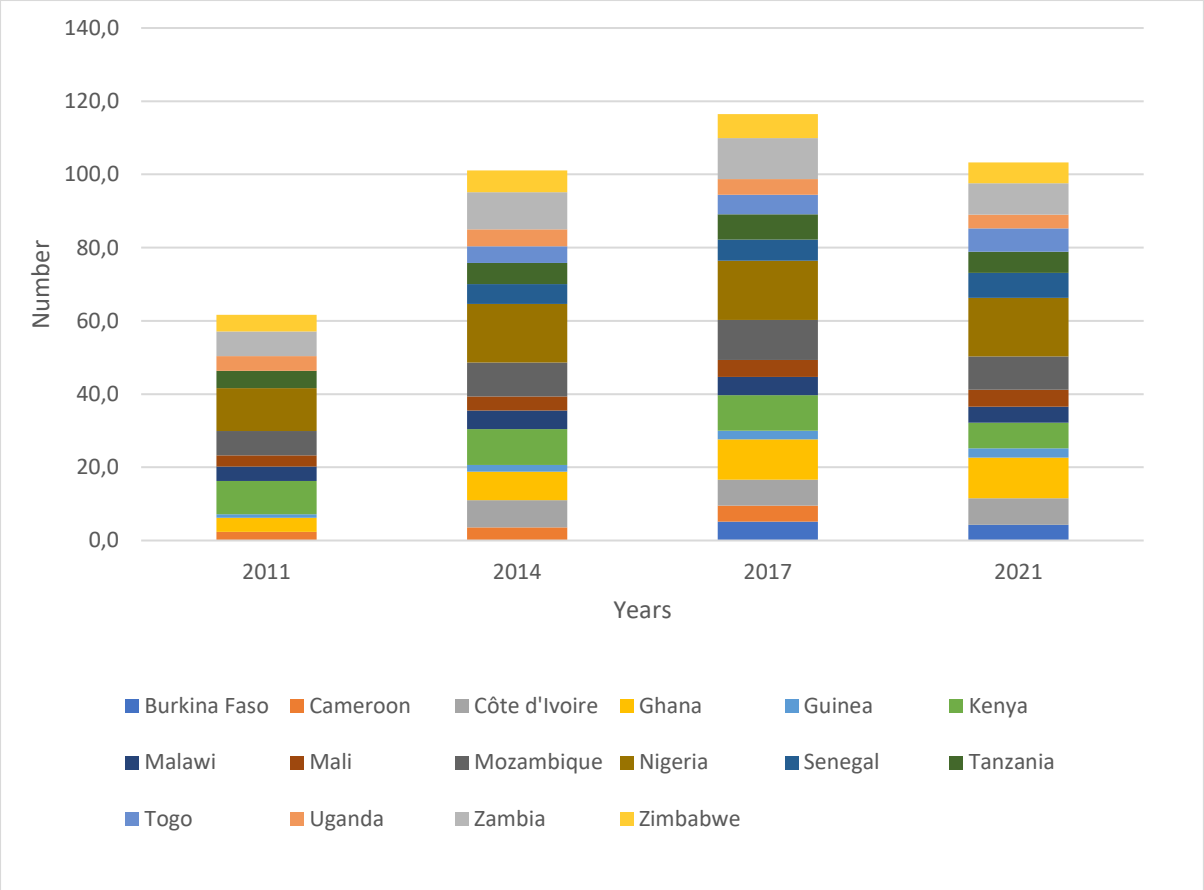
Source: Researcher's compilation using data from Financial Access Survey (FAS), 2024

It is evident that CB branches per 100,000 adults in the selected SSA nations remain low, and the growth observed has been minimal. For example, Guinea had 1.57 branches per 100,000 adults, which increased to 2.63 by 2021 (FAS, 2024). A similar trend is seen in Burkina Faso,

where the number of branches rose from 2.03 in 2011 to 2.69 in 2021 (FAS, 2024). These findings align with Triki and Faye (2013), who highlighted that SSA economies have a low density of CB.

2.5.1.3. NUMBER OF ATMS PER 100,000 IN SSA

Figure 2.8 Trends in the number of ATMs (per 100,000 adults) in the SSA region



Source: Researcher's compilation using data from Financial Access Survey (FAS), 2024

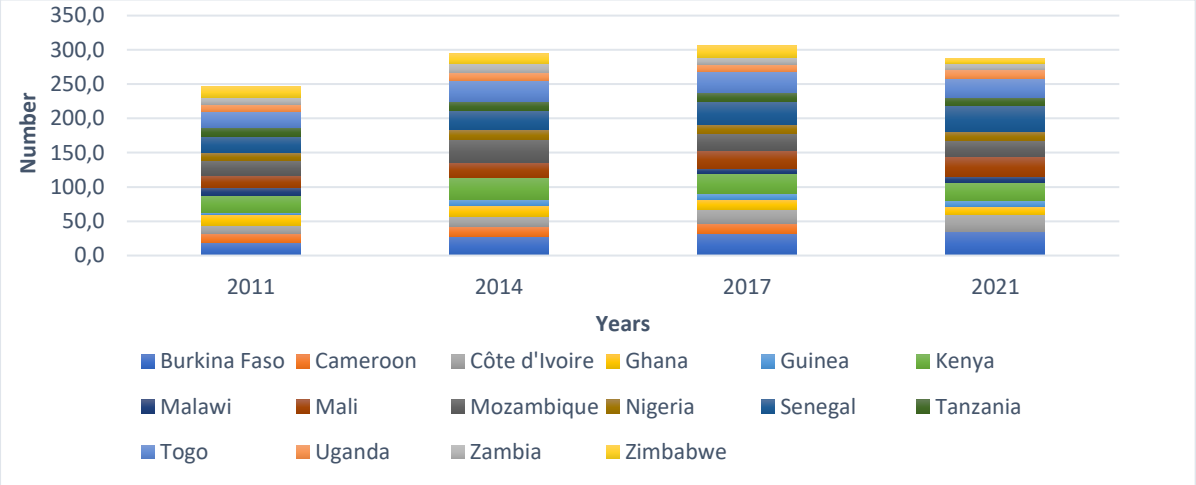
Figure 2.8 displays the number of automated teller machines (ATMs) per 100,000 adults in selected SSA countries. In 2021, Nigeria led with 15.99, while Guinea had the lowest with 2.53. The use and adoption of ATMs in Nigeria have recently seen significant growth, with banks heavily investing in information and communication technology (ICT) to keep pace with global trends. Despite this investment, Adewoye (2013) found no straightforward evidence that banks are achieving the expected returns from their ATM investments. However, Ehiedu (2021) concluded that increased ATM penetration improves financial inclusiveness in Nigeria.

2.5.2 FINANCIAL INCLUSION MEASUREMENT – FINANCIAL USAGE

While financial inclusion begins with account ownership, its true benefits are realised through active account usage, such as saving money, managing risk, and making or receiving payments. Over the past decade, SSA has seen considerable progress in financial account ownership and usage, driven by mobile money. Beyond account ownership, financial inclusion also focuses on account utilisation. Indicators such as current deposits and existing loans as a percentage of GDP serve as proxies for this usage, reflecting the extent and frequency of use by individuals. Several studies have utilised these proxies to assess financial inclusion (William et al., 2017; Cámara & Tuesta, 2014; Amidžic et al., 2014; Sharma, 2016). Iqbal & Sami (2017) found that the institutional branches and the ratio of credit to deposit have a positive and strong impact on India's GDP.

2.5.2.1. OUTSTANDING LOANS FROM AND DEPOSITS WITH CB (% OF GDP)

Figure 2.9 Trends of outstanding loans from CB (as a percentage of GDP)



Source: Researcher's compilation using data from Financial Access Survey (FAS), 2024

Figures 2.9 and 2.10 illustrate the trends in outstanding loans and deposits with CB as a percentage of GDP from 2011 to 2021 for selected SSA countries, reflecting the usage of financial services. Countries that have seen an increase in inclusion according to Figure 2.9 include Burkina Faso, Côte d'Ivoire in Mali, Senegal, and Cameroon during the years 2011, 204, and 2017 to 2021. Senegal experienced the most significant rise, with outstanding loans growing from 24.43% of GDP in 2011 to 37.98% in 2021, followed by Burkina Faso, Côte d'Ivoire, and Mali.

Senegal is the SSA's second biggest with respect to the number of financial organisations and market share of credit entities (Afreximbank, 2022). Financial usage is crucial for achieving

financial inclusion outcomes and supporting policy objectives like economic growth, employment, and human capital development. It has recorded average per-capita real GDP growth above 3% over the past decade, with poverty declining from 42.8% to 37.8%. Additionally, access to electricity has increased from 56% to over 70%, life expectancy has risen from 65 to 68 years, and the HDI has improved (United Nations Development Programme, 2023).

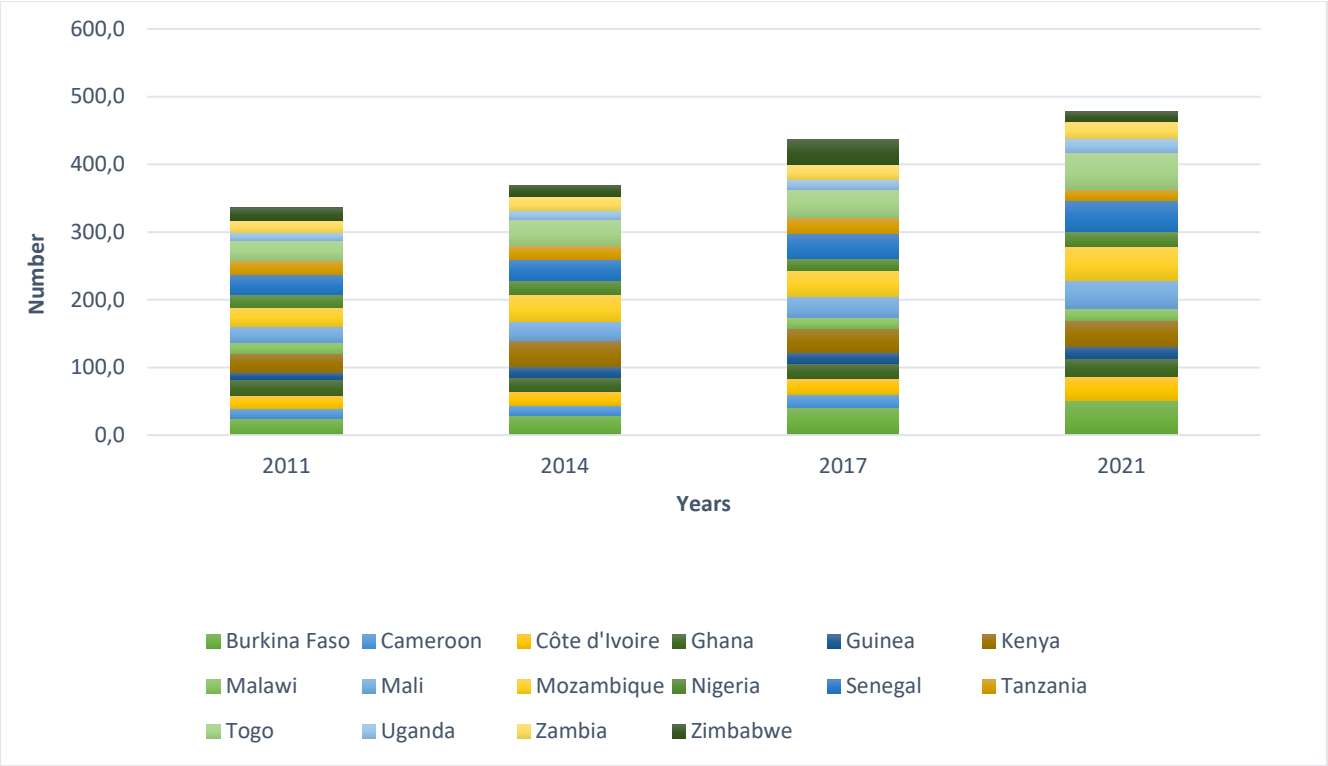
Table 2.2 Senegal's Financial Sector Structure

Type of institution	*Number of registered institutions*
Credit institutions	28
Commercial banks	26
Insurance companies	30
Microfinance	234

Source: Imam, 2013

Alternatively, Zimbabwe ranks lowest, followed by Malawi, Guinea, and Zambia. Despite prominent levels of financial inclusion, with 88% formally served in 2022, Zimbabwe has seen a decrease in credit usage from 16.8% of GDP in 2017 to 8.17% in 2021 (FinMark Trust, 2022). Some individuals are financially excluded because of a lack of need, cultural or religious reasons, or psychological barriers such as fear of debt and repayment concerns.

Figure 2.10 Trends of outstanding deposits in CB (as a percentage of GDP)

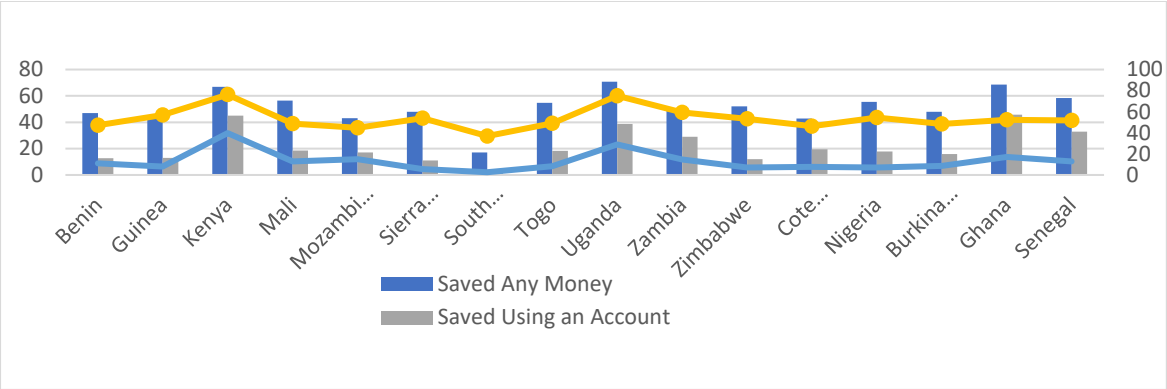


Source: Researcher's compilation using data from Financial Access Survey (FAS), 2024

Figure 2.10, which depicts outstanding deposits with CB as a percentage of GDP, indicates growth in deposits across most countries. Togo, Burkina Faso, Mozambique, Senegal, and Mali exhibited significant increases, with some nearing double-digit growth by 2021. For instance, Togo's deposits increased from 40.8% of GDP in 2017 to 55.20% in 2021, while Burkina Faso saw its deposits rise from 40.25% to 51.82% in the same period. In Burkina Faso, access to savings products is well-developed, with 51% of adults having access to some form of savings product, and 18% saving with a formal financial institution (FinMark Trust, 2022). Zimbabwe's economy, characterised by low savings due to low interest rates on deposits, low-income levels, and the short-term nature of deposits, has also seen similar trends (Reserve Bank of Zimbabwe, 2011).

2.5.2.2. SAVING AND BORROWING COMPARISON IN SSA

Figure 2.11 Comparison of savings and borrowing for the SSA countries (2021)



Source: Researcher's compilation using data from World Bank, 2021

Figure 2.11 presents a combined graph showing financial usage through formal financial providers compared to informal saving and borrowing methods. In 2021, Uganda had the highest number of customers who saved money but did not use formal financial institutions. According to the Financial Capability Survey 2020, many Ugandans save informally, with 44% relying on village savings and loan associations and 42% using savings boxes at home. Kenya has the highest formal savings rate, with 45% of people saving through formal mechanisms. Overall, both national and private savings rates in SSA countries are low, with variations across countries (Loko et al., 2022). The graph indicates that more people save money overall than those who save through formal financial institutions.

A similar pattern is observed with credit usage, where fewer people borrow from formal institutions. In Uganda, 77% of customers owe money, but 29% borrow from mainstream formal financial institutions (Demirgüç-Kunt et al., 2022). This highlights the importance of informal financial services. The trend shows more people borrowing money in general than those using formal channels, including credit cards. The informal financial sector in the region remains larger than the formal sector, playing a significant role in providing finance for traders and farmers, thereby supporting socio-economic development (Tsai, 2004).

2.6 CONCLUSION

This chapter has examined the trends in financial inclusion for selected SSA countries, beginning with a discussion on economic growth patterns. The GDP growth in these countries was impacted by the COVID-19 pandemic adversely and further declined as a consequence of the effects of Ukraine and Russia wars. The chapter then explored trends in the HDI and

domestic credit to the private sector. It is observed that financial access has increased over time in SSA economies this is explained by data from 2021 which show that the number of proxies of access has risen in these economies. These trends highlight the growing influence of fintech and mobile banking retail agent outlets. The following chapter will present a literature review on financial inclusion for the selected SSA countries.

CHAPTER THREE

LITERATURE REVIEW

3.1 THEORETICAL FRAMEWORK AND EMPIRICAL LITERATURE REVIEW

The indicated chapter undertakes an analysis of empirical literature that analyses financial inclusion broadly to the other facets that measure the growth of the economy. The chapter is organised into initially looking at the theoretical literature and the frameworks that link financial inclusion and growth. Furthermore, the country-specific link between the two variables is investigated. Thereafter, an overall evaluation of literature and empirical findings will be undertaken to inform the study's a priori expectations and methods in chapter four.

3.2. THEORETICAL LITERATURE

3.2.1 FINANCIAL INCLUSION AND ECONOMIC GROWTH

The works that link the financial sector and the growth patterns of the economy were pioneered by studies such as Schumpeter, (1912); Shaw, (1973); McKinnon, (1973) and Levine, (1997) as cited in Onodugo et al. (2013). The framework by Schumpeter, (1912); Shaw, (1973); McKinnon, (1973) and Levine, (1997) as cited in Onodugo et al. (2013) explained that the transformation mechanism between the sector development, inclusion and growth is achieved through well-functioning intermediaries in the financial sector. Levine (2021) explains that intermediaries undertake the role of information gathering which assists in solving the problem of information asymmetry in the economy. Also, Levine (2021) notes that intermediaries can use gathering of information to gather savings from different individuals and pool the funds for investment and borrowing in turn creating a database of investment data. Konstantakopoulou (2023) states that the roles of financial intermediaries and development are through capital accumulation and channelling investments to areas of technical innovation. The four primary areas where banking and markets influence economic growth include the reduction of the cost of payment systems. Fungacova and Weill (2015) and Galindo et al. (2001) further claim that development increases the trustworthiness of the system. Financial intermediaries are important in raising transaction volumes and moving resources from the surplus to deficit units, hence improving resource distribution (Babajide et al., 2015).

Financial systems manage risk through sharing of risk and allowing savers to hold many assets. In this way, the uncertainty that savers and borrowers are faced with is reduced. The literature provides empirical evidence that low financial services access levels contribute to income inequality and slower growth. Svirydzenka (2016) and Babajide et al., (2015) explain that the effectiveness of a financial system can be analysed by its efficiency in pooling funds and

playing the intermediary role of using the pooled savings towards borrowers. It becomes a challenge when the units in need are unable to obtain access to official financing sources (Gupte et al., 2012). As a way to address this, financial inclusion, therefore, attempts to achieve inclusive growth for all by making finance available even to the deprived section of the population (Iqbal & Sami, 2017).

Individuals with access to bank accounts for building credit and saving can borrow during unfavourable financial shocks (Sharma, 2016). Financial inclusion has been defined in various forms, from a strict definition to a more relaxed definition in which ownership of a bank account is seen as the first step to greater inclusion. The World Bank (2025) explains that this allows people to make transactions through a formal system. Following that, credit and savings might be utilized to build micro-enterprises and educate children, reducing income inequality and poverty for the people and thereby enhancing the nation's overall economic growth. In an undeveloped financial system, where funds are scarce, people are unable to save, limiting their potential to invest. As a result, without an inclusive financial system, impoverished persons and small businesses should depend solely on their resource constraints and incomes to engage in education and entrepreneurship to capitalize on growth prospects (World Bank, 2008). Financial development is not the most essential component in assuring economic participation and eliminating income inequality. On the other hand, increasing access to finance is significantly more important in uplifting the poor through raising savings and expanding a pool of resources that is efficiently channelled across economic players (Bae et al., 2012).

Levine (2021) explains that an increase in inclusion, coupled with an increase in funds included in the formal system, can lead to economic growth if the funds are efficiently allocated. Some scholars such as Omar and Inaba (2020); Ratnawati (2020); Balele (2019) and Swamy (2010) have concluded that improving access to finance may increase economic growth while decreasing wealth inequality and poverty (Kakwani et al., 2000). Individuals and households gain from financial inclusion by having a secure place to save, an easier and less expensive way of accessing remittances as well as other payments, loans, or insurance premiums to support health or education costs, and pensions for old age (Pearce, 2011). Therefore, the channel of transformation is through the ability of the sector to play significant intermediary roles and increase access to cheap credit facilities and other financial market products for all high, middle, and low-income classes of the country or region. Kakwani et al. (2000) explain how an efficient financial market and banking system must be able to contribute

to making the lives of the poor and vulnerable better, to realise gains on the growth trajectory of the economy.

3.2.2 THE SOLOW GROWTH MODEL

Robert Solow, a neo-classical in 1956 introduced a theory for growth. The model is built on the production function and shows how growth in capital, labour force and technological advances interact in an economy (Ramanayake, 2019; Schiliro, 2017; Ferrara & Guerrini, 2009; Heshmat, 2001).

$Y = f(k, l)$…… (3.1)

The Solow model relates growth rates to capital stock and emphasises how greater investment spending leads to increased productive capacity (a supply-side effect) (Ferrara & Guerrini, 2009).

Odeniran and Udeaja (2010) state that in the short term, for the economy to realise the gains of financial development, capital should be raised through intermediaries. In the longer run, that suggests that growth equals the labour force plus exogenously determined technological progress. Thus, implying that an economy converges to balanced growth because of labour-augmenting technological progress. Odeniran and Udeaja (2010) identified that two main variables lead to an efficient finance-growth nexus - increases in both the rate of savings and the growth of the population, whilst maintaining income per capita. The variation of a steady state differs from one country to another and is dependent on the key elements that determine that country's steady state (Heshmat, 2001). Heshmat (2001) explains that a higher saving rate can lead to a richer country when coupled with a lower rate of return on physical and human capital (Heshmat, 2001).

The Solow growth models claim that financial development controls investment development primarily through directing the mobilisation of savings into investments. The absence of the financial sector impedes productivity. Criticism against the Solow growth model is that it does not capture the effects of technological innovations and developments over time, coupled with a shortfall in explaining how this affects the economy in the longer run (Odeniran & Udeaja, 2010). Secondly, it does not explicitly address determinants of financial inclusion; however, explains how the savings and investment financial sector affects economic growth.

3.2.3. PUBLIC GOOD THEORY

Also known as the "Pure Theory of Public Expenditure," it was established by Paul Samuelson in 1954. Samuelson believed that public goods were a necessity for a society to function well and that they should be non-rivalrous and non-excludable. Ozili (2020) states that to increase participation in the financial system, both the depth and breadth of financial participation, these services need to be classified as public goods, thereby moving from the privatisation of the financial system. This view is centred on the breadth of the financial systems, which is increasing the number of persons participating in the financial system by having bank accounts (Ozili, 2020). The same author explains that if financial services are classified as public goods that entails then all the attributes of public goods, including the free rider problem, can increase participation since it will be free for all players in the economy (Ozili, 2020).

The non-rivalry in consumption attribute entails that there is an infinity of loans available, and the whole market structure of the banking system moves from being an oligopoly to a perfect market, which is not realistic in practice. Ozili (2020) also argues against this theory that it entails that financial intermediaries will have to provide their services for free and that they have little consideration towards information gathering but focus on financial inclusion by opening accounts and giving everyone an account debit card. Ozili (2020) further explains that once the accounts fall under the definition of a public good, that means that all costs are paid for by the business, and the government will have to contribute through subsidies for costs arising from offering citizens free formal financial services.

Financial services can be manifested as a public good in several ways. At the level of consumers, the basic conditions that are needed to ensure that banking clients can utilise financial services to the optimal level are to educate them, which can also reduce over-indebtedness. The theory states that all societal members must benefit from the financial inclusion service (Kamal et al., 2021). Economists have an issue with free riding concerning public goods, stating that it prevents the production and consumption of goods and services, thus impacting growth negatively, through conventional free market methods.

3.2.4 DISSATISFACTION THEORY

According to Heckaman (2022), the theory was introduced by Lannaccone and Lutz in 1970 and termed the dissatisfactory theory. Ozili (2020) states that the premise of the dissatisfactory theory is anchored on the perception of the clients who are financially excluded and argues that addressing these issues can manage to attract these people. Ozili (2020) states that a review of rules, regulations and even the conduct of business in terms of attitude towards clients can

improve the country's position in terms of financial inclusion. Ozili (2020) argues that designing target products which are aimed at addressing specific concerns of that group can improve financial inclusion for example women's accounts, which help with the retirement of old people and investment accounts for young people.

The dissatisfaction theory explains that once addressing concerns i.e. trust issues, coupled with targeted products in the financial sector it will be less costly and time-consuming to attract those that are financially excluded. The discontentment with the financial inclusion concept has a lot of merit. Beginning with the fact that previous theories do not address the issue of "voluntary financial exclusion," this theory makes a purposeful effort to do so. Convincing those who left the formal financial system out of discontent to rejoin reduces the degree of voluntary financial exclusion. Second, the idea makes it easy to pinpoint those in the population who are economically disadvantaged (Ozili, 2020).

3.2.5 ENDOGENOUS GROWTH THEORY

The model treats technological progress as one of the determinants of growth, in contrast to the neo-classicalists, who are endogenous. Aghion and Howitt (2008) refuted the neoclassical theory and argued that technological progress can depend on the economic decisions of economic agents (Onyimadu, 2015). More saving allows more capital or capital accumulation, adoption of better technology results in faster growth. The idea is that technological change is derived from the combination of an increase in the investment of human capital, coupled with the efficient role of intermediaries through an increase in savings, which will be used for capital for research and development initiatives (Onyimadu, 2015).

The theory further assumes that there are increasing returns to scale (Dornbusch et al., 2011). The model posits that innovation and investment in human capital through education or training programs lead to improvement in the quality of labour, which increases productivity. Through public and private investments, such as R&D costs and skill-building for human capital, the quantity of technology in an economy with "endogenous growth" can be continuously increased. An economy could perpetually "sustain" growth rates because technological innovation raises the quantity of physical capital already employed in production. Greater investment, which is made up of both human and physical capital, not only affects per capita income but also has the potential to sustain future economic growth at a rapidly increasing rate, in contrast to the neoclassical paradigm. Treating human and physical capital endogenously enables the model to determine not just short-run growth but also long-run growth:

$Yt = AKt$…… (3.2)

According to the AK model, the source of innovation is spillovers from investment in physical stock. According to the model, aggregate capital stock (k) is given by output (Y) (Pagano, 1993). In the AK model, technological advancement is represented by the gap between the original productivity of the component before learning by doing and the productivity following this, which shall be greater (Onyimadu, 2015). According to Pagano (1993), financial market development stimulates the economy through three channels, the first being the channelling of savings to enterprises, which leads to improvements in the allocation of capital and affects the savings rate (Elmawazin et al., 2015).

3.3 EMPIRICAL LITERATURE

This section reviews previous literature relating to the question at hand. The literature evaluation is based on disputes over the definition of financial inclusion, its dimensions, and its determinants. The available literature with variables of interest to this study is divided into developed, developing and literature on the SSA region.

3.3.1 EMPIRICAL LITERATURE ON DEVELOPED COUNTRIES

It is often assumed that nations with significant economic development and efficient financial systems are expected to have the highest financial inclusion levels. According to Fintech financial inclusion survey reports, when analysing countries of diverse levels of development and per capita income in 148 countries, Demirguc-Kunt et al. (2013) found that nations with high per capita GDP had higher account penetration than poor countries. Education level, age and gender are factors associated with being financially excluded. These have been cited as the factors that are driving and sustaining the deficient performance of other nations in financial inclusion (Finscope, 2020).

To appropriately manage the risks involved with utilising financial services, financial literacy is essential. Neuberger (2015) stated in a study titled Financial Inclusion, Regulation, and Education in Germany that poor understanding of financial systems and services has an unfavourable effect on inclusion. Bayar and Gavriletea (2018) concluded that financial inclusion may boost growth by developing a financial sector. The authors studied how an increase in the depth, breadth and uptake of financial services concerning the economy's growth

in emerging markets and identified a unilateral causality from financial market accessibility toward growth (Bayar & Gavriletea, 2018).

Financial inclusion analysis acknowledges that it is unobservable and therefore proxies are used as measures. Studies such as Tsouli (2022) have used the index which includes variables such as the number of CB per 100 000 adults: the number of ATMs per 100 000 adults, and outstanding deposits and loans with CB as a percentage of GDP. The results of the study show that four main variables contribute to inclusion, and these include the growth in the GNI per capita since it explains the increase in income for those who are directly affected by the policies of banking systems and are not financially excluded due to financial system policies. Tsouli (2022) also found that growth in population density also increases in demand for services and needs to be further investigated on how one can separate general population growth and density and actual improvement in the financial inclusion of a fixed population. The results from Tsouli (2022) extend to explain that interest rates and inflation also increase financial sector participation in Europe. Inflation contributes through the population being cushioned against value depreciation by banks of their savings.

3.3.2 EMPIRICAL LITERATURE ON DEVELOPING COUNTRIES

Swamy (2010) discovered that increasing access to the poor is the very first step toward reducing poverty and raising inclusive growth. The author used multiple regression analysis (OLS) to investigate the influence that financial inclusion imposes on inclusive growth in India from 1975 to 2007. Financial inclusion at a household and individual level is said to make sending and receiving money possible, safeguard savings, cushion against unexpected events and assist small and medium enterprises to invest in assets and grow their businesses.

Sharma (2016) used vector autoregression (VAR) as well as the Granger causality in India over the period 2004 to 2013 and found that economic growth will be achieved only when financial inclusion broadens access to formal banking services. A study by Neaime and Gaysset (2018) found that while inclusion contributes to the solutions of reducing the levels of inequality, it does not significantly impact poverty. Interestingly, these results can be compared to a study by Erlando et al. (2020), who agree with Neaime and Gaysset (2018) on the impact of inequality issues but argue that it does reduce poverty levels. The conflicting results can be attributed to the difference in methodologies used as estimation techniques since Neaime and Gaysset (2018) utilised the GMM whilst Erlando et al. (2020) used the VAR. Moreover, Neaime and Gaysset (2018) also affirm the findings of Tsouli (2022) by stating that densities of population,

inflation rates and internet users have a positive, significant effect on financial inclusion and lower poverty thereof. Ali et al. (2019) looked at it from the perspective of the Pakistan economy for the period of 1985-2017 and found that positive correlation between financial inclusion in both short and long-run periods of economic growth.

Work by Arandara and Gunasekera (2020) used the Survey method to measure financial inclusion in 2018 in Sri Lanka. The results from the survey method identify that demographic factors do indeed significantly contribute to issues of financial inclusion, such as gender and also historical factors that phantom factors of gender can explain this phenomenon. Arandara (2020) et al further allude that countries with male-dominated labour systems tend to also have a male-dominated financial system in both having an account and borrowing from these financial intermediaries. The study by Arandara and Gunasekera (2020) in Sri Lanka also confirms that the levels of understanding of the financial system have a notable role in the uptake of financial services, as suggested in a study in Germany by Neuberger (2015). Arandara and Gunasekera (2020) further note that an increase in employment improves inclusion. These results of employment and levels of understanding of financial systems and services have also been found in Asia and African countries by Cicchiello et al. (2021) to have a positive impact on financial services uptake.

Whilst in China, Liu et al. (2021) deviated from an analysis of education, demographics and employment and decided to look at it from a technological advancement on the uptake of financial services angle. The results of the study by China, Liu et al. (2021), contribute immensely to the theoretical literature and are in line with the AK model, which also explains technological advancement as a significant factor in economic growth, since the authors found a confirming result of a positive and significant effect. Eton et al. (2021) further explain the channels through which the finance inclusion and growth nexus can be achieved, which is through growth in the business sector and through promoting small to medium enterprises. The growth-financial inclusion nexus in Titissari et al. (2021) found that this link is not only a country-specific effect but rather a regional economic level in their analysis of the development in Indonesia.

Most recently, Aitaa and Amadi (2023) used the different proxies of financial inclusion, such as the procedure by Tsouli (2022), but the index included variables such as supply-side measures, such as availability, and demand-side measures of financial services, such as financial service penetration and usage. The results of the study confirm the results by Evans

and Alenoghena (2017), who found a positive impact on the GDP in Africa, which aligns with the results found in Indonesia by Dewi et al. (2024).

3.3.3 EMPIRICAL LITERATURE IN SUB-SAHARAN AFRICA

Ndlovu (2018) for SSA found that an increase in the financial sector's stability and a more significant impact on banking is attributed to the demand for services. Ndlovu (2018) explains that these gains need to interact with a proportionate improvement in policies and the quality of institutions because well-performing banking systems can be regressed by political instability and corruption. The emphasis on the quality of institutions, policy stability and political stability is also noted in Ajide (2017), who states that good institutions can improve inclusion and growth levels when coupled with good indicators of earnings, inflation, and the market structure of the banking system. Ajide et al (2020) also state that improvement in access to financial services through technological and infrastructural for i.e. physical access to ATMs and ICT advancement, improves the levels of financial inclusion. Ajide et al. (2020) explain that there is a need to implement innovative ideas for improving inclusion in SSA because of the low levels of inclusion, which, based on the study's measure, 29/33 sampled countries can be ranked as having a low level of financial inclusion. In the same breath of technological advancement, Domeher et al (2022)'s findings reveal that innovations in the sector enhance inclusion in selected SSA countries.

In a similar vein, Adedokun et al. (2023) discovered that financial inclusion significantly boosts growth and added that there is a one-way causal relationship between the two in the short term, with financial inclusion driving growth. Consequently, the evidence clarifies how financial inclusivity can only be facilitated by economic growth. Additionally, a bidirectional causal relationship between financial inclusion and economic growth was discovered by Adedokun et al. (2022). The results from Adedokun et al. (2022) are different from Adedokun et al (2023) in that they analyse countries according to various levels of development. The study also discovered that, in the upper-middle-income class of SSA, there is a unidirectional causal relationship between financial inclusion and economic growth. Therefore, reducing inequality and promoting economic growth can be achieved through the financial system's inclusivity and efficiency for privileged and weaker segments.

The findings of Adedokun et al. (2022) and Ugwuanyi et al. (2023) can be verified on the benefits of financial inclusion and economic expansion; however, Ugwuanyi et al. (2023) divide the financial sector into digital and traditional categories. The findings advance

understanding of both the direction and the distinct effects of the two on economic growth. Ugwuanyi et al. (2022) in SSA countries explained that traditional financial inclusion has a higher GDP per capita than digital financial inclusion. Ugwuanyi et al. (2022) elaborate on how traditional banking systems should not be disregarded, even though digital finance is a novel idea in the context of developing nations. Sarpong and Nketiah-Amponsah (2022) looked at the different proxies of financial inclusion, from availability measures and usage measures and found that usage has a higher incidence of growth than the other proxies that measure availability and knowledge of financial services. Therefore, Sarpong and Nketiah-Amponsah (2022) emphasised the need to promote usage to attain the desired contribution of the financial sector to economic growth.

Chinoda and Kapingura (2023) also looked at digital finance, such as in Ugwuanyi et al. (2022) and note that digital finance performs better when there is strong institutional quality and governance in SSA. This result is contrary to Ugwuanyi et al. (2022), who emphasised that traditional financial institutions contribute more to economic growth than digital finance institutions. Chinoda and Kapingura (2023) explain that to realise the grains from digital finance institutions and governance must be of higher quality. A similar conclusion was drawn in Jima and Makoni's (2023) research, that financial inclusion and economic growth have a positive and statistically significant long-term relationship. This indicates that the growth of financial services improves economic performance and helps the SSA countries achieve sustainable economic growth and development in the long run.

3.4. ASSESSMENT OF LITERATURE

All research reviewed offers insights into the relationship that exists between financial inclusion and economic growth through financial development. Theoretically, Solow's growth model of the neoclassical focuses on the ratio of capital to labour while treating technology as an exogenous factor and remains largely quiet on finance's role in the economy. Endogenous growth theory, on the other hand, is based on a linear production theory that recognises technology as a critical component in economic growth. The Endogenous growth theory is more relevant to this study of financial inclusion and growth due to its argument of increasing returns to scale from capital investment. This means that government policies that focus towards enforcing market competition can be able to raise an economy’s growth rate. Many financial inclusion and economic growth experts have mostly focused on indicators such as availability, access, and usage.

The empirical literature produces mixed results. Financial inclusion is positively correlated with growth, according to the majority of studies conducted in the SSA region, including Ajide (2020), Thathsarani (2022), Jima and Makoni (2023), and Adedokun et al. (2022). Research, like that of William et al. (2017) and Okoye et al. (2017), has indicated a significant effect of financial inclusion on economic growth by incorporating financial inclusion metrics along with other factors like age, gender, and race, this study aims to supplement earlier research on financial inclusion and growth.

3.5. CONCLUSION

The chapter reviewed literature that discusses the relationship between financial inclusion and economic growth. The study explored empirical literature from both developed and developing countries, as well as SSA nations. Most of the studies reviewed reveal a linkage between financial inclusion and growth and all other variables of the study. Theories that relate to the financial sector and economic growth that have been reviewed and explained are the Solow growth model, the AK model, and the dissatisfaction theory of financial inclusion.

CHAPTER 4

DATA AND RESEARCH METHODOLOGY

4.1 INTRODUCTION

This chapter outlines the study's methodology employed to meet its objectives. The previous chapter has focused on reviewing empirical literature regarding the relationships between economic growth, financial inclusion, human development, and financial sector development. The chapter is organised into eleven sections, starting with the introduction. The theoretical framework underlying this study is discussed in the second section, and the model specification in the third section. Section four concentrates on defining variables and their anticipated outcomes in this study, as well as estimation techniques. The fifth section deals with cointegration. Sections six to eight outline the choice of estimation analysis. Furthermore, the Granger causality testing is outlined in section nine, followed by diagnostic tests in section ten. The last part of this chapter, sections eleven and twelve, outline data sources and the chapter summary, respectively.

4.2 THEORETICAL FRAMEWORK

Examination of the relationship between financial inclusion and economic growth can be explained by the pioneering work of Schumpeter, (1912); Shaw, (1973); McKinnon, (1973) and Levine, (1997) who established the foundational theories describing the relationship between the financial sector and economic development. A successful financial inclusion story only takes place where there is a developed financial sector. The transformation mechanisms that have been explained in the literature entail that funds from savers are passed to borrowers through intermediaries and this contributes immensely to growth.

Additionally, the neoclassical school of thought growth model (as introduced by Robert Solow in 1956) notes that the nexus between growth and the accumulation of the nation’s capital contributes to the process of a nation moving towards a steady state. Robert Solow (1956) further explains that the phrase “steady state” explains the existence of stability of capital flows and output in the long run. The theory states that for an economy to achieve growth through the financial sector more money must be channelled to investment of capital per employee. In the short run, growth is given by the accumulation of capital and in the long run, the model explains that growth is equal to the labour force plus exogenously determined technological progress.

Based on theory, financial inclusion can only occur when a developed financial sector exists. The theory addresses how a developed financial sector can be able to affect growth. Many researchers show that the expansion of the financial sector has an important bearing on economic development and growth. Scholars such as Omar and Inaba (2020); Ratnawati (2020); Balele (2019), and Swamy (2010) concluded that improving access to finance may increase economic growth while decreasing wealth inequality and poverty (Kakwani, 2000). Individuals and households gain from financial inclusion by having a secure place to save, an easier and less expensive way of accessing remittances, other payments, loans, or insurance premiums to support health or education costs, and pensions for old age (Pearce, 2011).

4.3 MODEL SPECIFICATION

The study seeks to explore the connection between financial inclusion and economic growth in selected SSA countries. In studying the linkage between the variables of interest, the study will adopt and modify a model by Thathsarani et al. (2021), who examined financial inclusion and economic growth in South Asia and the model is expressed in functional form as follows:

$$Y = F(HDI; DOCREGDP; ATM; BRA; ODEGDP;\ OLGDP) \quad (4.1)$$

Given that the focus of this study is on selected SSA region, a panel model is estimated as follows:

$$LY_{it} = \beta 0 + \beta_1 HDI_{it} + \beta_2 DOCREGDP_{it} + \beta_3 ATM_{it} + \beta_4 BRA_{it} + \beta_5 ODEGDP_{it} + \beta_6 OLGDP_{it} + e_{it} \quad (4.2)$$

Where,

Y=Economic growth

HDI= Human Development Index

DOCREGDP= Domestic credit to the private sector as % of GDP

ATM= Automated teller machines (per 100,000 adults), a financial inclusion measure of access

BRA= A financial inclusion measure of access, which refers to branches in CB (per 100 000 adults)

ODEGDP= Outstanding deposits (CB) as % of GDP

OLGDP =Outstanding loans (CB) as % of GDP

e= Stochastic Error Term

4.3.1. DEFINITIONS AND A PRIORI EXPECTATIONS

Economic Growth

For the measurement of the growth of the economy, the study used GDP as the proxy since, by definition, it measures the size of the economy by accounting for the total production and services in the economy. Many researchers have utilised this proxy for growth in their studies of the finance and growth relationship. In their studies, such as Balele (2019), Liang and Jian-Zhou (2006) and Beck et al. (2000), Cámara & Tuesta (2014) found that an increase in the proportion of the population participating in the financial sector showed a strong connection with variables like GDP, financial stability, financial institutions, and efficiency.

Human Development Index

HDI statistically assesses the long-term progress in three key areas of social progress which are life expectancy, accessibility, and having an acceptable standard of living (UNDP, 2020). The HDI index is a broader measure when compared to GDP per capita because it includes measures of life expectancy, literacy, and income per capita, therefore Fossaceca (2020) explains that it also measures access to resources for a long, healthy life. Fossaceca (2020) states that economic growth can only explain the level of production in an economy, whilst development links this productivity to the change in standards of living in an economy. Fossaceca (2020) explains that GDP per capita does not explain distribution, whilst HDI provides an overview of distribution. This index proposes utilising "people and their capabilities as the ultimate criteria" for measuring the developmental levels of countries (Fossaceca, 2020).

In a study assessing the impact of budget allocation and the contribution of some industries to Nigeria's economic development, Abdullahi (2018) discovered that sectors such as agriculture, health, education, and transportation contribute to GDP growth and thus Nigeria's economic development. Other research (Ghosh, 2006; Ranis, 2004) discovered a bidirectional causal association between growth and human development, while Mhlanga and Denhere (2020) found that human development leads to greater financial inclusion.

Domestic credit to the private sector (as % of GDP)

Domestic credit to the private sector as a percentage of GDP is commonly defined as private sector claims divided by GDP (loan/GDP). This is an indicator of bank penetration. This proxy

is the most suited for financial intermediation than other monetary aggregates as it represents the channelling of funds to private market participants extended to governmental bodies, government agencies, and public enterprises. It provides a better representation of resource allocation efficiency in the economy. This is due to the sector's ability to utilise and allocate resources effectively and productively when compared to the public sector (Ahiakpor et al., 2023). The definition of domestic credit allocated to the private sector is provided by Giuliano and Ruiz-Arranz (2005) as the amount to which the private sector relies on banks to finance working capital, investment, and consumption. Okoye et al. (2017) revealed that financial inclusion, through the availability of credit to rural areas, had a favourable effect on poverty alleviation in Nigeria. The prior expectations are also guided by studies that state that it is with certainty that private-sector credit improves economic growth, such as Olowofeso et al. (2015).

Financial Inclusion Measurements- Financial Availability

CB branches per 100,000 adults, which show the degree of penetration of financial institutions (CBB), and Automated Teller Machines (ATMs) per 100,000 adults, which reflect account ownership, are two variables that can be used to measure access to the financial sector. Access represents the possibility for people to use formal financial services. These proxies exhibit geographical and demographical outreach; they refer to the physical point of service or infrastructure offered by financial institutions (William et al., 2017; Cámara and Tuesta, 2014). Swamy (2010) discovered that poor people need access to money to accomplish poverty reduction, inclusive growth, and long-term economic development. This is consistent with William et al. (2017), who state that an expansion of ATM and CB branches is projected to relieve poverty and help economic growth. As per research by Bruhn and Love (2014), expanding access to finance looks as if it has a favourable influence on economic growth, particularly for low-income individuals. Most studies have established a positive and significant impact (Iqbal & Sami, 2017; Babajide et al., 2021).

Financial Inclusion Measurements - Financial Usage

Additionally, to accessing and owning, financial inclusion is interested in the use of accounts. Current deposits (OD) and existing loans (OL) measured as a percentage of GDP are used as proxies for utilisation. Usage measures the extent and frequency of use by individuals. Several studies have employed these proxies for financial inclusion (William et al., 2017; Cámara & Tuesta, 2014; Amidžić et al, 2014; & Sharma, 2016). According to Iqbal and Sami (2017), bank branches and credit deposit ratio hold a positive and strong influence on the Indian GDP.

4.4 ESTIMATION TECHNIQUE

4.4.1. CROSS-SECTIONAL DEPENDENCE

When undertaking an analysis that involves panel data, it is important to first test for the existence of cross-sectional dependence. It entails a condition in which all the units in the cross sections in the panel are correlated. Henningsen et al. (2024) explain that it is usually a factor that is derived from unobserved factors which affect all the units in the data set but might be affecting the units differently. Henningsen et al. (2024) state that the impact is more severe in dynamic panel estimators, which estimate models which exhibit endogeneity in models. Henningsen et al. (2024) state that if it exists in a data set, it is important to note it because it affects the estimators when the estimation technique is wrongly chosen and the results will have little to no difference from using OLS.

$Y_{it} = \alpha_i + \beta' x_{it} + \mu_{it}, \quad i = 1, \dots\dots N \; and \; t = 1 \dots\dots T$ ……………………………. (4.3)

Where:

1) *x_{it} is a $K \times 1$ vector of regressors.*

2) *β is a $K \times 1$ vector of parameters to estimate*

3) *α_i represent time-invariant nuisance parameters.*

The null hypothesis u_{it} is assumed to be independent and identically distributed (i.i.d) over time intervals and across cross-sectional units. Under alternative, u_{it} may be correlated across cross-sections but the assumption of no serial correlation remains. Thus, the hypothesis of interest is:

$$H_0 : \rho_{ij} = \rho_{ji} = cor\left(u_{it} u_{jt}\right) = 0 \; for \; i \neq j$$

VS

$$H_i : \rho_{ij} = \rho_{ji} \neq 0 \; for \; some \; i \neq j$$

Where ρ_{ij} is a product-moment correlation coefficient of the disturbance and is provided by:

$\rho_{ij} = \rho_{ji} = \frac{\sum_{t=1}^{T} u_{it} u_{jt}}{(\sum_{t=1}^{T} u^2{}_{it})\ 1/2 (\sum_{t=1}^{T} u^2{}_{jt})\ 1/2}$ ……………………………………………..…….. (4.4)

Notice that the quantity of pairings (u_{it}, u_{jt}) increases with N. For assessing cross-sectional dependence in panels, two kinds of tests have been suggested: the Breusch and Pagan (1980)

Lagrange Multiplier approach and the Moran (1948) spatial dependence test. To test the null of zero cross-equation error correlations, this study will look for cross-section dependence using the Lagrange Multiplier (LM) approach statistic. This approach is particularly easy to compute and does not require the system estimation of the SURE model (Pesaran, 2021).

4.4.2 PANEL UNIT ROOT

A unit root test is carried out to avoid spurious regression by ensuring that all variables employed in the study follow a random walk. When analysing time series data, it is important to ensure that the data is stationary. In Gujarati (2009), it is explained that using data at the wrong level of integration can affect the forecasting behaviour and selection of the best estimation technique. Gujarati (2009) further explains that data that is not stationary will lead to spurious results. Gujarati (2009) also explains that when data is stationary, the mean, variance and autocovariance are time-invariant. Van Greunen et al. (2014) indicate that when the mean, variance and autocovariance are time-invariant, these metrics fluctuate within certain bounds over time. Additionally, if two variables display trends over time, a regression of one, alternatively, could have a high R2 even if the two are uncorrelated, and this is known as spurious regression. Van Greunen et al. (2014) explain that using variables that are not stationary means that t-ratios from the results cannot be used because the standard assumptions of asymptotic analysis will be invalid; therefore, the hypothesis test about the regression will be invalid.

To overcome these challenges, this study conducts both informal and formal tests for stationarity, and the results obtained from both tests are compared for robustness. Thus, the Levin-Lin, the Fisher type test and the informal test are conducted by graphing and observing the behaviour of the series over time. Panel unit root tests are a form of alternative; stronger tests compared to those premised on individual time series.

Levin, Lin, and Chu (2002) Panel Unit root test

By treating panel data as being made up of homogeneous cross-sections, the Levin and Lin (1992, 1993) and Levin, Lin and Chu (2002) tests—henceforth referred to as the LLC test—perform a test on a pooled data series. LLC contended that the capacity of individual unit root tests to reject alternative hypotheses with extremely persistent equilibrium deviations is restricted. In tiny sample sizes, this is especially problematic. Instead of separate unit root tests for all cross-sections, LLC recommends a panel unit root test.

Levin-Lin-Chu Test (LLC) proposes the hypotheses:

H0: each time series contains a unit root.

H1: each time series is stationary.

The LLC test for unit roots in panel data is computed based on the following model:

$$\Delta y_{it} = \delta y_{it-1} + \sum_{L=1}^{Pi} \theta_{iL} \Delta_{yit-L} + \alpha_{mi} d_{mt} + \varepsilon_{it} \quad m = 1,2,3 \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (4.5)$$

Three models are taken into consideration: (1) $d_{1t} = \emptyset$ (the empty set) with no individual effects, (2) $d_{2t} = \{1\}$ where the time trend of the series y_{it} it is specific to each individual. The lag order ρ_i is not known and can differ among people. The techniques outlined in the section on lag order selection in ADF regression can be used to choose it. ρ_i represents the chosen lag order. For the test to be conducted $\frac{\sqrt{N}}{T} \rightarrow 0$ is a prerequisite. The assumption that the errors ε_{it} are assumed to be $i.i.d.\ 0, {\sigma^2}_{i,t}$.

Im Pesaran and Shin (IPS) Panel Unit Root Test

The t-bar statistic, proposed by Pesaran and Shin (2003), is a more versatile and mathematically straightforward unit root testing method for panels. This method allows for the concurrent analysis of both stationary and non-stationary series. Moreover, group-to-group heterogeneity in the dynamics, residual serial correlation, and error variances are all permitted by this test.

In place of pooling data, IPS looks at ADF statistical means, which are determined for all cross-sectional units within the panel. This is done when an error term μ_{it} of the model $u_{it} = \sum_{j=1}^{p\ i} \varphi_{ij} u_{it-j} + \varepsilon_{it}$) is serially correlated, potentially exhibiting distinct serial correlation patterns among cross-sectional units T and N, rather than pooling the data. To determine whether unit roots exist in panel data, the following regression model has to be taken into consideration:

$$\triangle\, y_{it} = \alpha_i + \rho_i y_{it-1} + \sum_{j=1}^{p_i} \varphi_{ij} \Delta y_{it-j} + \varepsilon_{it} \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (4.6)$$

The autoregressive characteristics of each cross-section, which are the results of the IPS test based on an average of the individual ADF statistics, are what this test depends on. It is defined as the null hypothesis $H_0: \rho_i = 1$ for all i while the alternative hypothesis is now given as $H_a: |\rho_i| < 1$, for at least one i . When taking the average of each of the individual ADF statistics, the IPS T-bar statistics is obtained, i.e. $t^- = \frac{1}{N} \sum_{t=1}^{N} \rho_i$ where t_{pi} is the individual t-statistic for testing.

4.5 PANEL COINTEGRATION TEST

The next stage is to look for evidence of long-term cointegration amongst the dependent and independent variables after the order of cointegration has been established. Following the establishment of a cointegration relationship, methods akin to those suggested for single time series models can be effectively employed to estimate the long-run parameters. To test cointegration, a variety of tests are available; the most popular ones are McCoskey and Kao (1998), Kao (1999), and Pedroni (1999). Nonetheless, cointegration is tested in this study using Pedroni (1999) and Kao (1999).

4.5.1 PEDRONI COINTEGRATION TEST

To explore the null hypothesis that there is no cointegration in non-stationary panel data, Pedroni (1999, 2004) developed seven statistical tests. It is possible to study heterogeneous panels with fixed effects, unique deterministic trends, and heterogeneous slope coefficients thanks to this framework. In its most basic form, this entails constructing the test statistic and tabulating the distributions using the residuals from Engle and Granger's panel analogue of a static regression and accepting no cointegration as the null hypothesis (1987). The test statistic is created, and the distributions are tabulated using the static regression. The estimated long-run relationship for each group is the starting point. With residuals gathered from the subsequent regressions, all test statistics are residual-based tests.:

$$Y_{i,t} = \alpha_i + \beta_{1i}x_{1i,t} + \beta_{2i}x_{2i,t} + \cdots + \beta_{Mi}x_{Mi,t} + e_{i,t} \quad \text{..... (4.7)}$$

For t=1. T; i=1…, N; m=1…. M.

Where:

T is the amount of observations over time,

N is the number of individual members within a panel

M is the quantity of regression variables.

Pedroni outlines seven various statistics for testing the null hypothesis of no cointegration versus cointegration in panel data. After an appropriate normalization, the seven tests put out by Pedroni asymptotically follow a conventional normal distribution. One significant adjustment accounts for the heterogeneity of the cross-section units by modifying the cointegration residuals' long-run variance according to the group. Three of the tests are based

on averaging along the in-between dimension (Pedroni, 1999, 2004), while four of the tests are based on pooling along the panels within a dimension. One significant factor is that a model with non-stationary coefficients would have the characteristic whereby the error term's past values affect the current value of yt in a non-declining manner over time. In addition, three statistics are group-mean panel cointegration statistics, that are premised on pooling along the between-dimension (Pedroni, 1999, 2004).

4.5.2 THE KAO PANEL COINTEGRATION TEST

The Kao test (1999) presents two distinct types of tests DF and ADF that are used in cointegration tests. Consider the model:

$y_{it} = x'_{it}\beta + z'_{it}\gamma + e_{it}$ ……. (4.8)

where $\gamma_{it}$and χ_{it} are I (1) and non-cointegrated. For $\mathcal{Z}_{it} = \{\mu_i\}$, Kao (1999) proposed DF and ADF-type unit root tests for eit as a test for the null of no cointegration. The DF-type tests can be calculated from the fixed effects residuals:

$\hat{e}_{it} = \rho\widehat{e_{it-1}} + \upsilon_{it}$ ……..…….. (4.9)

where $\hat{e}_{it} = \tilde{y}_{it} - \tilde{\chi}_{it}\hat{\beta}\ and \tilde{\gamma}_{it} = \gamma_{it} - \bar{\gamma}_i$. To test the null hypothesis of no cointegration, the null can be written as $H_0: \rho = 1$. The OLS estimate of ρ and the t-statistic are given as:

$$\hat{\rho} = \frac{\sum_{i=1}^{N}\sum_{t=2}^{T}\hat{e}_{it}\,\hat{e}_{it-1}}{\sum_{i=1}^{N}\sum_{t=2}^{T}\hat{e}_{it}^{\,2}} \qquad (4.10)$$

and

$$t\rho = \frac{(\hat{\rho}-1)\sqrt{\sum_{i=1}^{N}\sum_{t=2}^{T}\hat{e}_{it-1}^{\,2}}}{s_e} \qquad (4.11)$$

Where $s_e = \frac{1}{NT}\sum_{i=1}^{N}\sum_{t=2}^{T}(\hat{e}_{it} - \hat{\rho}\hat{e}_{it-1})^2$.

Kao proposed the following four DF-type tests:

$$DF_\rho = \frac{\sqrt{NT}\,(\rho-1)\hat{} + 3\sqrt{N}}{\sqrt{10.2}} \qquad (4.12)$$

$$DF_t\sqrt{1.25t_p} + \sqrt{1.875N} \tag{4.13}$$

$$DF_\rho^* = \frac{\sqrt{NT}(\rho - 1) + \frac{3\sqrt{N}\,\hat{\sigma}_\upsilon^2}{\hat{\sigma}_{0_\upsilon}^2}}{\sqrt{\frac{3 + 36\hat{\sigma}_\upsilon^4}{5\hat{\sigma}_{0_\upsilon}^4}}} \tag{4.14}$$

and

$$DF_t^* = \frac{t_\rho + \frac{\sqrt{6N}\,\hat{\sigma}_\upsilon}{2\hat{\rho}_{0\upsilon}}}{(\frac{\hat{\rho}_{0_\upsilon}^2}{2\hat{\sigma}_\upsilon^2}) + (\frac{3\hat{\sigma}_\upsilon^2}{10\hat{\sigma}_{0_\upsilon}^2})} \tag{4.15}$$

Where $\hat{\sigma}_\upsilon^2 = \hat{\sum}_{yy} - \hat{\sum}_{yx}\hat{\sum}_{xx}^{-1}$ and $\hat{\sigma}_{0\upsilon}^2 = \hat{\Omega}_{yy} - \hat{\Omega}_{yx}\hat{\Omega}_{xx}^{-1}$. While DF_ρ and DF_t are founded on strong exogeneity in regressors and error terms, DF_ρ^* and DF_t^* are for the cointegration with endogenous relations amongst regressors and errors. For ADF, the below regression is utilised:

$$\widehat{e_{it}} = \rho\hat{e}_{it-1} + \sum_{j=1}^{p} \vartheta_j \Delta\hat{e}_{it-j} + \nu_{itp} \qquad \text{..... (4.16)}$$

With the null hypothesis of no cointegration, the ADF test statistic is formulated as:

$$ADF = \frac{t_{ADF} + (\frac{\sqrt{6N}\,\hat{\sigma}_v}{2\hat{\sigma}0_v})}{\sqrt{(\frac{\hat{\sigma}_{0_v}^2}{2\hat{\sigma}_v^2}) + (\frac{3\hat{\sigma}_v^2}{10\hat{\sigma}_{0_v}^2})}} \qquad \text{..... (4.17)}$$

Where t_{ADF} is the t-statistic of ρ in equation (4.16). The asymptotic distributions of DF_ρ, DF_t, DF_ρ^*, DF_t^* and ADF converges to a standardised normal distribution N (0, 1) by sequential limit theory.

4.5.3. THE AUTOREGRESSIVE DISTRIBUTED LAG (ARDL) COINTEGRATION

The ARDL method was conceptualised by Pesaran, Shin, and Smith. ARDL methodology is a method for simultaneously estimating long-run and short-run connections and dynamics within

the variables (Pesaran et al., 1999). The technique has several benefits, such as not requiring pre-tests for unit roots, unlike other techniques (Nkoro & Uko, 2016). The ARDL technique is preferred in working with variables of varied orders I (0) and I (1), or a combination of both. This method's primary benefit is its adaptability in situations where the variables have varying integration orders (Demirgunes, 2015). Another advantage of the model is its capacity to accurately depict the data generation process within a general-to-specific modelling framework with appropriate lags. The variable of interest is expected to be a function of both its past values (auto-regressive) and the current and past values of other variables (distributed lag) in an auto-regressive distributed lag (ARDL) model. The panel ARDL approach makes use of the Mean Group (MG) and Pooled Mean Group (PMG) estimators. The panel ARDL long run equation is represented as follows:

$$y_{it} = \beta_0 + \sum_{i=1}^{k} \beta_1 HDI_{i,t-j} + \sum_{i=1}^{k} \beta_2 DOCREGDP_{i,t-j} + \sum_{i=1}^{k} \beta_3 ATM_{i,t-j} + \sum_{i=1}^{k} \beta_4 BRA_{i,t-j} + \sum_{i=1}^{k} \beta_5 ODEGDP_{i,t-j} + \sum_{i=1}^{k} \beta_6 OLGDP_{i,t-j} + e_{it} \quad \ldots\ldots\ldots\ldots (4.18)$$

Where i= 1,2,3…N and t= 1,2,3…. T, β_0 represent the constant and $\beta_1 - \beta_5$ show the long-run coefficients of the stated variables and e_{it} is the error term which is presumed to be white noise and varies across countries and time.

4.6 PANEL VECTOR ERROR CORRECTION MODEL (VECM)

This is a cointegrating VAR model. Once co-integration is established, the VECM test would be required to evaluate the existence and direction of the long-run equilibrium relationship (Brooks, 2008 P293). The panel VECM is needed to first establish the presence of cointegration among the variables of interest. ECM is also known as an equilibrium correction model. This methodology is accurate for estimating the correction from the previous period of disequilibrium, and it has excellent economic implications. VECM model is expressed also in the form of first differences, thus permitting the discovery of erroneous regressions by removing trends from the variables. The general form of the VECM used is:

$$\Delta Y_t = \alpha \beta' y_{t-1} + \sum_{i=1}^{p-1} \Gamma_i \Delta Y_{t-i} + \varepsilon_t \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (4.19)$$

Where: $\Delta: Operator\ differencing, where\ \Delta y_t = y_t - y_{t-1}$

y_{t-I}*: Vector variable endogenous with the 1st lag*

ε_t: *Vector Residual*

Γ_i: *Matrix with order* $K \times K$ *of coefficient Endogenous of the i-th variable*

α: *Vector adjustment, matrix with order* $(K \times r)$

β: *Vector cointegration (long run parameter) matrix* $(K \times r)$

4.7 FIXED EFFECTS (FE) MODEL

A fixed effect (FE) estimation technique is used to address the endogeneity problem in regression models where the independent variable relates to the error term. In a panel data set, the effect of an individual's inherent features is estimated using the FE regression model. The conventional LS method is nevertheless applied in the FE model, despite its differences from the common effect. Additional models are required to reflect the difference since it is seen as less realistic to model in a way that yields a consistent intercept for each cross-section and time. FE presupposes that variations in intercepts may account for individual differences (cross-section). Panel data are characterised with so much information in N individuals observed T times as there is with NT individuals. Estimation of this method depends on the assumptions about the intercept, slope coefficients, and error term (Gujarati, 2009).

If the panel is treated like a pooled cross-section and measures to control for individual fixed effects are not taken, there is the risk of obtaining biased estimates of the relationship between X and Y. The FE model is designed to address this problem. The existence of unobservable factors that consistently impact the outcome of interest (Y variable) is with panel data, which can be accounted for using the below methods:

- First difference (FD) transformation
- Dummy variable (DV) regression
- Fixed effects (FE) estimator

A model that explicitly accounts for individual fixed effects can be specified with a unique intercept for each individual (Pedace, 2013). Fixed effects estimation builds on the error components model:

$$\gamma_{it} = \chi_{it}\beta + \alpha_i + \epsilon_{it} \quad (4.20)$$

The observed outcome of person i at time t is indicated by γit, the corresponding (K x1) vector of parameters to be estimated is β, and the (1x K) vector of covariates of this person measured contemporaneously is represented by χit. This model has two distinct components that make up its error term. These are distinct qualities that are frequently overlooked. A subject-specific

and time-varying idiosyncratic error makes up the second component, εit. Because of collinearity with the error, the standard regression model intercept α is dropped.

4.8 RANDOM EFFECTS (RE) MODEL

For every entity, this model method proposes unique intercept terms, and once more, these intercepts hold over time. It is considered that there are cross-sectional and temporal correlations between the explanatory and dependent variables (Brooks, 2008). Both the FE and RE techniques require tight exogeneity. The RE model's error terms account for the variance in intercepts. When the RE model is used, heteroscedasticity is eliminated. This method is also referred to as the Error Component Method (ECM) or the Generalised Least (GLS) technique. The RE model's remaining values may be correlated with one another over time, as well as with various individuals or cross-sections. As a result, this model assumes that the intercept is a random variable and an intercept difference for every individual. The orthogonality condition $\mathrm{E}(\alpha_i|\chi_i) = \mathrm{E}(\alpha_i) = 0$ indicates that there could be no relationship between any of the regressors and stable unobserved confounders. Because of how limited this assumption is, RE frequently fails to pinpoint the desired causal effect. The RE estimator is consistent if both conditions are met because $\mathrm{E}(v_{it}|\chi_{it}) = 0$ indicates that the conditional mean is accurately modelled. The model appears as follows:

$$\gamma_i = \chi_i\beta + v_i \quad (4.21)$$

where $\upsilon_i = \alpha_i j_T + \epsilon_{i,}$ and j_T is a (TX1) vector of ones.

Since RE estimation makes use of the composite errors' temporal structure, strict exogeneity is necessary. Define the matrix (T X T) with ($\Omega = \mathrm{E}(v_i v_i)$. This is the composite errors' variance-covariance matrix. More error structure assumptions are required to estimate it.

The standard assumptions of constant variance of the idiosyncratic errors across t, $\mathrm{E}({\epsilon^2}_{it}|\chi_i, \alpha_i) = \mathrm{E}({\epsilon^2}_{it}) = {\sigma^2}_{\epsilon}$ and $\mathrm{E}\ (\epsilon_{it}\epsilon_{is}|\chi_i\alpha_i) = \mathrm{E}\ (\epsilon_{it}\epsilon_{is}) = 0$ for all $t \neq s$ as well as the constant variance of the stable components across i, $\mathrm{E}({\alpha^2}_i|\chi_i) = {\sigma^2}_{\alpha})$ are sufficient (Wooldridge, 2010,p.294).

The conditional and unconditional variance-covariance matrix $\mathrm{E}(v_i {v'}_i|\chi_i) = \mathrm{E}(v_i {v'}_i)$ is implied by the two assumptions taken together.

4.9 GRANGER CAUSALITY TEST

It is a hypothesis utilised to assess whether one series helps in predicting another. This test was developed by Clive Granger in 1969. The notion of causality is based on how well past values of a time series y_t could predict future values of another series x_t. Granger causality can be tested in ARDL models using the standard Wald or F test:

$$Y_t = \alpha + \sum_{k=1}^{k} \gamma k \Delta Y_{t-k} + \sum_{k=1}^{k} \beta_k X_{t-k} + \varepsilon_t \text{ With } t = 1, \ldots\ldots T \ldots\ldots\ldots\ldots\ldots\ldots \text{(4.22)}$$

The model can then be used to test whether x causes y. If past values of x significantly predict the current value of y even when past values of y have been included in the model, then x exerts a causal influence on y. Using (1), one can effectively investigate this causality on a F test with the following null hypothesis:

$$H_0: \beta_1 = \cdots = \beta_k = 0 \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots \text{(4.23)}$$

If H_0 is rejected, it indicates the presence of causality from x to y. The x and y variables can be interchanged to test for causality in the other direction, allowing for the observation of bidirectional causality.

4.10. DIAGNOSTIC CHECKS

Diagnostic checks are used to assess the models' soundness to reach appropriate, consistent, and accurate findings. After designing and estimating a panel data model, tests for normality, heteroscedasticity, and serial correlation are performed to assess the model's goodness of fit and the validity of the assumptions.

4.10.1 NORMALITY TEST

In this study, the Jarque-Bera test is employed to check normality. The normality test is used to discover misspecification and functional form issues that may jeopardise the traditional normal linear regression model's assumption of normality (Wooldridge, 2010).

4.10.2 SERIAL CORRELATION

Serial correlation assumes that the variance and correlation between successive disturbances are zero, indicating the independent distribution of the error components, and is used to assess the soundness of a model. It is possible to identify serial correlation using statistical tests such as the Durbin-Watson test and the Glesjer-Godfrey LM test, which are utilised in this study to compare the alternative hypothesis of no serial correlation with the null hypothesis of no serial correlation (Wooldridge, 2010).

4.10.3 HETEROSKEDASTICITY

Under the linear regression assumption, the variance of the error component is a constant, which is expressed by the homoscedasticity assumption represented by Var μt. Trevor Breusch and Adrian Pagan developed the Breusch Pagan test in 1979. It is assumed that the error terms in this test have a normal distribution. The study examines whether the variance of the regression errors is influenced by the values of the independent variables. The test's null hypothesis states that homoskedasticity exists if it is not rejected (Wooldridge, 2010).

4.11. DATA SOURCES

The study's data is obtained from the World Bank and the IMF's financial access survey for the period 2011 to 2021. The following are of interest in the study human development index, domestic credit to the private sector as a percentage of GDP, CB branches per 100,000, outstanding deposits as a percentage of GDP, and outstanding loans as a percentage of GDP.

4.12. CONCLUSION

This chapter has focused on discussing the methodology followed by this study in achieving the outlined objectives. The theoretical framework underpinning this study was identified to be the Solow growth model, which mostly relies on the work of Robert Solow (1956). The study employs the LLC and IPS panel unit root tests to verify if the variables in this study are integrated or not. Once the order of cointegration has been determined, the panel cointegration test is followed using the Kao and Pedroni tests. Thereafter, the study applies the ARDL test, and if there is longer-run cointegration, the panel VECM test is used to check and evaluate the presence and direction of the long-run equilibrium relationship. The study further conducts causality and diagnostic checking. The following chapter is going to present estimation results and the findings of the study.

CHAPTER 5

ESTIMATION AND ANALYSIS OF RESULTS

5.1 INTRODUCTION

To address the general goal of this study, which was stated in the first chapter, this chapter offers an interpretation of the data. Using the ARDL and ECM, the goal is to ascertain whether financial inclusion fosters economic growth in 32 chosen SSA countries between 2015 and 2021. The preceding chapter's analytical framework is adhered to in this analysis. The chapter is divided into multiple sections, with a section on descriptive statistics and correlations coming after the introduction. The discussion of the Levin, Lin, Chu, Im Pesaran, and Shin tests of stationarity is covered in the fourth section. Cross-sectional dependence is examined in the fifth section. Panel co-integration test results are examined in the sixth section. This is followed by panel ARDL and VECM results in sections seven and eight, and diagnostic tests in section nine. The examination of causality and the conclusion to the chapter are given in sections ten and eleven, respectively.

5.2 DESCRIPTIVE STATISTICS

Descriptive statistics are essential to check if the sample is normally distributed, check outliers and provide information on measures of central tendency and measures of dispersion. Of great interest are skewness and kurtosis. Skewness and kurtosis are both considered measures of normality in descriptive statistics. Kurtosis is the peakiness of the distribution series, whereas skewness evaluates the degree of asymmetry of the series. The acceptable values for kurtosis and skewness in a normally distributed series are 3 and 0, respectively (Gujarati, 2009).

Table 5.3 Descriptive statistics

	GDP	HDI	ATM	BRA	CREGDP	ODEGDP	OLGDP
Mean	4.616630	0.518473	6.909329	4.336353	18.15482	24.95628	17.63180
Median	4.920266	0.520000	6.030793	4.408410	15.29237	21.51079	14.39490
Maximum	15.74488	0.643000	17.00300	14.66872	40.16302	55.19871	37.98058
Minimum	-7.816951	0.395000	0.971841	1.087524	5.237706	9.093523	3.006402
Std. Dev	3.135958	0.056501	3.379747	2.000525	8.013035	10.14243	8.413005
Skewness	-0.349405	-0.211035	1.001118	2.134879	0.612293	0.879059	0.644182

Kurtosis	6.392536	2.430554	3.850133	11.25436	2.446608	2.941457	2.261331
Jarque Bera	82.48376	3.454077	32.53028	593.7611	12.41526	21.27405	15.16290
Probability	0.000000	0.177810	0.000000	0.000000	0.002014	0.000024	0.000510
Sum	761.7439	85.54800	1140.039	715.4982	2995.546	4117.786	2909.247
Sum Sq. Dev	1612.814	0.523547	1873.321	656.3443	10530.23	16870.50	11607.70
Observations	165	165	165	165	165	165	165

Source: Researcher's computation using EViews Econometric Software

Table 5.1 shows the overview of the structure of the data used, which includes gross domestic product (GDP), Human Development Index (HDI) and domestic credit to the private sector (CREGDP). Measures of financial inclusion are the Automated teller machines (per 100,000 adults) (ATM), branches in CB (per 100,000 adults) (BRA), Outstanding deposits (CB) as % of GDP (ODEGDP) and Outstanding loans (CB) as % of GDP (OLGDP). The GDP growth rate is leptokurtic (6.392536 > 3), has a long-left tail, and exhibits negative skewness. The HDI is platykurtic, with a long-left tail (negative skewness) (2.430554) < 3.

ATM mirrors a long right tail (positive skewness) and is mesokurtic because the kurtosis is 3.850133. Branches in CB (per 100,000 adults) have a long right tail (positive skewness) and are leptokurtic because (11.25436 > 3. In addition to having a normal distribution, domestic credit to the private sector as a percentage of GDP is platykurtic (2.446608<3). Similarly, the percentage of GDP that is made up of outstanding deposits at CB is platykurtic and reflects a normal distribution (2.941457 <3). Finally, the outstanding loans (CB) as a percentage of GDP exhibit a platykurtic distribution with a normal distribution (2.261331 < 3).

To measure the goodness of fit of whether sample data have skewness and kurtosis matching a normal distribution, the Jarque Bera test was estimated. The null hypothesis of normal distribution is rejected for GDP, ATM, BRA, CREGDP, ODGDP and OLGDP. The probability values for these variables from the Jarque Bera test are below the significance level of 0.05. The results also show that HDI follows a normal distribution; there is a failure to reject the null hypothesis for this variable because the p-value is larger than the standard 0.05.

5.3 CORRELATION MATRIX

Table 5.4 Correlation Matrix

	GDP	HDI	CREGDP	ATM	BRA	ODEGDP	OLGDP
GDP	1.000000	-0.577197	-0.104686	-0.382144	0.419862	-0.621192	-0.392187
HDI	-0.577197	1.000000	0.414043	0.890343	-0.103944	0.885955	0.763670
CREGDP	-0.104686	0.414043	1.000000	0.598663	0.552764	0.413779	0.882112
ATM	-0.382144	0.890343	0.598663	1.000000	0.091853	0.706187	0.865843
BRA	0.419862	-0.103944	0.552764	0.091853	1.000000	-0.170111	0.355904
ODE...	-0.621192	0.885955	0.413779	0.706187	-0.170111	1.000000	0.714070
OLGDP	-0.392187	0.763670	0.882112	0.865843	0.355904	0.714070	1.000000

Source: Researcher's computation using EViews Econometric Software

Table 5.2 illustrates possible relationships between the variables of this study. The aim is to determine the type of relationship the variables share. The relationship might be negative, positive, or neutral. A correlation coefficient must lie between −1 and +1, where -1 means that the relationship between two variables is perfectly negative, and a + 1 correlation suggests a perfect positive correlation. If it is zero, this means there is no correlation. The values that are closest to +1 or -1 mean variables are highly or strongly correlated, while the variables approaching zero show an indication of little or no correlation.

Values above 0.5 demonstrate that the two values are highly or strongly correlated, while values below 0.5 mean that the two variables do not have such a strong, positive correlation. There are strong, positive relationships between HDI and ATM; HDI and ODEGDP; HDI and OLGDP; CREGDP and ATM; CREGDP and BRA; CREGDP and OLGDP; ATM and ODEGDP; ATM and OLGDP; ODEGDP and OLGDP.

There is a positive correlation between the HDI and three of the four inclusion variables. The variable's sign indicates that one percentage point in HDI will result in a corresponding increase of 0.890343, 0.885955, and 0.76370 in the number of ATM, ODEGP, and OLGDP, respectively. The outcomes agree with Abdelghaffar et al. (2022), who found that financial inclusion and HDI had a positive correlation. Based on Sarma and Pais (2011), a nation's financial inclusion and HDI levels fluctuate in tandem.

Findings also demonstrate positive relationships between inclusion proxies, such as the number of ATMS, BRA, OLGDP, and CREGDP. Credit extended to businesses and individuals helps create more capital, increasing their profit margins, saving, and investing, and enabling them to take on any risk. Outcomes agree with the findings of Nsiah and Tweneboah (2023), who found a substantial correlation between the two variables. Having access to credit tends to increase household income and promote involvement in the financial industry.

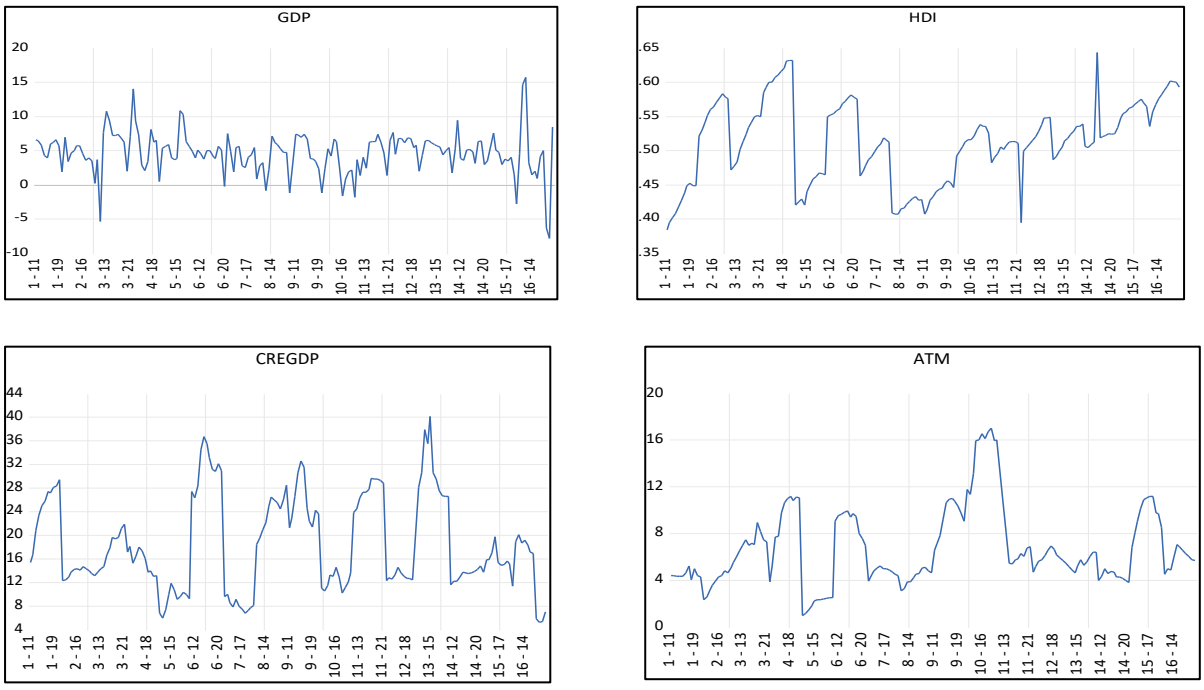
The variables GDP and BRA, HDI and CREGDP, ODEGDP and CREGDP, ATM and BRA, and OLGDP and BRA have a weak relationship with each other. Overall, however, the findings indicate a positive correlation between inclusion proxies. These results tally with previous research, including Cicchiello et al. (2021), who discovered a direct and substantial correlation between GDP and the financial inclusion index. This indicates that the financial sector serves a greater number of people and social groups as GDP rises.

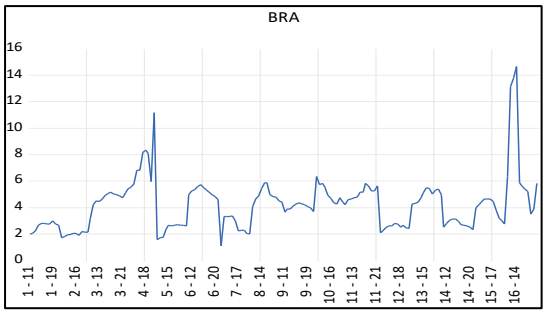
There is a strong negative relationship between GDP and HDI, as well as between GDP and ODEGDP. There is an indication of a weakly negative relationship between GDP and ATM; OLGDP and GDP; CREGDP and GDP; HDI and BRA; and ODEGDP and BRA.

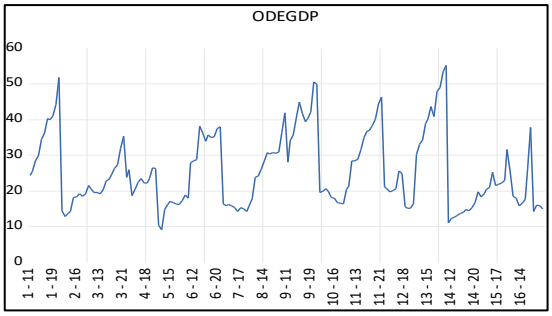
5.4 UNIT ROOT TESTS

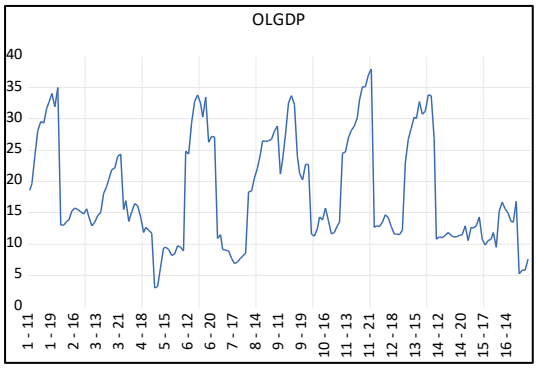
To investigate the stationarity of the panel data in this study the unit root tests proposed by Levin, Lin, and Chu (2002) and Im, Pesaran, and Shin (2003) are utilised. Firstly, however, informal testing through graphical analysis is provided.

Figure 5.1 Unit Root Test-Graphical Plots (level series)



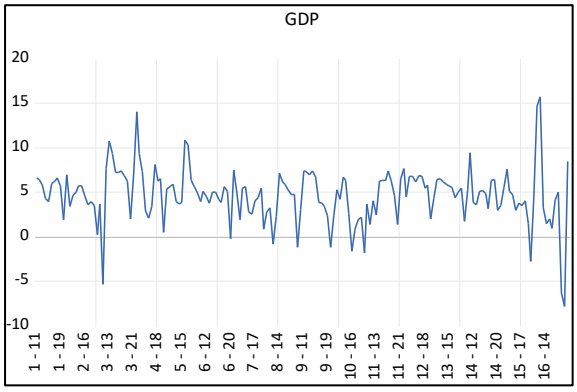


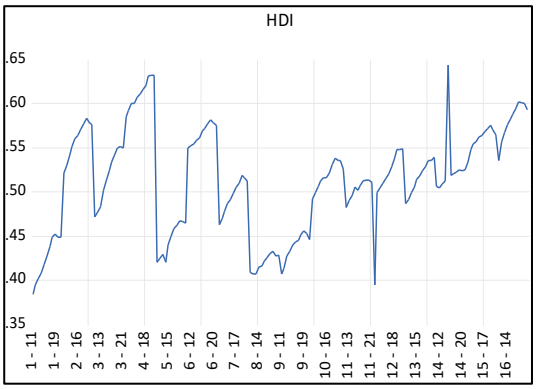


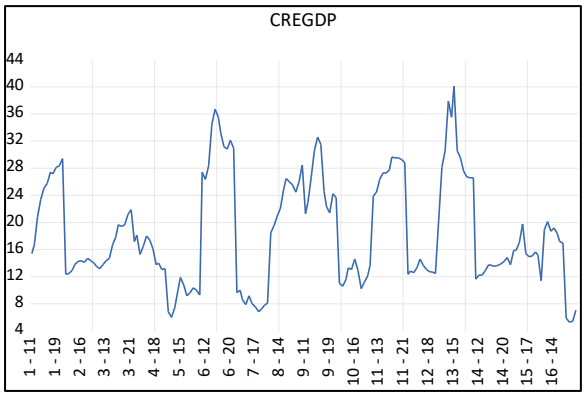


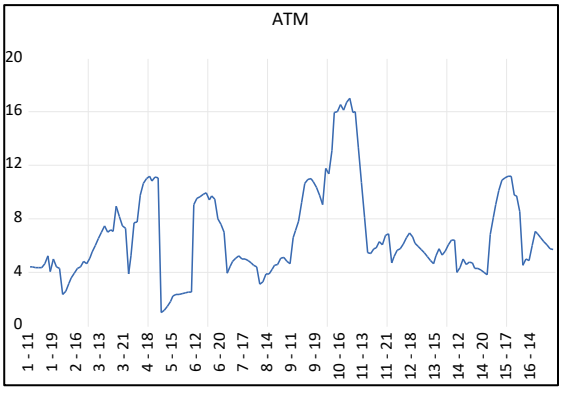
Source: Researcher's computation using EViews Econometric Software

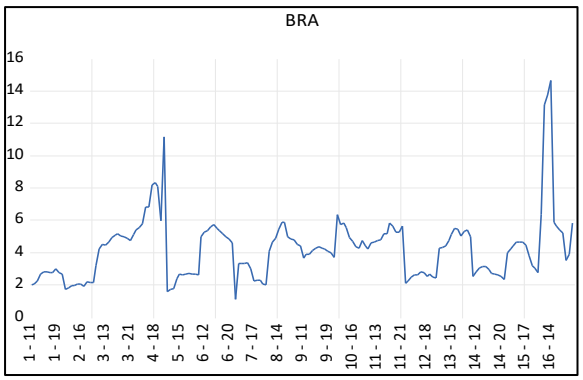
Figure 5.2 Unit Root Test-Graphical Plots (1st difference series)

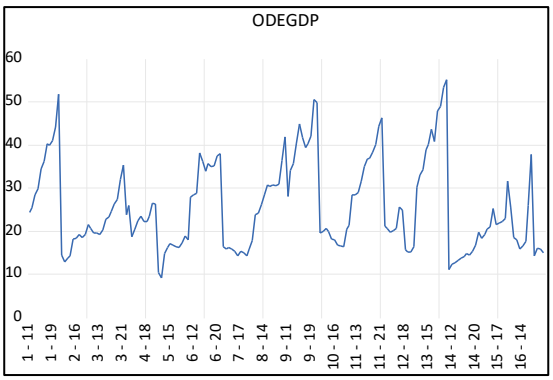


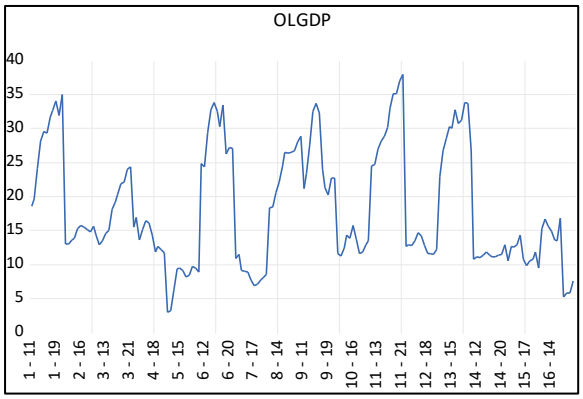












Source: Researcher's computation using EViews Econometric Software

Table 5.5 Unit root test: Level series

	Levin, Lin, and Chu		**Im, Pesaran and Shin**	
Variables	Individual intercept	Individual intercept and trend	Individual intercept	Individual intercept and trend
GDP	-5.36743***	-7.82065***	-3.98261***	-3.72251***
HDI	-9.03957***	-16,2362***	-4.81494***	-2.53776***
CREGDP	-7.84298***	-5.33282***	-2.45139***	0.30871
ATM	-5.27113***	-5.58417***	-1.81575**	0.31574
BRA	-1.84796**	-5.45593***	0.40793	0.50833
ODEGDP	2.74723	-4.88048***	3.63145	-0.11205
OLGDP	-4.02850***	-6.78342***	-1.16782	-0.03453

Source: Researcher's computation using EViews Econometric Software

*Note***significant @ 1%Level, **significant @5%level, *significant@ 10%level.*

Table 5.3 displays the panel unit root results at the level series performed using Levin, Lin, Chu (2002) and Im, Pesaran, and Shin (2003) tests. Based on the findings, GDP and HDI are stationary at level series for both LLC and IPS at the 1% significance level. Most of the variables do not demonstrate stationarity at the level series for IPS. Thus, the variables need to be tested at the first difference for stationarity.

Table 5.6 Unit root test: First difference series

	Levin, Lin, and Chu		Im, Pesaran and Shin	
Variables	Individual intercept	Individual intercept and trend	Individual intercept	Individual intercept and trend
GDP	-8.85488***	-6.33184***	-8.66155***	-2.62551***
HDI	-26.7863***	-26.0946***	-8.57034***	-4.89689***
CREGDP	-7.41370***	-7.79183***	-3.10039***	-0.81535
ATM	-4.85213***	-10.5953***	-1.84373**	-2.12813**
BRA	-8.10940***	-9.75793***	-3.41760***	-1.53780
ODEGDP	-10.2758***	-7.87891***	-4.97134***	-0.96580
OLGDP	-8.41352***	-8.83801***	-3.90624***	-1.32371

Source: Researcher's computation using EViews Econometric Software

Note***significant @ 1%Level, **significant @5%level, *significant@ 10%level.

Table 5.4 represents panel unit root test results following the first differencing. The results confirm that all variables are stationary after first differencing in LLC and IPS. Some of the variables, including CREGDP, BRA, ODEGDP and OLGDP, exhibited stationarity solely in the presence of an individual intercept, rather than in both individual intercept and trend conditions under IPS. ATM illustrated stationarity under the 5% significance level for both individual intercept and individual intercept and trend for IPS.

5.5 CROSS-SECTIONAL DEPENDENCE TEST RESULTS

Cross-sectional dependence must be carried out before panel study analysis. The scaled LM test, scaled CD test, and LM test were developed by Breusch and Pagan (1980), Pesaran (2003), and Baltagi et al. In this case, the bias-corrected CD test from (2012) was applied.

Table 7.5 Cross-dependence test results

Residual Cross-Section Dependence Test			
Null hypothesis: No cross-section dependence (correlation) in residuals			
Test	Statistic	d.f.	Prob.
Breusch-Pagan LM	69.38472	36	0.0007
Pesaran scaled LM	3.934427		0.0001
Pesaran CD	4.950191		0.0000

Source: Researcher's computation using EViews Econometric Software.

The p-value of all these tests, the Breusch-Pagan LM, Pesaran scaled LM, and Pesaran CD are < 0.05. The null hypothesis is rejected, indicating cross-sectional dependence among the

residuals. To deal with this problem, the panel least squares have to be estimated, and the cross-sectional dependence test must be performed again.

Table 5.8 Cross-dependence results

Residual Cross-Section Dependence Test			
Null hypothesis: No cross-section dependence (correlation) in residuals			
Test	Statistic	d.f.	Prob.
Breusch-Pagan LM	6.585498	36	1.0000
Pesaran scaled LM	-3.466532		0.0005
Pesaran CD	0.386117		0.6994

Source: Researcher's computation using EViews Econometric Software

Table 5.6 shows the findings after the estimation of bias-corrected CD. The statistical values for the Breusch-Pagan LM, Pesaran scaled LM, and Pesaran CD are 6.585498, -3.466532 and 0.386117, respectively, and the probability value of the Breusch LM and Pesaran CD tests are >0.05, while the probability value of the Pesaran scaled LM test is significant at 1%. The conclusion of the cross-sectional dependence test is drawn from the results of the Pesaran CD test because T >N. According to the results, Pesaran CD p-value is 0.6994 and is greater than 0.05; the study therefore fails to reject the null hypothesis and concludes that there is no cross-sectional dependence in this study.

5.6 PANEL COINTEGRATION TEST

To check if the regressions have a long-run relationship.

5.6.1 THE PEDRONI COINTEGRATION TEST

The Pedroni cointegration test was utilised to generate the results shown in Table 5.7. The findings indicate that in six of the 11 test statistics, the p-value is < 0.05 %. This indicates that the study rejects the null hypothesis of no cointegration, suggesting a long-run relationship between the series.

Table 5.9 Pedroni Test results

Null Hypothesis: No cointegration					
Trend assumption: No deterministic trend					
Automatic lag length selection based on SIC with a max lag of 0					
Newey-West automatic bandwidth selection and Bartlett kernel					
Alternative hypothesis: common AR coefs. (within-dimension)					
				Weighted	
		Statistic	Prob.	Statistic	Prob.

Panel v-Statistic	-3.041182	0.9988	-3.100460	0.9990
Panel rho-Statistic	3.854510	0.9999	3.694895	0.9999
Panel PP-Statistic	-7.544642	0.0000	-8.927404	0.0000
Panel ADF-Statistic	-2.308074	0.0105	-3.088185	0.0010
Alternative hypothesis: individual AR coefs. (between-dimension)				
	Statistic	Prob.		
Group rho-Statistic	4.976088	1.0000		
Group PP-Statistic	-12.17030	0.0000		
Group ADF-Statistic	-3.629969	0.0001		

Source: Researcher's computation using EViews Econometric Software.

5.6.2 THE KAO PANEL COINTEGRATION TEST

Table 5.8 shows the Kao cointegration test, and according to the table is significant at 1% when looking at the p-value. This signifies a strong rejection of the null hypothesis of no cointegration, leading to the conclusion that cointegration is present within the series,

Table 5.10 The Kao Panel results

Kao Residual Cointegration Test				
Null Hypothesis: No cointegration				
Trend assumption: No deterministic trend				
Automatic lag length selection based on SIC with a max lag of 2				
Newey-West automatic bandwidth selection and Bartlett kernel				
			t-Statistic	Prob.
ADF			-7.360956	0.0000
Residual variance			13.08727	
HAC variance			6.988543	

Source: Researcher's computation using EViews Econometric Software.

5.7 THE AUTOREGRESSIVE DISTRIBUTED LAG (ARDL) COINTEGRATION

The variables in this study are integrated in different orders, with I (0) and I (1) orders of integration, and this necessitates that the ARDL model be estimated.

Table 5.11 The Autoregressive Distributed Lag (ARDL) Cointegration results

Panel least squares variables	Panel Autoregressive Distributed Lag (ARDL)			
Variables	**Coefficient**	**Std.Error**	**t-statistic**	**Prob.**
GDP (-1)	1.736161	0.066681	26.03667	0.0000

HDI	2.548428	2.537118	1.004458	0.3176
CREGDP	2.441798	0.321930	7.584875	0.0000
ATM	3.545475	0.940334	3.770440	0.0003
BRA	4.212752	0.379371	11.10458	0.0000
ODEGDP	-0.359913	0.109482	-3.287412	0.0014
OLGDP	-3.709649	0.504276	-7.356383	0.000

Source: Researcher's computation using EViews Econometric Software.

*Note***significant @ 1%Level, **significant @5%level, *significant@ 10%level.*

The results show that the GDP of the lagged period (GDP (-1)) had a positive influence on the current period.

As stated in the earlier chapters, the objectives of the study are to determine the impact that the availability and usage of financial services have on the economic growth of SSA nations. The impact of availability on the economic growth objective is measured by the variables ATM and BRA. To measure the effect of financial service accessibility on growth, the study uses the variables ATM and BRA. In contrast, the influence of financial service usage is evaluated using the variables ODEGDP and OLGDP.

The findings suggest that the impact of financial inclusion varies depending on the specific measure used, indicating heterogeneous effects on economic growth. According to the results, financial inclusion accessibility, as measured by ATM and BRA, demonstrates a positive and significant impact on GDP. The results show that a 1% increase in availability to the financial sector using increasing ATMS and BRA leads to a 3.5% and 4.2% increase in GDP, respectively. These outcomes are consistent with prior expectations and align with the research of Ifediora et al. (2022), Jima and Makoni (2023), and Kamara (2024), all of whom found that financial availability significantly boosts economic growth. Regarding availability indicators like BRA and ATMs, the study confirms their strong positive effect on economic expansion, suggesting that an increased presence of financial transaction points encourages more economic agents to engage in economic activities.

Conversely, financial inclusion through usage shows a negative correlation with economic growth. Usage is represented in the study by ODEGDP and OLGDP, and the findings run counter to initial expectations. Nevertheless, existing literature, such as Ifediora et al. (2022), has also identified a negative link between usage and growth. However, according to literature like Ifediora et al. (2022), there is a negative correlation between economic growth and usage.

While there is evidence that using banking services can positively impact growth, this relationship is not as strong as it may seem, given the argument that using financial infrastructure has a negligible effect on economic expansion. According to Nkwede (2015), who shared this consensus, the percentage of GDP that is made up of outstanding deposits from CBS has a negative correlation with growth. According to other studies, like Wibowo et al. (2023), the lower quality of CB loans and their consumptive use are to blame for the negative effects of outstanding loans as a percentage of GDP.

The results, as measured by HDI, had a positive but statistically insignificant impact. A 1% increase in HDI will cause GDP to increase by 2.55. The results align with the expected outcomes and support from studies such as Pham Tan Hoa et al. (2016), who investigated the impact of HDI on economic growth. Using regression models, the study found that HDI has a positive impact on economic growth. Therefore, improvement in health, education and income can enhance the freedom and individual capabilities of the population, leading to an increase in economic activity and growth. These results have been supported by Rahman et al (2020).

Finally, the indicator of financial development was the domestic credit to the private sector (CREGDP). According to the findings, there is a statistically significant positive impact (p-value = 1%) of financial sector development on growth. According to the results, a 1 per cent increase in CREGDP will eventually result in a 2.44 increase in GDP. The outcomes meet the initial projections and match with the results by Olowofeso et al. (2015), Van et al. (2021), and Osman (2014), which have shown that growing and improving financial development promotes economic expansion. According to Amoo et al. (2017), other macroeconomic factors, such as inadequate infrastructure development and subpar trade performance, are subordinate to the strength of a developed banking sector.

5.8 ERROR CORRECTION MODEL

Table 5.12 Short Run Model

Short Run Equation				
Variable	**Coefficient**	**Std Error**	**t-Statistic**	**Prob.**
COINTEQ01	-0.021829	0.004126	-5.290795	0.0000
D(GDP(-1))	0.674898	0.058639	11.50931	0.0000
D(HDI)	-205.7131	18.94517	-10.85834	0.0000
D(CREGDP)	3.428610	0.176806	19.39196	0.0000
D(ATM)	2.406657	0.564455	4.263686	0.0000

D(BRA)	4.811535	0.288283	16.69030	0.0000
D(ODEGDP)	-0.946760	0.076513	-12.37393	0.0000
D(OLGDP)	-3.858722	0.237881	-16.22122	0.0000
C	3.115325	0.588408	5.294495	0.0000
@TREND	0.005109	0.000973	5.252432	0.0000

Source: Researcher's computation using EViews Econometric Software.

Table 5.10 displays the panel short-run ARDL results of this study.

The following results pertain to the 1st objective of the impact of access to financial services on economic growth. The impact of accessibility on the economic growth objective is measured by the variables ATM and BRA. These results confirm that there is cointegration of (-0,0218), which is negative, statistically and strongly significant at 1%. This implies that the variables converge to the long-run equilibrium, with a speed of convergence being 2, 18%. Financial inclusion, when measured through proxies of accessibility, has a positive impact on GDP, and the relationship is significant 1% significance level. The results are in line with Van et al. (2021) and Emara and El Said (2021), who also recommended the need to improve the ease of access to financial services and products, for example, by increasing the number of commercial bank branches.

Furthermore, the 2nd objective of the usage of financial services, the results show they do not promote economic growth. The influence of financial service usage is evaluated using the variables ODEGDP and OLGDP. The results are in line with Nwisienyi et al. (2020), who found that usage had a negative impact on economic growth. Also, Olusegun et al. (2021) recorded a negative relationship between financial inclusion usage and concluded that improved financial inclusion through usage may be detrimental to financial system stability, due to the concentration of credit risk.

On the other side, financial development measured by domestic credit to the private sector had a positive impact on GDP, and these results are in line with Ringmu et al (2023) and Olowefeso et al (2015). Adu et al (2013) recommended that policies that target financial development are conducive to economic growth.

Lastly, HDI had a significant negative impact on economic growth. These results are in line with Ramadhani (2021). Abraham and Ahmed (2011) propose that a negative impact between HDI and GDP growth in the short run is attributable to policies that prioritise growth above human development, but that HDI will eventually reach equilibrium in the long run.

5.9 DIAGNOSTIC CHECKS

Table 5.13 Results of diagnostic tests.

Test	**H_0**	**Test statistics**	**P-value**	**Conclusion**
Normality	Residuals are multivariate Normal	12.58899	0.001846	Errors are not normally distributed
Residual Serial Correlation Test	No serial Correlation	0.005875	0.9390	There is no autocorrelation
Residual Heteroscedasticity	Heteroscedasticity	0.285825	0.5938	Residuals are homoscedastic

Source: Researcher's computation using EViews Econometric Software.

The diagnostic tests evaluate normality (normality test), serial correlation (serial correlation LM), and heteroscedasticity based on the Arch heteroscedasticity test. It has been found that there is no autocorrelation and no heteroscedasticity in residuals, which is according to diagnostic test results.

5.10 GRANGER CAUSALITY TEST

Following the results of the ARDL, the study employs the Granger causality test to examine the impact of the independent variable and the dependent variable. One aim of this study is to investigate the causal relationship between financial inclusion and economic growth. The objective is to identify the causality between financial inclusion access, financial inclusion usage and economic growth in selected SSA countries. Table 5.12 presents Granger causality test results that were performed using the Dumitrescu-Hurlin causality test.

Table 5.14 Pairwise Dumitrescu Hurlin Panel Causality Tests

Null Hypothesis:	**W-Stat.**	**Zbar-Stat**	**Prob.**
ATM does not homogeneously cause GDP	2.32658	1.32369	0.1856
GDP does not homogeneously cause ATM	1.76946	0.52780	0.5976
BRA does not homogeneously cause GDP	1.67447	0.39209	0.6950
GDP does not homogeneously cause BRA	4.11231	3.87473	0.0001
ODEGDP does not homogeneously cause GDP	1.93078	0.75826	0.4483
GDP does not homogeneously cause ODEGDP	1.45515	0.07878	0.9372

OLGDP does not homogeneously cause GDP	1.78541	0.55058	0.5819
GDP does not homogeneously cause OLGDP	1.87152	0.67360	0.5006

Source: Researcher's computation using EViews Econometric Software

As stated, financial inclusion access is measured by ATM and BRA, while financial inclusion usage is measured by OLDGP and ODEGDP.

The results indicate a unidirectional causality from GDP and financial inclusion access measure commercial bank branches (BRA) as the p value is 0.0001, which is < 0.01 level of significance. Therefore, we can only reject the null hypothesis that GDP does not homogeneously cause BRA and fail to reject the opposite. This unidirectional Granger causality relationship extends from GDP to Financial inclusion access measured by commercial bank branches (BRA). Thus, any change in economic growth is able to predict changes in these financial inclusion indicator in support of a demand following hypothesis. These findings are supported by Chehayeb and Taher (2024) and Mushtaq (2016). It is important to note that only one measure of financial inclusion access (BRA), which is the number of commercial bank branches, has a causal relationship with GDP.

The results further reveal that there's no Granger causality relationship between financial inclusion usage measures by OLDGP and ODEGDP. The results are contrary to a number of studies, such as Odame et al. (2024), who reported a unidirectional causality from financial inclusion usage to economic growth. Likewise, Abel et al. (2024) in a study that investigated the causal relationship between financial inclusion and economic growth. The study found a positive Granger causality between economic growth and the three measures of financial inclusion adopted for the study – branches of commercial banks per 1000 adults, depositors with commercial banks per 1000, and outstanding loans with commercial banks as a percentage of GDP. With regards to the causal relation with the rest of the variables, the results show that there are no further causal relationships. The overall findings of this study show that only commercial bank branches in Granger cause economic growth, implying the absence of a definitive causal relationship.

The overall results in this study indicate a mixed causality between the financial inclusion indicators and economic growth. We found only one causal relationship between economic growth and financial inclusion. The findings of our study align with those of Anane (2019) and Purwiyanta et al. (2022), who also observed limited causal relationships between financial inclusion indicators and economic growth. Anane (2019) found that only two indicators of

financial inclusion had a relationship with economic growth. Similarly, Purwiyanta et al. (2022) found that only financial inclusion depth, as measured by the ratio of private credit to GDP, influenced economic growth, while other indicators such as financial access and stability did not have a significant impact. These consistent findings suggest that the impact of financial inclusion on economic growth may be contingent upon specific dimensions of financial inclusion and the context in which they are measured. Therefore, policymakers should consider focusing on enhancing financial inclusion access to stimulate economic growth effectively.

5.11 CONCLUSION

The chapter has discussed the outcomes of the study that were estimated using the ARDL cointegration estimation technique as proposed in Chapter four. Firstly, the chapter has focused on the descriptive statistics, followed by the test for unit root, which revealed that variables in this study are integrated in both orders (1) and order (2), as some variables became stationary after first differencing, while some variables were stationary at the level series. Results revealed that only the financial inclusion access dimension significantly contributes to economic growth in the long run in SSA. The results from the error correlation model also yielded the same results, showing a positive impact of GDP on financial inclusion. Research indicates that financial inclusion, as measured through usage, demonstrates an inverse impact on economic growth.

CHAPTER 6

SUMMARY, CONCLUSION, POLICY RECOMMENDATIONS AND THE DELIMITATIONS OF THE STUDY

6.1 INTRODUCTION

In this chapter, the summary of the study, the conclusion drawn from the previous chapter as well as policy implications and recommendations are presented. The first section 6.1 is the introduction, and the summary of the study is detailed in section 6.2. Lastly, section 6.3 details the findings related to policy implications and recommendations, while also presenting the study's delimitations and discussing further research areas.

6.2 SUMMARY AND CONCLUSION OF THE STUDY

The study aimed to investigate the financial inclusion and economic growth relationship for the selected SSA countries. To achieve this objective, several steps and assessments have been conducted. Firstly, the research problem was laid out in chapter one. Government policies have focused on financial inclusion as a strategy to boost economic growth thus eradicating poverty and inequality.

The study reviewed trends of economic growth and financial inclusion in the SSA region in Chapter two. Upon review, trends reveal that account ownership, which is a fundamental base towards inclusive growth, has grown significantly from 2011 to date in the SSA region. Uganda and South Africa have contributed significantly to the improvement in account ownership as they have experienced a vast growth of more than 25 percentage points in the period between 2011 and 2021 (Raithatha, 2022). The region had 34.3% in 2014 and recorded 55.07% in 2021 (Raithatha, 2022). Advancement in digitalised financial services is recognised as the main force behind the increased financial inclusion as well as innovative business models such as agent banking hence SSA is recognised as a leading region in the growth of mobile money account ownership. Consequently, Kenya's poverty decreased by two per cent between 2008 and 2010 due to better access to mobile money services. A developed financial sector has been identified as a stimulus and a way to cultivate successful financial inclusion. Of the selected lower-income SSA countries, Kenya has the most developed financial sector which is bank-led and is well advanced in development compared with many other SSA countries of the same income level. Togo, Senegal, and Burkina Faso have developed financial sectors as well. In

total, the Togolese financial system has six insurance companies, five CBs, four nonbank financial institutions one development bank, and a savings bank.

The economic growth and financial inclusion connection has been theoretically explained through the Solow growth model, Public good theory, and dissatisfaction theory in chapter three. The Solow model equates an economy's rate of growth to its capital stock and emphasizes how greater investment spending leads to increased productive capacity. Accessibility towards formal financial services should be free non-rivalrous and non-excludable according to the public good theory. The dissatisfaction theory holds that financial inclusion initiatives in a country must first target people who previously did not partake in any of the services in the formal financial sector because of rules of conduct or a result of having a negative experience with its business agents.

To understand the relationship between financial inclusion and economic growth, an empirical literature review was conducted. There are different views among scholars who used different estimation techniques in studying the relationship. Through assessment of the literature, it has been pointed out by several authors that financial inclusion positively impacts economic growth. To be more specific, scholars have alluded that financial inclusion leads to poverty alleviation and subsequently income inequality decreases. Authors have gone further to state that utilisation of financial services has a measurable but discernible influence on inclusive growth relative to the availability and knowledge of financial services. While others have emphasized the importance of financial literacy in driving financial inclusion.

Chapter four detailed the methodology utilised to examine the relationship and achieve the objectives outlined in chapter one. The theoretical framework that underpins this research was identified, and variables of interest were defined together with their a priori expectations. The study adopted a model that was estimated by Thathsarani et al. (2021) who investigated financial inclusion and economic growth in South Asia. The unit root test for the panel data was highlighted to establish the order of integration, and the cross-sectional dependence test was outlined. Thereafter, the Kao and Pedroni test of cointegration was defined. To determine the presence of the short-run relationship between the variables, the panel ARDL test was discussed. To deal with the problem of endogeneity, where the independent variable is correlated with the error term in a regression model, a fixed effect method was noted. The study then reviewed all diagnostic tests to check for heteroskedasticity, autocorrelation and normality.

Chapter five is about the estimation and results analysis. The study's estimation was conducted using the panel ARDL model. There is a long-run relationship between the variables in this study. This confirms a strong, positive, significant impact of financial inclusion access on economic growth. Financial inclusion, when measured through usage, has a negative impact on growth. Furthermore, it has been established that the human development index has a positive impact on economic growth, although it is statistically insignificant. The study also found that domestic credit to the private sector has a positive impact on economic growth.

6.3 POLICY IMPLICATIONS AND RECOMMENDATIONS

The empirical findings of this study have yielded several policy recommendations. Firstly, financial access, as measured by the number of automated teller machines per 100,000 adults and the number of CB branches per 100,000 adults, according to the study, has been observed as the only financial inclusion indicator that demonstrates a positive relationship with economic growth. Therefore, to ensure inclusive growth, the government needs to enhance physical access to banking services. The expansion will facilitate greater participation in the formal financial system, leading to increased savings, investment, and overall economic activity.

The study has also found that financial inclusion, when measured through financial usage, is negatively related to economic growth. According to authors such as Cámara and Tuesta (2014) and Raithatha (2022), the usage of formal financial services is not an indication of financial system inclusiveness but rather an output of financial inclusion. This dimension assesses how consumers utilise financial services, such as transfers, remittances, borrowing, and savings, to represent the efficiency and inclusivity of the financial services offered to individuals in an economy. Given the positive relationship between human development and domestic credit to the private sector with economic growth, the government should continue to enhance and encourage financial institutions to improve their ability to equitably distribute financial resources across all economic segments. This approach will enable all economic agents to access credit, thereby fostering increased growth through various transmission channels.

6.4 DELIMITATIONS OF THE STUDY AND AREAS FOR FURTHER RESEARCH

This research has investigated the link between financial inclusion and economic growth for selected SSA countries between 2011 and 2021. The selection of countries is done based on data availability as per the World Bank database and other sources of data such as the IMF financial inclusion access survey. Some of the shortcomings experienced in doing the research

include data unavailability, and this has caused the study to focus only on 16 countries of the SSA region.

In examining the impact of financial inclusion on economic growth for the selected SSA countries, the study focused mainly on financial inclusion indicators as dependent variables. Variables used included GDP for economic growth, human development index, domestic credit to the private sector as percentage of GDP, automated teller machines per 100 000 adults, branches in commercial bank per 100 000 adults, outstanding deposits in commercial banks as a percentage of GDP and outstanding loans in commercial banks as a percentage of GDP. Further research on this topic could include other macroeconomic variables that might affect financial inclusion. Further research could be augmented to include other variables of interest, such as poverty, inflation, and interest rates, which were not included within this study.

Furthermore, there has been an increasing measurement of financial inclusion through digital finance, as individuals can now send and receive money without requiring bank accounts, ATMS, or visits to CB branches. The growth of mobile and internet banking suggests that future research should incorporate the number of electronic money (e-money) and instant money users to assess financial access more comprehensively. Additionally, further studies could investigate and compare the relationship between financial inclusion in other developing regions, such as SADC, COMESA, and WAEMU.

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APPENDICES

Appendix 1: Descriptive Statistics

	GDP	HDI	ATM	BRA	CREGDP	ODEGDP	OLGDP
Mean	4.616630	0.518473	6.909329	4.336353	18.15482	24.95628	17.63180
Median	*4.920266*	*0.520000*	*6.030793*	*4.408410*	*15.29237*	*21.51079*	*14.39490*
Maximum	15.74488	0.643000	17.00300	14.66872	40.16302	55.19871	37.98058
Minimum	-7.816951	0.395000	0.971841	1.087524	5.237706	9.093523	3.006402
Std. Dev.	3.135958	0.056501	3.379747	2.000525	8.013035	10.14243	8.413005
Skewness	-0.349405	-0.211035	1.001118	2.134879	0.612293	0.879059	0.644182
Kurtosis	6.392536	2.430554	3.850133	11.25436	2.446608	2.941457	2.261331
Jarque-Bera	82.48376	3.454077	32.53028	593.7611	12.41526	21.27405	15.16290
Probability	0.000000	0.177810	0.000000	0.000000	0.002014	0.000024	0.000510
Sum	761.7439	85.54800	1140.039	715.4982	2995.546	4117.786	2909.247
Sum Sq. Dev.	1612.814	0.523547	1873.321	656.3443	10530.23	16870.50	11607.70
Observations	165	165	165	165	165	165	165

Appendix 2: ARDL bound test results.

F-Bounds Test		Null Hypothesis: No levels relationship		
Test Statistic	Value	Signif.	I(0)	I(1)
		Asymptotic: n=1000		
F-statistic	1.046353	10%	1.99	2.94
k	6	5%	2.27	3.28
		2.5%	2.55	3.61
		1%	2.88	3.99
Actual Sample Size	131	Finite Sample: n=80		
		10%	2.088	3.103
		5%	2.431	3.518
		1%	3.173	4.485

Dependent Variable: GDP
Method: ARDL
Date: 01/12/24 Time: 02:45
Sample (adjusted): 2011M03 2021M01
Included observations: 119 after adjustments
Maximum dependent lags: 4 (Automatic selection)
Model selection method: Akaike info criterion (AIC)
Dynamic regressors (4 lags, automatic): HDI CREGDP ATM BRA ODEGDP OLGDP
Fixed regressors: C
Number of models evaluated: 62500
Selected Model: ARDL(2, 0, 2, 2, 2, 2, 2)
Note: final equation sample is larger than selection sample

Variable	Coefficient	Std. Error	t-Statistic	Prob.*
GDP(-1)	1.736161	0.066681	26.03667	0.0000
GDP(-2)	-0.753685	0.067139	-11.22573	0.0000
HDI	2.548428	2.537118	1.004458	0.3176
CREGDP	2.441798	0.321930	7.584875	0.0000
CREGDP(-1)	-4.291371	0.629876	-6.813036	0.0000
CREGDP(-2)	1.831513	0.358470	5.109246	0.0000
ATM	3.545475	0.940334	3.770440	0.0003
ATM(-1)	-6.971048	1.741296	-4.003369	0.0001
ATM(-2)	3.367655	0.896824	3.755091	0.0003
BRA	4.212752	0.379371	11.10458	0.0000
BRA(-1)	-7.334776	0.749875	-9.781330	0.0000
BRA(-2)	3.180038	0.462141	6.881102	0.0000
ODEGDP	-0.359913	0.109482	-3.287412	0.0014
ODEGDP(-1)	0.602532	0.211287	2.851719	0.0053
ODEGDP(-2)	-0.234653	0.115304	-2.035085	0.0445
OLGDP	-3.709649	0.504276	-7.356383	0.0000
OLGDP(-1)	6.445520	0.975061	6.610373	0.0000
OLGDP(-2)	-2.704397	0.551923	-4.899955	0.0000
C	-1.464541	1.189258	-1.231475	0.2210

R-squared	0.999576	Mean dependent var	4.189204
Adjusted R-squared	0.999499	S.D. dependent var	1.694663
S.E. of regression	0.037922	Akaike info criterion	-3.561204
Sum squared resid	0.143807	Schwarz criterion	-3.117478
Log likelihood	230.8916	Hannan-Quinn criter.	-3.381021
F-statistic	13086.17	Durbin-Watson stat	1.994986
Prob(F-statistic)	0.000000		

*Note: p-values and any subsequent tests do not account for model selection.

Appendix 3: Error Correction Model

ARDL Error Correction Regression
Dependent Variable: D(GDP)
Selected Model: ARDL(2, 2, 2, 2, 2, 2, 2)
Case 5: Unrestricted Constant and Unrestricted Trend
Date: 04/22/24 Time: 02:03
Sample: 2011M01 2021M12
Included observations: 119

ECM Regression
Case 5: Unrestricted Constant and Unrestricted Trend

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	3.115325	0.588408	5.294495	0.0000
@TREND	0.005109	0.000973	5.252432	0.0000
D(GDP(-1))	0.674898	0.058639	11.50931	0.0000
D(HDI)	-205.7131	18.94517	-10.85834	0.0000
D(HDI(-1))	164.3726	21.00688	7.824705	0.0000
D(CREGDP)	3.428610	0.176806	19.39196	0.0000
D(CREGDP(-1))	-2.475102	0.250943	-9.863212	0.0000
D(ATM)	2.406657	0.564455	4.263686	0.0000
D(ATM(-1))	-1.988460	0.578811	-3.435419	0.0009
D(BRA)	4.811535	0.288283	16.69030	0.0000
D(BRA(-1))	-3.017750	0.435326	-6.932169	0.0000
D(ODEGDP)	-0.946760	0.076513	-12.37393	0.0000
D(ODEGDP(-1))	0.644848	0.091662	7.035063	0.0000
D(OLGDP)	-3.858722	0.237881	-16.22122	0.0000
D(OLGDP(-1))	2.819014	0.315195	8.943720	0.0000
CointEq(-1)*	-0.021829	0.004126	-5.290795	0.0000

R-squared	0.990151	Mean dependent var	-0.008502
Adjusted R-squared	0.988717	S.D. dependent var	0.166686
S.E. of regression	0.017705	Akaike info criterion	-5.105371
Sum squared resid	0.032289	Schwarz criterion	-4.731707
Log likelihood	319.7696	Hannan-Quinn criter.	-4.953638
F-statistic	690.3575	Durbin-Watson stat	1.976727
Prob(F-statistic)	0.000000		

* p-value incompatible with t-Bounds distribution.

F-Bounds Test — Null Hypothesis: No levels relationship

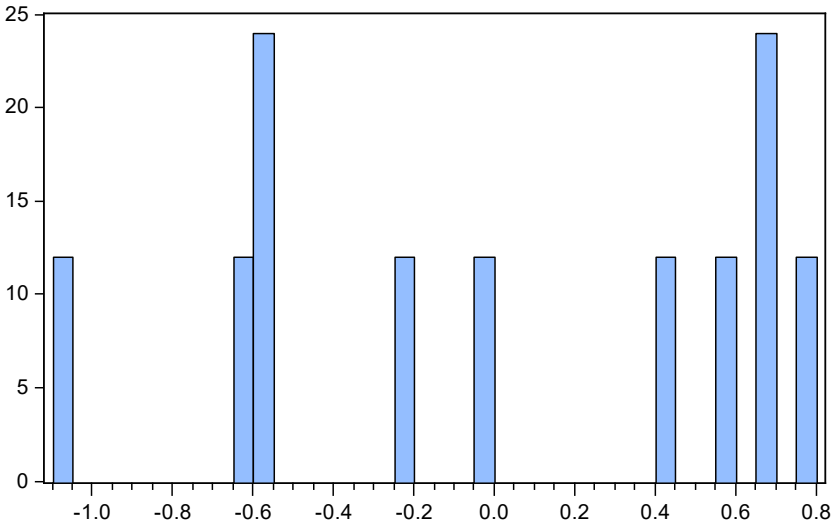
Test Statistic	Value	Signif.	I(0)	I(1)
F-statistic	3.765983	10%	2.53	3.59
k	6	5%	2.87	4
		2.5%	3.19	4.38
		1%	3.6	4.9

t-Bounds Test — Null Hypothesis: No levels relationship

Test Statistic	Value	Signif.	I(0)	I(1)
t-statistic	-5.290795	10%	-3.13	-4.37
		5%	-3.41	-4.69
		2.5%	-3.65	-4.96
		1%	-3.96	-5.31

DIAGNOSTIC TEST

Appendix 4 : Normality Test



Series: Residuals	
Sample 2011M01 2021M12	
Observations 132	
Mean	2.61e-14
Median	-0.013012
Maximum	0.780404
Minimum	-1.054961
Std. Dev.	0.628820
Skewness	-0.180112
Kurtosis	1.530596
Jarque-Bera	12.58899
Probability	0.001846

Appendix 5: Heteroskedasticity Test: Arch

Heteroskedasticity Test: ARCH

F-statistic	0.285825	Prob. F(1,128)	0.5938
Obs*R-squared	0.289645	Prob. Chi-Square(1)	0.5904

Test Equation:
Dependent Variable: RESID^2
Method: Least Squares
Date: 04/11/24 Time: 00:43
Sample (adjusted): 2011M03 2021M12
Included observations: 130 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.085174	0.033604	2.534638	0.0125
RESID^2(-1)	-0.047202	0.088290	-0.534626	0.5938

R-squared	0.002228	Mean dependent var	0.081335
Adjusted R-squared	-0.005567	S.D. dependent var	0.373255
S.E. of regression	0.374293	Akaike info criterion	0.887709
Sum squared resid	17.93219	Schwarz criterion	0.931825
Log likelihood	-55.70112	Hannan-Quinn criter.	0.905635
F-statistic	0.285825	Durbin-Watson stat	2.004677
Prob(F-statistic)	0.593836		

Appendix 6: Autocorrelation test

Breusch-Godfrey Serial Correlation LM Test:
Null hypothesis: No serial correlation at up to 1 lag

F-statistic	0.005875	Prob. F(1,123)	0.9390
Obs*R-squared	0.006257	Prob. Chi-Square(1)	0.9370

Test Equation:
Dependent Variable: RESID
Method: Least Squares
Date: 04/11/24 Time: 01:01
Sample: 2011M02 2021M12
Included observations: 131
Presample missing value lagged residuals set to zero.

Variable	Coefficient	Std. Error	t-Statistic	Prob.
HDI1	-0.014845	19.49660	-0.000761	0.9994
CREGDP1	0.000117	0.208528	0.000560	0.9996
ATM1	-5.10E-05	0.673571	-7.58E-05	0.9999
BRA1	-0.000142	0.334808	-0.000423	0.9997
ODEGDP1	-8.42E-05	0.089495	-0.000941	0.9993
OLGDP1	-2.51E-05	0.350879	-7.14E-05	0.9999
C	1.27E-05	0.026496	0.000479	0.9996
RESID(-1)	-0.006913	0.090189	-0.076648	0.9390

R-squared	0.000048	Mean dependent var	-3.65E-18
Adjusted R-squared	-0.056860	S.D. dependent var	0.285200
S.E. of regression	0.293196	Akaike info criterion	0.443172
Sum squared resid	10.57354	Schwarz criterion	0.618757
Log likelihood	-21.02778	Hannan-Quinn criter.	0.514520
F-statistic	0.000839	Durbin-Watson stat	1.999998
Prob(F-statistic)	1.000000		

Appendix 7: The Granger Causality Test

Pairwise Dumitrescu Hurlin Panel Causality Tests
Date: 03/24/24 Time: 01:08
Sample: 2011 2021
Lags: 1

Null Hypothesis:	W-Stat.	Zbar-Stat.	Prob.
ATM does not homogeneously cause GDP	2.32658	1.32369	0.1856
GDP does not homogeneously cause ATM	1.76946	0.52780	0.5976
BRA does not homogeneously cause GDP	1.67447	0.39209	0.6950
GDP does not homogeneously cause BRA	4.11231	3.87473	0.0001
ODEGDP does not homogeneously cause...	1.93078	0.75826	0.4483
GDP does not homogeneously cause OD...	1.45515	0.07878	0.9372
OLGDP does not homogeneously cause GDP	1.78541	0.55058	0.5819
GDP does not homogeneously cause OLGDP	1.87152	0.67360	0.5006
BRA does not homogeneously cause ATM	4.06411	3.80588	0.0001
ATM does not homogeneously cause BRA	4.45743	4.36776	1.E-05
ODEGDP does not homogeneously cause ...	3.03470	2.33528	0.0195
ATM does not homogeneously cause ODE...	1.43892	0.05559	0.9557
OLGDP does not homogeneously cause ATM	16.6367	21.7667	0.0000
ATM does not homogeneously cause OLGDP	1.92606	0.75151	0.4523
ODEGDP does not homogeneously cause...	6.10552	6.72217	2.E-11
BRA does not homogeneously cause ODE...	1.03187	-0.52590	0.5990
OLGDP does not homogeneously cause BRA	5.10770	5.29671	1.E-07
BRA does not homogeneously cause OLGDP	2.52136	1.60195	0.1092
OLGDP does not homogeneously cause ...	3.06773	2.38248	0.0172
ODEGDP does not homogeneously cause...	2.24329	1.20470	0.2283