THE REPUBLIC OF TÜRKİYE
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DIGITAL FINANCIAL INCLUSION AND ECONOMIC GROWTH IN GHANA

Master's Thesis

Mohammed Ahmed Suleman

ISLAMIC ECONOMICS AND FINANCE DEPARTMENT

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Abstract

This study empirically examines the impact of financial inclusion (FI) on economic growth (EG) in Ghana during the period 2004 to 2023. This study employed Autoregressive Distributed Lag (ARDL) cointegration to investigate the cointegration effect between the predictor variable (financial inclusion) and the dependent variable (GDP per capita) while considering macroeconomic control variables (inflation, trade, and population). This study further implemented principal component analysis (PCA) to measure the financial inclusion index (FII) to avoid multicollinearity and reduce dimensionality. The bound test confirmed a strong cointegration effect of GDP per capita and among the predictor variables. The long-run (LR) main findings show that FII has a positive and substantial effect on economic expansion, while trade openness and inflation show a significant negative effect on economic expansion in the LR. The short-run (SR) dynamic main findings indicate that FII and inflation have no immediate effect in the SR. Conversely, population growth revealed a significant negative effect on per capita income in the SR. Moreover, the correlation test analysis further revealed a positive and substantial relationship between FII and economic expansion in Ghana. Therefore, policymakers, financial regulators, and the government of Ghana should expand the leverage of FI by targeting disadvantaged and vulnerable people who lack financial access while stabilizing and managing macroeconomic control variables to promote economic development and financial sustainability in the LR. Additionally, the findings from the literature reveal that DFI has a significant impact on Islamic finance and banking stability, enhancing financial access, operational efficiency and adherence to Shariah-compliant financial services, which leads to inclusive growth.

Keywords: Financial Inclusion, Economic Expansion, Cointegration Effect, ARDL, Ghana.

Özet

Bu çalışma, 2004-2023 yılları arasındaki yıllık zaman serilerini kullanarak, finansal kapsayıcılığın Gana'daki ekonomik büyüme üzerindeki etkisini ampirik olarak incelemektedir. Çalışmada, kişi başına düşen GSYİH ile finansal kapsayıcılık endeksi, dışa açıklık, enflasyon ve nüfus artışı gibi belirleyici değişkenler arasındaki uzun ve kısa dönem eşbütünleşme etkisini araştırmak için Otoregresif Dağıtılmış Gecikmeler (ARDL) eşbütünleşme yöntemi kullanılmıştır. Finansal kapsayıcılığı ölçmek ve çoklu doğrusal bağlantıyı önleyerek boyutsallığı azaltmak amacıyla Temel Bileşenler Analizi (PCA) uygulanmıştır. ARDL sınır testi, kişi başına düşen GSYİH ile açıklayıcı değişkenler arasında güçlü bir uzun dönem eşbütünleşme etkisi olduğunu ortaya koymuştur. Uzun dönemde, temel bulgular finansal kapsayıcılık endeksinin ekonomik büyüme üzerinde olumlu ve anlamlı bir etkiye sahip olduğunu gösterirken, dışa açıklık ve enflasyonun ekonomik büyüme üzerinde olumsuz ve anlamlı bir etkisi olduğu görülmüştür. Kısa dönemde ise, finansal kapsayıcılık endeksi ve enflasyonun ekonomik büyüme üzerinde hemen bir etkisi bulunmamaktadır. Buna karşılık, nüfus artış oranındaki artışın kısa dönem dinamiklerinde kişi başına düşen gelir üzerinde olumsuz ve istatistiksel olarak anlamlı bir etkisi vardır. Ayrıca, korelasyon testi analizinin bulguları da finansal kapsayıcılık ile ekonomik büyüme arasında pozitif ve anlamlı bir ilişki olduğunu ortaya koymuştur. Bu nedenle, Gana'daki hükümet, politika yapıcılar ve finansal düzenleyiciler, finansal erişimi olmayan dezavantajlı ve savunmasız grupları hedefleyerek finansal kapsayıcılık düzeyini artırmalı, aynı zamanda kapsayıcı büyümeyi teşvik etmek için makroekonomik kontrol değişkenlerini istikrara kavuşturmalı ve yönetmelidir. Ek olarak, literatürdeki bulgular, finansal erişimle ilgili engelleri ele alırken İslami finans ve bankacılığın finansal kapsayıcılığı teşvik etme potansiyeline sahip olduğunu vurgulamaktadır.

Anahtar Kelimeler: Finansal Kapsayıcılık, Ekonomik Büyüme, Eşbütünleşme Etkisi, ARDL.

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Figures and Tables

List of Abbreviation

AN	Africa Nations.
ATM	Automated Teller Machine.
AIC	Akaike Information Criterion.
ARDL	Autoregressive Distributed Lag.
BTA	Better than Cash Alliance.
CV	Control Variables.
CM	Commercial Bank.
DFI	Digital Financial Inclusion.
DOLS	Dynamic Ordinary Least Square.
DV	Dependent Variables.
ECM	Error Correction Model.
EC	Economic Growth
FAS	Financial Access Survey.
FI	Financial Inclusion.
FII	Financial Inclusion Index
FMLS	Fully Modified Least Square.
GLS	Generalized Least Square
GDP	Gross Domestics Products.
GhIPSS	Ghana Interbank Payment and Settlement System.
GCC	Gulf Cooperation Council nations.
GMM	Generalized Method of Moments.

HDI	Human Development Index.
ICT	Information technology.
IV	Independent Variable.
IMF	International Monetary Fund.
LICs	Low Income Countries.
LR	Long Run
MENA	Middle East and North Africa.
MOMO	Mobile Money.
NBFIs	Non-bank Financial Institutions.
OECD	Organization for Economic Co-operation and Developmental
OIC	Organization of Islamic Cooperation
PCA	Principal Component Analysis.
POS	Points of Sale.
SIC	Schwarz Information Criterion).
SR	Short Run
SDGs	Sustainable Development Goals.
SAARC	South Asian Association for Regional Cooperation
SSA	Sub-Saharan African.
SME	Small Medium Enterprises.
VECM	Vector Error Correction Model.
WDI	World Development Indicator

Chapter One

Introduction

1.1 Background of the Study

Inclusive finance has been an important subject for policymakers in underdeveloped and developed countries worldwide and has become a critical topic and prerequest for inclusive growth, economic expansion, and innovative advancement in the financial sector worldwide (World Bank, 2019). In general, the world bank define financial inclusion (FI) as the accessibility and affordability of financial services for economic participants (World Bank, 2019). FI was defined by the International Monetary Fund (IMF) as the accessibility and availability of financial services at affordable prices for individuals, especially the underprivileged groups (IMF, 2021). Sarma, (2008), and Siddik et al., (2019) defined FI as a way of offering unbanked and disadvantaged people access to financial products and services with affordable costs and reliability, which has potential benefits for society. Another study by Allen et al., (2016) simply defined FI as the process of offering financial access that is affordable and accessible to individuals that have limited access to financial access.

Several theoretical and empirical studies have defined the concept of FI (Akileng et al., 2018; Chinoda & Kwenda, 2019; Demirguc-Kunt et al., 2017; Diniz et al., 2012; Khan, 2011; Nguyen, 2020; Sahay et al., 2015; Sarma & Pais, 2011). In accordance with Sarma & Pais, (2011) FI is referring to the affordability and accessibility of financial services to individuals, with an emphasis on small micro enterprises and disadvantaged and underprivileged groups. Moreover, FI is a situation whereby adults, low-income and vulnerable people have easy access to and effective usage of formal financial services and products. (Demirguc-Kunt et al., 2017). Another study by Diniz, Birochi, and Pozzebon (2012) stated that FI means offering all economic participants an inexpensive formal financial system and services with a preference for low-income groups. They declared that the main policy factor that has been found to contribute to the elimination of poverty is FI. FI is the ability of the public to receive and utilize various financial products (credit, insurance, savings, payments, and money transfers) at affordable prices that satisfy the user's requirements and raise their well-being and standard of living within a properly regulated

environment (Conceicao, 2019). Concerning the measurement of FI, another study by Khan, (2011) defined FI as a strategy implemented by the policymakers to promote formal financial products and services and offer effective and sufficient credit facilities to those who require financial services, such as underprivileged groups, disadvantaged people, small micro enterprises, and poor people. This could be economic participants who lack financial access and have no bank accounts from financial institutions. Patwardhan et al., (2018) FI involves providing rural populations and disadvantaged people with access to financial products and services from financial institutions. It is undeniable that greater FI enhanced economic development and financial sustainability, further reducing poverty and income inequality. Several empirical studies investigated the influence of FI on EG. For example, Sethi & Acharya, (2018) and Siddik et al., (2019) examined FI and EG in developed and underdeveloped countries and found a significant relationship between FI and EG.

FI makes it easier for money to move freely from savers to borrowers, boosts liquidity in industries and financial institutions that need it most, and encourages rapid economic development by allocating money efficiently (Sethi & Acharya, 2018). Consequently, FI influences both developed and developing countries' financial systems and promotes economic expansion. A study by Olarewaju Afolabi, (2020) and Demirgüç-Kunt & Klapper, (2012) declares that a well-designed plan and effective policies that offer effective financial services, for instance, savings, credits, pension funds, and insurance to vulnerable, poor, and disadvantaged individuals can boost employment growth and further increase investment and savings opportunities with a numerous effect that could enhance financial sustainability and improve inclusive growth.

On the relationship between FI and SDG achievements. FI can contribute to SDG attainment. For instance, effective FI provision can facilitate reducing income inequality, lowering transaction costs, poverty alleviation, and improving EG and educational systems (Abor et al., 2018). In line with Sharma, (2016) and Adedokun & Ağa, (2023) FI encourages and enhances wealth accumulation and long-term inclusive growth, addressing gender equality and poverty alleviation, and promoting economic development. Therefore, inclusive financial activity is vital for inclusive growth for developing countries worldwide, as it enhances and ease the access and usage of financial products and services by economic participants, especially vulnerable people.

Nevertheless, in relation to Islamic finance and banking, digital financial inclusion (DFI) is essential for improving financial access and adherence to Shariah-compliant banking and financial services. Moreover, digital FinTech transformation in Islamic finance can enhance operational efficiency and Shariah-compliant principles. Numerous theoretical and empirical studies (Bashir, 2024; Hassan et al., 2020; Kanwal et al., 2023; Monika & Azam, 2021; Phan et al., 2020; Putri & Hanif, 2024; Sajid et al., 2024) stated that FI has positively enhanced Islamic banking efficiency and sustainability, improved operational efficiency and Shariah standards, and also contributed to many Muslims countries (Malaysia, Turkey, Gulf countries, Indonesia, etc.) Islamic banking performance by promoting their products, enhancing services, lowering transaction costs, and further helping Islamic banks to operate more efficiently. Moreover, in this study, Islamic finance is discussed prominently; however, the empirical model does not directly measure variables of Islamic finance because Ghana does not have any Islamic finance windows or Islamic financial institutions in the Ghanaian financial sector.

FI is a critical topic among policymakers and stakeholders worldwide, particularly in developing countries and low-income countries (LICs) due to its potential advantages, which lead to advanced economic development (Nizam et al., 2020). Notwithstanding the potential role FI played in the developing countries. African countries still have a low FI compared to developed countries (Demirguc-Kunt et al., 2017; Zins & Weill, 2016). In developing countries, 65% of adults lack a financial account, while 20% deposit their funds via financial institutions (World Bank Group, 2022). Additionally, 48% of Sub-Saharan African (SSA) countries population live below $1.25 per day (World Bank, 2015). More than 2.7 billion adults in African countries cannot access financial services effectively and efficiently. Furthermore, in 2017, the adult segment in SSA countries had only 30% registered bank account numbers (Beck et al., 2007; Demirguc-Kunt et al., 2017). Therefore, to enhance these trends, policymakers should increase FI accessibility, which can lead to inclusive growth, and enhance financial sustainability.

Conversely, financial exclusion (FE) can be described as the process whereby individuals have no access to formal financial products and services to obtain their daily needs (Sinclair, 2013). Another study by Sethi & Acharya, (2018) stated that FE is a situation whereby the majority of economic participants are excluded from the formal financial services and products. Accordingly, EFInA, (2019) highlighted that a high inaccessibility of formal financial services can have an

unfavorable effect on EG, for instance, losing opportunities for potential revenue and further decreasing savings and investments.

In the empirical and theoretical review, numerous studies measure FI and EG toward cross-country and single-country levels using different FI indicators and find a significant linkage between FI and EG (Allen et al., 2016; Arora et al., 2021; Chinoda & Kwenda, 2019; Demirgüç-Kunt & Klapper, 2012; Iqbal & Sami, 2017; Sarma, 2008; Sarma & Pais, 2011; Sharma, 2016). However, a study by Sarma, (2008) critiques the implementation of single indicators to determine the level of FI, which can lead to misleading outcomes.

Overall, in our modern economic system and financial sector, FI is extremely crucial for developed and underdeveloped countries because it boosts inclusive growth and nations financial infrastructure, as it enhances EG and improves financial sustainability. In addition, FI is crucial for vulnerable and disadvantaged people who often have limited access to financial services, especially in underdeveloped countries like Ghana. Thus, this study is mainly intended to assess the relationship and the effect of FI on Ghanaian economic growth. This study employed a time series dataset received from the Financial Access Survey (FAS) and the World Development Indicators (WDI) for the period 2004 to 2023. The data is available to investigate the long-run and short-run cointegration effect between FI and EG (for more details you can refer to the data section).

Moreover, this study focuses on FI and EG in Ghana which included SSA because these countries are still developing, which makes it hard and more difficult for disadvantaged, low-income, and vulnerable people to access formal financial services, which can affect EG because a high population of SSA countries are unbanked, causing SSA to lose the opportunity of potential revenue. Henceforth, the government should expand the accessibility of financial services to individuals and SMEs, especially the disadvantaged and low-income people. Thus, it is essential to examine whether FI has a negative or positive effect on EG in Ghana. Furthermore, this study further highlights the influence of FI in Islamic finance and banking development. This is critical for the Bank of Ghana and the government, as the elected president (His Excellency John Mahama) just introduced an Islamic finance and banking window to the Ghanaian community in 2025. This is essential and crucial for Ghanaian EG and financial sustainability and further increases FI across the country.

1.2 Background of FI in Ghana: An Overview

In the context of Ghana, the development of financial inclusiveness cannot be discussed without mentioning the role of the central bank, microfinance institutions, and FinTech, as they have significantly contributed to financial accessibility, economic stability and further enhanced financial sustainability, and improved usage of FI among the Ghanaian community.

The banking system in Ghana was underdeveloped before 2009 because the banking system was solely dependent on colonial banking financial structures. Additionally, due to the lack of information technology infrastructure, the banking systems made it difficult to access financial products and services from financial institutions (Brownbridge & Gockel, 1998). The main players in the Ghanaian financial industry were commercial banks, insurance companies, and the central bank of Ghana (Brownbridge & Gockel, 1998). Furthermore, the underdeveloped infrastructure makes fraud easy to happen in the banking system because of the lack of national data identification to validate transactions (Amoah et al., 2020). These issues affect the financial sector, which has contributed to financial exclusion in Ghana. Henceforth, to increase and improve financial inclusion, foreign-owned banks introduced the first automated teller machines (ATMs) in 1995 by the Trust Bank with the implication of ICT (information technology) in the banking sector, and it became a main domain in the Ghanaian-owned banks in 2006 (Domeher et al., 2014). Subsequently, to promote the agenda of FI in the Ghanaian community, the Central Bank of Ghana has played a significant role over the past decade. For instance, the Central Bank of Ghana introduced policy guidelines in 2008 for the banking sectors to allow other branchless banking systems to reach up and take the advantages and potential benefits of digital technologies (Boateng, 2018). Furthermore, in the same year, the government further established the first biometric payment system called E-ZWICH (Africa & Breckenridge, 2010). E-ZWICH is a biometric smart card system introduced by Ghana Interbank Payment and Settlement System (GhIPSS) to enhance FI accessibility and ease the usage of financial access across the country.

Furthermore, in 2012 the government of Ghana engaged the Maya Declaration, aiming to revise the payment system policy by the end of 2012 and regulatory guidelines of branchless banking to encourage vulnerable people to obtain 70% of FI by the end of 2017. Moreover, in 2014, the government further engaged in the “Better than Cash Alliance” (BTA). BTA is an FI

program with the aim of increasing access to digital payments and decreasing transaction costs (Boateng, 2018). The Ghanaian financial sector has gone through diverse innovation stages, such as the first ATMs in 1995, E-ZWICH in 2008, and the Ghana Interbank Payment System and mobile money (MOMO). According to the Government of Ghana, (2017) in 2017 the banking system in Ghana issued 2,044 ATMs which are operated under the GhIPSS. The banking sector further issued 7,356 points of sale (POS) in the same year, mostly in urban population areas. Further, the Bank of Ghana (2020) stated that within the first quarter of 2019, the average E-ZWICH card issuance increased dramatically about 13%, from 793,000 to 2,836,565 cards for the period 2012 to 2013, respectively. However, the annual report from the Bank of Ghana, indicated that at the end of 2021, the Ghanaian financial sector contained the following: 24 savings and loans companies, 23 general banks, 180 microfinance companies, 2 leasing companies, 144 community banks, 15 financial houses, and 420 foreign exchange bureaus (Bank of Ghana, 2021).

On the other hand, the concept of microfinance is not new in Ghana; it was not a dignified organization until the acting of non-bank financial institutions (NBFIs) 1993 Act 328. The term microfinance in Ghana is considered a financial sector that consists of diverse financial institutions that facilitate a particular financial service to the vulnerable. For instance, insurance companies, savings and loan companies, and leasing companies that provide microfinance services to individuals, such as savings, microcredit, insurance, money transfer, etc. (Boateng, 2018).

In relation to FinTech innovation in Ghana. FinTech is essential and critical in enhancing the Ghanaian financial sector by introducing a comprehensive platform to expand access of FI in Ghana, for instance MOMO. MOMO was introduced in Ghana in 2008. According to the Bank of Ghana, (2018) the usage of MOMO in the Ghanaian financial sector expanded rapidly in the country as a substitute strategy for cash payments. Consequently, MOMO provision encourages vulnerable people to transfer funds, take out loans, make deposits, and pay bills. Furthermore, there has been a 131% growth in Ghanaian mobile money penetration, as stated in the Ministry of Finance strategic plan for digitization report in 2017. This has resulted in around 23.9 million recorded accounts with approximately 11.1 million activated account numbers (Antwi-Wiafe et al., 2023) and as of December 2021, there were 26 FinTech institutions operating in Ghana with an additional 300 start-up companies in the Ghanaian financial sector. Further, in June 2021, a total

amount of $7.9 million was invested in Ghanaians FinTech sector by Zeepay Gh Ltd (Ahiabenu, 2021).

This study mainly investigated the linkage between FI and EG in Ghana. The data analysis is based on Ghana because Ghana is still a developing country, which makes it hard for vulnerable people to gain the advantages of financial products and services. Notwithstanding, the usage of FI in some areas is still limited to financial access, such as gender and regions. For example, 54% of females had account number with financial institutions, while 62% of males had account numbers with financial institutions. In relation to regional saving account, only 19% of the rural population have savings accounts compared to 36.2% of the urban population (Adabor et al., 2023; World Bank Group, 2013). However, over the past decade studies showed that Ghana digital platforms have played an essential role in financial inclusion. Recent empirical studies indicate that Ghana digital platforms, such as MOMO, have contributed a substantial impact on productivity performance and EG, creating new jobs and reducing income inequality and poverty alleviation. Demirgüç-Kunt & Klapper, (2012) Ghana is one of the SSA countries that showed significant growth in financial inclusiveness and further increase the accessibility of financial services. Consequently, from 2011 to 2020, Ghana's FI has risen from 29% to 58%, respectively.

1.3 Problem Statement and Motivation

The idea of FI gained popularity across underdeveloped and developed countries worldwide, and it is increasingly appearing as a strategic factor in economic development and financial sustainability, as well as a critical topic for policy makers and academics in our modern financial system of digitalization. An increase in digital FI accessibility, affordability and usage plays a substantial role on societal empowerment and EG.

Financial exclusion is one of the main obstacles that harm Ghana and other developing countries EG and financial sustainability because a high proportion of the unbanked causes developing countries to lose the opportunity of potential revenues. Therefore, the motivation of the research problem statement is best explained in these following statements through some empirical studies. According to Demirgüç-Kunt & Klapper, (2012) the vast majority of the population in developing countries has a lack of financial access, including Ghana. In 2011, the

percentage of adults that owned an account was 29%. However, within two years after MOMO was established in Ghana, the percentage increased to 41% in 2014. While bank account ownership is a significant element towards FI, the main concern is how often these accounts are implemented in financial services. A recent study by UNSGSA, (2016) discovered that currently two billion adults do not have access to financial systems. Low-income, poor individual and disadvantaged people living in developing nations, which make up over 70% of the world poor, are mostly affected by financial exclusion. This hinders vulnerable individual's capacity to make money, defend themselves in critical situations, and save for their well-being in the future. Moreover, the inability to obtain financial access hinders the growth and prosperity of 200 million small medium enterprises (SMEs) in developing financial market systems.

Furthermore, in relation to credit access from the formal financial system, only 30% of Ghanaians have bank penetration that enables them to access credit (World Bank, 2015). Similarly, Poku et al., (2014) stated that 70% of Ghanaian population does not have a bank account, while approximately 90% of cash is held outside the boundaries of the banks. Beck et al., (2015a) stated that there is a significant number of adult populations in Africa that have a lack of financial access to maintain their financial needs. According to the World Bank, (2015) bureaucracy, distance, and high costs are some of the main obstacles that constrict the accessibility of formal financial services. All of these obstacles indicate market failure due to inadequate policies. Disadvantaged individuals in developing countries and LICs could gain potential benefits from getting financial access with an affordable cost and easy access.

Numerous studies suggest that financial exclusion is much more noticeable in underdeveloped countries compared to developed countries. This shows that FI is extremely crucial and requires global consideration, particularly in SSA countries, which included Ghana. For example, Demirgüç-Kunt & Klapper, (2012) employed Global Findex Datasets and discovered that the account penetration rate in developing nations (54%) is less in Organization for Economic Co-operation and Development (OECD) countries (94%). The study further revealed that 86% in OECD countries receive their wages through bank accounts, while in developing countries and SSA nations, 41% - 45% received their wage payments through bank accounts, respectively. UNSGSA (2016) revealed that in LICs and developing nations, financial services accessibility remains one of the main challenges for a considerable number of SMEs in LICs and emerging

economies. Hence, doubt has been raised whether there is linkage between FI and EG in developing countries and LICs.

1.4 Research Objectives

The main objective of this study is to investigate the long-run and short-run cointegration relationship between FI and GDP per capita in Ghana. Hence, the objectives are as follows:

- To assess the influence of FI on EG.
- To evaluate the linkage between FI and EG indicators such as GDP per capita, inflation, trade openness and population growth.
- To assess the influence of FI on Islamic finance and banking development.

1.5 Research Questions

The research questions are essential to align with the main objectives, purposes and hypotheses of the study. Therefore, the questions are significantly correlated with the primary objectives. The questions are as follows:

- The effect of DFI on EG in Ghana?
- What is the relationship between FI and EG?
- What is the concept and measurement of FI?
- The influence of FI on Islamic finance and banking development?

1.6 Research Hypothesis

Concerning the main objective and the questions of the study. This study examines the null hypothesis to decide whether FI has led to EG, reducing income inequality, poverty, and influence on Islamic finance development. The following are the research hypotheses:

Hypothesis 1: In general, the study hypothesized that FI enhanced the linkage between FI and EG in developed and underdeveloped countries, enhanced monetary policy effectiveness, and further reduced income inequality and poverty alleviation. This hypothesis can be identified with numerous existing literature and theories across different countries on the effect of FI on EG and

financial sustainability. For example, Sahay et al., (2015) stated that expanding financial access levels to multiple financial services will have a substantial effect on EG. Inoue & Hamori, (2019) find a noteworthy correlation between real GDP per capita and commercial bank branches and further discover significant linkage on EG. Ahmad et al., (2021) indicate that FI and human capital have a crucial effect on economic development and sustainability in China. In the same vein, Sethi & Acharya, (2018) declared that FI has a substantial effect on inclusive growth; they proposed that advancing FI with proper policies and regulations will eventually result in stronger EG in the LR. H1: There is a positive correlation between FI and EG in addition to reduced income inequality and poverty.

Hypothesis 2: FI improves Ghanaian EG and reduces income inequality and poverty alleviation. This hypothesis can be shown in existing literature reviews. For example, Odame et al., (2024) findings revealed variations in Ghana's macroeconomic variables and FI metrics contribute to variations in the country's EG. Adabor et al., (2023) showed that FI indicators significantly contributed to urban population growth in Ghana over time. Iddrisu & Danquah, (2021) discovered a positive and substantial effect between FI and poor household welfare, further reduce income inequality. According to Koomson et al., (2020) FI diminish the possibility of being poor, indicating the potential of FI to decrease income inequality and poverty alleviation in Ghana. H2: FI has a positive and significant impact on Ghanaian EG.

Hypothesis 3: FI enhances the potential for Islamic finance and banking development, highlighting the influence of FI to encourage accessibility, efficiency, and inclusive growth. Hassan et al., (2020) FI has been instrumental in advancing the efficiency of Islamic banking since the global financial crisis. This study ultimately recommends that DFI can be used in the Islamic banking industry to meet the current demands that will support banking stability and promote financial sustainability and EG. H3: DFI has significant influence on Islamic finance and banking development.

1.7 Significance of the Study

The core significance of this study is to provide a comprehensive understanding regarding the potential impact and nexus of FI on EG in Ghana. There is a large body of literature regarding

the linkage between FI and EG worldwide. However, in relation to African nations, studies are rarely regarding FI and EG. Therefore, this study is crucial and extremely important for various reasons:

Comprehensive Understanding of FI: The research explored how financial inclusiveness can enhance and improve accessibility to financial services in Ghanaian communities specifically and in SSA countries in general. This is extremely important for disadvantaged and vulnerable people who have limited access to financial accessibility. This study further highlighted the significance of FI services as the main impact of EG and sustainability in SSA countries. It stated that greater access to FI can enhance and improve EG and further enhance the well-being of the people and encourage business activities, especially in Ghana and SSA countries.

Case Study Concentrated on Ghana: This study further contributes to the current literature by concentrating on Ghana and SSA countries in general, whereby it is rare to find comprehensive research on the effect of FI on EG. This study plays a significant role regarding FI and its impact on inclusive growth and financial sustainability in regions that are often overlooked or underdeveloped and unbanked.

Methodological rigor: This study employed the autoregressive distributed lag (ARDL) technique to explore the LR and SR dynamics between the selected variables, which are FI, GDP per capita, trade openness, population growth and inflation during the period 2004 and 2023. This technique is extremely helpful for exploring the causal analysis for the LR and SR dynamics between the dependent variable and predictor variables. This approach is useful in evaluating cointegrating correlations of endogenous regressors. The study explored the causal nexus between FI and EG. The findings show that there is positive relationship between FI and EG, indicating that an increase in financial inclusion can have a substantial effect on EG and financial market sustainability. Furthermore, the study employed principal component analysis (PCA) estimations techniques to measure a composite index for FI to ensure estimation are efficient, reduce dimensionality, and avoid multicollinearity.

Policy Implications: The findings showed a positive and significant long-run cointegration relationship between FI and EG in Ghana. This indicates the importance for policymakers to draw effective and efficient strategy plans and policies to improve financial accessibility, which can lead to inclusive growth, economic expansion, and reduced income

inequality and poverty alleviation in Ghana. Moreover, by understanding the complexity of financial inclusiveness, governments and policymakers can design environments that encourage innovation and EG, consequently leading to income equality and poverty reduction across the country. Finally, the findings of this study are beneficial for the bank of Ghana, the Ministry of Finance, policymakers, and major financial institutions in Ghana to increase accessibility of financial services and to create policies and strategy plans that could enhance and encourage the financial institutions to be involved in the digital financial services as their main financial contacts.

DFI enhances the potential for Islamic finance and banking development: FI has played a substantial role in advancing the efficiency of Islamic banking development since the 2007 financial crisis. DFI can be utilized in the Islamic banking sector to meet the demands that will support banking stability, improve operational efficiency, enhance Shariah compliant, and further promote economic growth.

Enhancing Sustainable Development Goals (SDGs): This study promotes the sustainable development goals achievement and Africa Union's Agenda 2063. By linking FI and EG, the findings of this study highlight that FI can assist in diminishing inequality and improving employment opportunities and poverty alleviation, which are some of the most critical factors that are faced by Ghana and SSA countries as a whole. In addition, by carefully examining the potential of FI in attaining SDGs and the African Unions Agenda, this study significantly contributed to broader economic activities and strategies and enhanced the well-being of the household living standards and economic expansion in Ghana and SSA countries. In summary, this study contributes significantly to the current literature review by reviewing and analyzing how FI can enhance EG, reducing poverty and income inequality. In addition, this study provides policy strategies for policymakers and government for effective decision-making.

1.8 Scope of the Study

This study aims to explore the linkage and influence of FI on EG in Ghana in alignment with the research-selected variables for FI and EG (commercial bank branches per 100,000 adults, commercial bank deposit accounts per 1,000 adults, outstanding deposits per percentage of GDP, outstanding loans per percentage of GDP, inflation, trade, population growth, GDP per capita). The

study datasets were arranged between the years 2004 and 2023 using ARDL estimation techniques to test cointegration analysis between the variables.

Ghana plays a substantial role in the economy of SSA countries by contributing to their cross-border trade, investment flows and GDP. In addition, Ghana is one of the key players operating in African trade due to its cross-border investment flows and geographical economic integration, which makes Ghana an important player in expanding the leverage of the African economy, especially in SSA countries. Ghana is crucial for this study due to its economic expansion, and rapid growth in FI development, digital opportunities for disadvantages, and FI challenges. According to F. K. Agyapong, (2021) and D. Agyapong, (2020) and Rasheed et al., (2019) in recent years, Ghana has been recognized as one of the African countries with a tremendous impact of digital financial services, for example, payment, credit, and savings, which are transferred via ATMs, MOMO, E-ZWICH and the internet. Numerous digital platforms provide transactions and encourage FI accessibility among women and youth. The rapid growth in the implication of FI services has attracted scholars and policymakers in Ghana. Furthermore, the scope of this study will further have considerable attention to provide recommendations to policymakers, and the provision of potential advantages in FI towards Islamic finance and banking development.

1.9 Organization of the Study

The organization of this research framework is structured into five separate chapters. The first chapter offers a comprehensive insight into the introduction of the study, background of the study, objectives, and scope of the study. It additionally highlights the significance of the study, research problem statement, and research hypotheses and questions. The second chapter discusses the literature review, examining the theoretical framework and empirical review of the study. It comprises a deeper understanding of FI concept, measurement of FI and EG, an insight into the theoretical linkage between FI and EG, and the influence of FI in Islamic finance and banking development. It additionally provides an empirical review of the influence of FI on EG and the nexus between FI and EG in developed and underdeveloped countries in general and specifically in Ghana, which is part of the SSA countries. Moreover, chapter three discusses the required research methodology in details. It consists of diverse sources of data collection, describing

dependent and independent variables, measurements and descriptions of the variables and methods of analysis that were implemented in this study that are well identified. Chapter four showed the empirical output of the data analysis. It presents the major data interpretation and findings and further discusses findings in relation to the effect of FI on EG in Ghana, SSA, and Asia and further underscores the influence of FI in Islamic finance and banking development. Chapter five provide a conclusion to the research findings and discussions and offers some policy recommendations for decision-making.

Chapter Two

Literature Review

Over the past decade, FI has become a critical topic for developing and developed countries worldwide and is now recognized as a substantial component to sustained EG. Numerous empirical studies have confirmed a strong linkage between FI and EG. This chapter is intended to explore the existing literature reviewed on FI and EG in developing and developed countries in general and in Ghana specifically, which is part of the SSA countries. It is structured into two sections. The first section offers a comprehensive insight into the conceptual framework and theoretical analysis of FI and EG. It presents the concepts of FI and measurement of FI and EG, theoretical linkage between FI and EG, and the influence of FI on Islamic finance and banking development. The second section examines various empirical literature on the influence of FI on EG and the linkage between FI and EG in developed and developing countries in general and specifically in Ghana which is part of SSA countries.

2.1 The Concept of FI

Financial intermediaries, along with financial regulators, contribute a substantial role in distributing funds within the financial market and economy. However, due to funding constraints and limited financial access, underprivileged populations may have a lack of financial access. Thus, the United Nations initially introduced the idea of FI in 2005 during the International Year of Microcredit (Ren et al., 2023). FI is one of the main component concerns for many countries worldwide. FI includes providing all economic participants with accessible and affordable financial services, with a primary focus on low-income groups, the poor, farmers, SMEs and other underprivileged populations with a lack of financial accessibility (Ren et al., 2023).

Conversely, the opposite of FI is FE, which can be defined as the lack of accessibility and availability for numerous economic agents, including insurance, credit, and savings (Sinclair, 2001). Moreover, FE is most commonly associated with poverty and social exclusion (Barboni et al., 2017). Therefore, FI is one of the critical issues facing vulnerable and disadvantaged groups

that have a lack of social and educational services (Bernheim et al., 2015). Henceforth, FI contributed to various countries economic growth worldwide. It has emerged as the main focus of inclusive growth, capturing the attention of policymakers worldwide (Ifediora et al., 2022).

According to Hannig & Jansen, (2011) the core objective of FI is to provide the unbanked population the prospect and chance to have access to financial products and services from financial institutions. Economic participants or households are categorized as being in financial exclusion when they have limited access to financial services (Kumar & Mishra, 2011). Inequality can occur as a result of FE and further create a poverty cycle (Beck et al., 2007). Moreover, this issue has consequences for both developed and underdeveloped countries with vulnerable people who have limited access to financial facilities (Demirgüç-Kunt & Klapper, 2013). The IMF stated that FI is correlated with macroeconomic upshots, involving economic expansion, equality and stability (Sahay et al., 2015).

Nevertheless, numerous countries worldwide have made FI a fundamental core idea of their government agenda. In addition to providing low-income members with access to financial services from financial institutions, FI tends to increase low-income purchasing power and standard of living and further boost the nation's economy and sustainability (Thoene & Turriago-hoyos, 2017). Currently, in developed and underdeveloped countries, FI is the most common aim for most central banks. Goel & Sharma, (2017) declare that the usage of financial system and service for economic participants is a key factor for inclusive growth. Hence, an increase in financial access will dramatically enhance and further impact the GDP. In the same vein, FI has become a prerequisite for long-term economic growth (Le et al., 2020). Moreover, FI played a substantial role in the development of financial institutions. Thus, the FI idea is not that old; it was presented in the early 2000s. Chibba, (2009) stated that one of the key factors that cause poverty is FE. Therefore, financial access must be affordable, accessible and available to all economic participants in the country in order to meet the goal of FI.

2.2 Measurement of FI

The main goal of FI is to assist all economic participants, whether individuals, institutions, or microeconomic enterprises, by aiding them to receive financial products and services and

providing them with various options for assisting low-income individuals to improve their financial condition (Alnabulsi & Salameh, 2021).

EG is a collection of policies that governments and policymakers use to improve the economic stability, and boost living standards and well-being of individuals, improve health and education, and promote technology through innovation and investment (Alnabulsi & Salameh, 2021). GDP growth rate and international benchmarks of EG are used to calculate the EG rate (population, production and export capacity, per capita income, investment, education and health) (Van et al., 2021). In terms of the elements that expand EG rate. Prior research on FI has largely concentrated on measuring and encouraging FI innovations and its effects on EG, inequality and poverty mitigation (Chibba, 2009; Demirgüç-Kunt & Klapper, 2012; Hannig & Jansen, 2011; Sarma, 2008; Sarma & Pais, 2011; Sharma, 2016).

Numerous empirical studies use one or more single-variable metrics to quantify FI, including insurance penetration, savings capacity, bank account ownership, bank branches, bank accounts, GDP per capita, number of banking employees, etc. (Barbu et al., 2017; Demirgüç-Kunt & Klapper, 2013; Owen & Pereira, 2018; Sarma, 2008). However, these single-variable metrics have drawn criticism for being overly limited in their ability to apprehend the complexity of FI (Abor et al., 2020). Individual variables indicators for measuring and assessing the complexity of FI are insufficient to discourse the role of the financial structure in areas, for example, credit, savings, payments, insurance, and money transfer. Moreover, measuring FI with a single or one-variable metric can have flaws and produce a misleading result that may not have any bearing on policy (Beck et al., 2007; Kim et al., 2018; Sarma, 2008; Sarma & Pais, 2011; Sethi & Sethy, 2019; Sethy & Goyari, 2018; Sharma, 2016; Yorulmaz, 2018).

Consequently, empirical studies reveal that, in order to avoid misleading results due to the complexity of FI, a comprehensive and holistic method is needed to measure FI (Abor et al., 2020). With regards to FI measurement, Kouki et al., (2020) implemented three core magnitudes to measure the FII, namely availability, usage, and penetration of financial services. Moreover, prior empirical studies (Demirgüç-Kunt & Klapper, 2013; Goel & Sharma, 2017; Lenka & Sharma, 2017) put efforts to measure FII using supply and demand indicators, including the percentage of economic participants having access to savings, life insurance, loans, payments, ATMs per 100,000 adults, the number of commercial bank branches, the percentage of GDP as outstanding deposits,

etc. Other empirical studies, such as (Chatterjee, 2020; Huang & Zhang, 2020; Olarewaju Afolabi, 2020) explore multiple FII as a benchmark to determine FI effectively. Furthermore, Beck et al., (2007) use the UNDP Human Development Index (HDI) to measure metrics using the usage and penetration variable. In the same vein, Anarfo et al., (2020;) and Sharma, (2016) used penetration, usage, and accessibility to determine the combined index from a wide collection of proxies of FI; they employed a multivariate analytics and PCA techniques.

2.3 Theoretical Linkage Between FI and EG

In general, the financial system can be divided into two main segments or areas. These are financial liquidity and depth, financial development, and financial access, which simply means FI (Lenka, 2022). The main objective of financial advance is integrating financial institutions, international capital flows and financial markets to minimize transaction costs (Ibrahim & Alagidede, 2018a). Nonetheless, the main goal of FI is to connect those who have a lack of financial access with transparent, reasonably priced, and trustworthy financial services to the advantage of the majority of the impoverished (Sarma, 2015; Siddik et al., 2019). It is vital to remember that a nation may be financially developed and growing and yet have a substantial number of people without formal financial services accessibility. Therefore, FI and financial development are essentially relative terms (Lenka, 2022).

Furthermore, several theoretical studies discuss the nexus between FI and EG, and the essentiality of FI in economic development. An expanding body of research literature on the linkage between FI and EG has shown that FI is a prerequisite for lowering poverty, raising total factor productivity, and fostering economic expansion, which encourages entrepreneurship and draws attention to the economy's overall outputs (Babajide et al., 2021; Boukhatem, 2016). FI allows economic participants to use and access financial products and services such as deposits, payment systems, and loans, which leads to business opportunities, investments, health care, and education, all of which have a substantial effect on the EG (von Fintel & Orthofer, 2020). According to Chen & Yuan, (2021) FI plays a crucial role in allocating limited financial resources by offering affordable financial services, which promotes economic expansion. In the same vein (Abramova et al., 2022; M. Ahmad et al., 2021; Omar & Inaba, 2020; Ozili, 2018) FI boosts a nation's economy in various ways by offering effective and affordable payment systems,

improving the allocation of financial resources, and disseminating knowledge about available and potential investment possibilities.

Numerous well-known theories serve as the foundation that links FI to EG for the theoretical literature. One such example is economic theory, which includes models of supply and demand (Misati et al., 2024). The demand and supply hypothesis is one of the key theories that has been implemented to investigate the correlation between FI and EG which was proposed by (Robinson, 1952). The objective here is to determine whether a financial innovation arises because of market demand for new financial innovations or because it develops on its own without the influence of market conditions. Demand for financial developments and innovations may come from businesses looking for creative methods to lower taxes and minimise risk, or it may come from economic participants who need to borrow and invest money (Misati et al., 2024). Furthermore, in accordance with the demand hypothesis, financial development happens after EG due to new demands for financial products such as current accounts, savings accounts, payment systems, ATMs. This rise in demand and services guarantees further expands on economic growth (Robinson, 1952). Robinson's theory basically suggests that financial development raises financial products and services demand in the economy, which in turn causes expansion in GDP per capita as a result of higher aggregate demand. Numerous empirical investigations confirm the demand-following concept and assert that it works better in emerging nations than in developing countries (I. Hasan et al., 2009; Samy Ben Naceur & Ghazouani, 2007; Samargandi et al., 2014). Moreover, consumers can easily access credit facilities because of greater inclusivity, which leads to raising demand for energy-intensive consumer goods such as conditioners, refrigerators, microwaves, irons, and washing machines. This in turn raises CO2 emissions (Frankel & Romer, 2017).

Alternatively, the supply of financial innovation argues that the incentives of financial subdivision to provide financial innovations, namely financial instruments, are not taken into account by regulatory or traditional economic theory. In this situation, the financial institution sectors are primarily motivated to develop in order to restore the monopolistic state that is typically lost as a result of financial inventions not being patentable. Financial institutions achieve this through either raising the complexity of financial services and products (Khraisha & Arthur, 2018). According to the supply-leading concept, financial development promotes economic sustainability and growth by offering resources for expansion (Hsueh et al., 2013). Accordingly, Patrick H. T.,

(1966) has listed three key elements in which financial development might impact economic expansion. First, to assure EG and development, we need to boost the capital accumulation rate by offering a simple and efficient platform for transactions, investments and savins. This will motivate economic participants in an economy to work more, save more, and invest more. Second, it provides an alternate method for moving money from less productive to more productive purposes. Finally, a channel that highlights how differences in ownership and composition facilitate the efficient transfer of physical wealth through intermediation among different asset holders.

Furthermore, two main growth models, exogenous and endogenous growth models, were developed in order to explain variations in EG over time and among nations. In order to elaborate on growth disparities worldwide, exogenous models emphasize the role of employment productivity (Domar, 1946) while endogenous growth model emphasizes technological advancement (Solow, 1956). However, critics point to the exogenous growth model's failure to acknowledge efficiency variables, including appropriate regulatory frameworks that transfer savings into investments and macroeconomic control variables (Chirwa & Odhiambo, 2018). Conversely, endogenous growth focuses more on human capital and inventive investment as a means of explaining variations in EG across time and between nations (Chirwa & Odhiambo, 2018; Inoue & Hamori, 2019). Accordingly, innovation, which includes new markets, processes, and products, is the driving force behind technical advancement. Many of these innovations are influenced by economic activity. Development in technology contributes to both observable and non-observable outputs. However, within the scope of endogenous growth, numerous literature have acknowledged the contribution of financial services concerning MOMO, FinTech, and the ability to save and move money (Ibrahim & Alagidede, 2018a; Sharma, 2016; Srouji, 2020).

Nevertheless, one of the most essential theories on the reasons behind economic expansion is the neoclassical hypothesis. Most prior studies on EG are based on the Solow growth model (Solow, 1956) which is one of the acknowledged neoclassical economic models. Solow tried to provide a more comprehensive explanation of how EG took place by using technological level, which is viewed as an external component as well as an independent variable in this model of EG. According to this theory, GDP can be affected by various factors, with a rise in technological sophistication being the most important factor. In the same vein, Romer (1990) in relation to technical advancement and its impact on EG. Romer declared that when allocating human

resources, a balance should be made or struck between production-related duties and those involving innovation and research. This is due to the fact that increased investment in innovation activities and research can lead to a rapid inclusive growth and sustainable EG.

According to theoretical literature, the relationship between FI and EG occurs through two key elements. First of all, the vulnerable and underprivileged people should have access to formal financial products and services at an affordable cost to enhance their standards of living and wellness. Economic activity and production are sparked by disadvantaged and low-income earners access to low-cost credit, which increases the output of products and services (Adedokun & Ağa, 2023; Sahay et al., 2015). Second, unbanked individuals need bank account numbers to access savings, and deposits that allow them to raise cash through financial markets or stock markets, encouraging them to participate and facilitating the transfer of savings to financial markets. Moreover, financial markets should ensure that funds are allocated efficiently and effectively into long-term profitable ventures. Therefore, in order to satisfy the funding requirements required to encourage additional investment, financial markets should take steps to protect against the essential liquidity shocks that can emerge from insufficient flows into the market. Consequently, output rises and creates more job possibilities, which raises income for disadvantaged and vulnerable people and causes income to be redistributed (Claessens & Perotti, 2007; Gowtham, 2017). Furthermore, expanding the access of financial products and services will probably speed up and enhance the process of conserving money and allocating resources to investors, which will raise the productivity factor (Claessens, 2006; Sethi & Acharya, 2018). Another study by Gowtham, (2017) declares that sustainable EG can be achieved only when all economic participants, including disadvantaged, underprivileged and all segments of society, are fully engaged in economic activities.

In general, the following factors contribute to the positive relationship between FI and EG. An inclusive financial system can make money more accessible and enable individuals from all segments of society to obtain quick, dependable, and reasonably priced financial services and products (Sarma & Pais, 2011). In the same vein, an increase in resource allocation and good strategic financial policy is associated with banks substantial deposit base (Babajide et al., 2021). Some studies have emphasized the inverse U-shaped linkage between FI and EG (Amponsah et al., 2021). On the other hand, inclusive finance makes financial products and services easier to

access and inexpensive for businesses and individuals in society, enabling them to make more effective investments in green technologies. In this sense, an increase in financial inclusivity can benefit the environment by lowering the cost and increasing the dependability of improved environmental services (Le et al., 2020). Moreover, an expansion of financial inclusivity enables businesses and individuals the opportunity to utilize a variety of financial service, which supports manufacturing and industrial activities within the economy (Wang et al., 2022). Hence, a stronger deposit base for financial services providers, more savings, and increased disposal income for vulnerable and disadvantaged people are all ways that financial inclusivity can boost the economy. Financial inclusion can have a substantial effect on Ghana's economic growth by enabling all economic participants from diverse segments of the society to engage in formal financial activities.

2.4 The Influence of DFI on Islamic Finance and Banking Development

DFI is essential and crucial in our modern financial stability and EG alongside both conventional finance and Islamic finance and banking. DFI can be described as a platform of digital technologies that offer financial products and services to all individuals in the economic activity to access formal financial services, particularly vulnerable people, lower-income people, and disadvantaged people who have a lack of financial services. Digital platforms such as digital wallets, FinTech, mobile banking, MOMO, digital payments and blockchain contribute significantly in enhancing and promoting FI across the world. Hence, in relation to Islamic finance. DFI is extremely important in addressing and enhancing financial accessibility and adherence to Shariah-compliant banking and financial services, and further encourages inclusive growth by reducing poverty.

According to Ozili, (2018) the effectiveness and efficiency application of DFI boosts the profitability of the banks and further improves financial sustainability and EG. Another empirical study conducted by Scott et al., (2017) revealed that there is a significant impact of FI on the profitability of American and European banking sectors. In the same vein, José & García, (2016) discovered that there is a substantial linkage between FI and financial sustainability. Furthermore, an increase in financial inclusion leads to inclusive growth, banking stability, and financial sustainability and EG. Li et al., (2020) conducted an empirical study in 31 Asian countries and discovered that FI has a positive and significant impact on financial sustainability. Several

empirical studies, for example, Beck et al., (2015) on African nations, Neaime & Gaysset, (2018) on MENA (Middle East and North Africa) nations, and Ahamed & Mallick, (2019) on international evidence of 86 countries, discovered in their studies that there is an enormous significant effect of FI on financial sustainability, bank solidity and EG.

In relation to Islamic finance. Numerous studies were conducted on the linkage between FI and Islamic finance, highlighting the impact of FI to encourage accessibility, efficiency, and inclusive growth. As demonstrated FI has been instrumental in advancing efficiency of Islamic banking since the global financial crisis. The implication of DFI in the Islamic banking industry is to meet the current demands that will support banking stability and promote financial sustainability and EG. Another study by Hassan et al., (2020) employed a panel-corrected standard error and two-stage least squares estimation approach to explore the impact of DFI on sustainable EG via Islamic banking sustainability. The study indicates that DFI endorsement can promote sustainable economic development and banks financial sustainability, particularly Islamic banks, leading to progress towards SDGs attainment, for instance, reducing poverty and economic inequality.

Furthermore, other empirical studies on FinTech and digitalization in Islamic finance and banking have identified various potential benefits and advantages of FinTech in expanding FI and increasing the accessibility and availability of the Islamic finance sector, particularly Islamic banking sector financial products and services (Ali et al., 2021; Aysan et al., 2022; Rabbani et al., 2020). Despite its lesser size than the conventional banking sector, it has demonstrated that Islamic finance is dynamic by nature and offers a wealth of prospects for Islamic FinTech innovation. This dynamism, however, also presents difficulties that require calculated solutions (Aysan et al., 2022). Moreover, in order to execute financial services and banking operations that adhere to Shariah standards, Islamic banks can use FinTech, which combines various digital solutions with Islamic finance standards. Fintech platforms help Islamic banks operate more efficiently and lower the transaction cost. Consequently, this makes it easier for marginalized and disadvantaged people to obtain formal financial services; vulnerable people often find it difficult to obtain standard banking services due to lower income or financial exclusion (Bashir, 2024). According to Phan et al., (2020) and Monika & Azam, (2021) the main fundamental of implementing FinTech in the Islamic finance and banking sector is to enhance and improve the excellence and efficiency of Islamic financial

products and services by boosting the accessibility and usage of financial services, lowering the transaction cost and service cost, and reducing intermediaries.

Nevertheless, there are multiple Islamic nations, such as Malaysia, Turkey, Indonesia, and Gulf Cooperation Council (GCC) countries, which have made a tremendous contribution of FinTech into their Islamic finance and banking sector, which leads to a significant impact on their Islamic banking performance through promoting their products, enhancing services, expanding efficiency, and increasing competitiveness in the financial market worldwide (Bashir, 2024). Moreover, a recent study conducted by Putri & Hanif, (2024) employed a descriptive analysis technique to assess the role of FinTech in promoting Islamic finance and banking development and sustainability in Indonesia. The findings of the study showed that the acceptance of Islamic FinTech shariah is highly predicted to continue expanding in the region, boosting the opportunities for Islamic finance product and service innovation. They further stated that regulatory support is highly recommended to ensure Islamic FinTech is fully Shariah compliant and can boost the financial inclusivity and sustainability of Islamic finance FinTech in the country.

Another recent study by Kanwal et al., (2023) investigates the nexus and the impact of financial technology within the Islamic finance sector with the primary focus on banking, investment and Shariah compliant standards and regulations. The findings of the study reveal that financial technology can assist to help enhance the accessibility of financial services, particularly for disadvantaged societies that have a lack of financial services. The study also finds that digital FinTech transformation in Islamic finance can enhance and improve operational efficiency and Shariah compliant standards. Furthermore, Sajid et al., (2024) explored generalized method of moments (GMM) analysis and Z-score techniques for the period 2010 to 2021 to explore the linkage between DFI and Islamic bank sustainability of 65 Islamic banks within six countries. They discovered that DFI positively and significantly impacts Islamic banking efficiency and sustainability, financial inclusivity, and lowers bank default risk and promotes inclusive EG.

2.5 Empirical Review

This section of the thesis will review findings and results from several empirical studies on the influence and nexus of FI on EG. The empirical review in this section is divided into two main

elements, which will comprehend studies shown in developed and developing countries worldwide, including Ghana, which is part of SSA countries.

2.5.1 FI and EG Linkages in Developing and developed Countries

Numerous empirical studies have examined the impact of FI and EG nexus across different countries, implementing diverse methodologies. Several studies reported a positive correlation between FI and EG, such as (Inoue & Hamori, 2019; Iqbal & Sami, 2017; Kim et al., 2018; Lenka & Sharma, 2017; Nizam et al., 2020; Sethi & Acharya, 2018; Sharma, 2016; Siddik et al., 2019; Singh & Stakic, 2021). Asha, Bhasi, and Chandramouli (2017) explored the linkage between financial accessibility and EG between 2007 and 2015 in eight South Asian nations using GMM measurement. They discovered that income increases alongside financial accessibility expansion. Therefore, expansion of financial system access plays a significant role in EG in low-income countries compared to middle-income nations. Similarly, Kim et al., (2018) implemented diverse methodologies such as dynamic panel estimation, panel Granger causality test, panel vector autoregressive methodology, and impulse-response functions to investigate the affiliation between FI and EG in 55 organization of Islamic cooperation (OIC) countries. The findings of dynamic penal estimation discovered a positive relationship impact on EG.

Malinda & Maya (2018) investigated the nexus between FI and EG from the period 2007 to 2016 in 11 countries and employed the vector error correction model, Granger causality tests, and the pooled regression model. The results demonstrate a long-run linkage between FI and EG. However, numerous empirical studies discovered LR and SR connections between energy consumption and GDP (Apergis & Payne, 2009; Mukalayi & Inglesi-Lotz, 2023) while other empirical studies discovered bidirectional causalities between EG and energy consumption (Farhani & Rejeb, 2012). As a result, FI positively impacts energy consumption through monetary expansion and vice versa.

In line with the relationship between the FI and EG. Singh & Stakic (2021) investigated the linkage between FII and economic development during the period 2004 to 2017 in South Asian Association for Regional Cooperation (SAARC) countries. They use dynamic ordinary least squares methods (DOLS), fully modified ordinary least squares (FMOLS), and the Pedroni panel

co-integration test. The study findings indicate that the Pedroni penal co-integration test showed an LR relationship between EG and FI in the SAARC nations. Moreover, the findings of DOLS and FMOLS further confirmed that the selected control variable alongside the FII has a significant effect on EG. Another study by Ain et al., (2020) examined the nexus between FI and EG for the period 2004 to 2016 using GMM method, the study declared a positive effect of FI on EG.

In the same vein, Sahay et al., (2015) employed GMM and OLS methods to assess the connection between FI on economic stability and inequality in developed countries. The results showed a positive significant relationship between FI and economic expansion. They stated that an increase in the financial access by economic participants to multiple financial services will have a substantial effect on EG. Similarly, concerning banking diffusion and the practice of banking services, Ratnawati, (2020) examines the influence of FI in terms of banking penetration and the use of banking services on income inequality, poverty alleviation, and inclusive growth in Asia. The findings indicated that FI has showed a positive and significant effect on poverty, income inequality and EG. Tchamyou et al., (2019) examined the potential of ICT for the period 1996 to 2014 in 48 African development dynamic countries implementing GMM methods. They discovered that the financial sector has a substantial effect in eliminating poverty and income inequality.

Furthermore, Sethi & Acharya (2018) implemented diverse methodologies to investigate the effect of FI on economic solidity for the period 2004 to 2010 in more than 25 underdeveloped and developed countries using panel data models (panel cointegration and panel causality tests). The findings demonstrated a positive LR association between FI and EG in the selected nations as well as a positive correlation between FI and EG. Additionally, FI has a noteworthy impact on economic stability. This study proposed that a proper strategy plan and well-regulated policies should be taken into consideration to boost FI, which will eventually lead to EG in the LR.

In the same vein, Inoue & Hamoz (2019) employed GMM methods to investigate the impact of FI on EG from the period 2004 to 2014 in 168 developing countries. The findings showed a significant relationship between GDP per capita and commercial bank branches with a positive linkage on EG in the selected nations. Nevertheless, Ahmad et al., (2021) investigated the relationship between DFI and economic development and discovered a positive effect in China's EG. The empirical results discovered that human capital and FI have a crucial impact on China's

economic development and sustainability. In the same vein, Ozturk & Ullah, (2022) employed multiple methods to investigate the influence of DFI on environmental sustainability and EG from the period 2007 to 2019 using GMM methods, two-stage squares, and pooled ordinary squares. The findings showed a negative effect between DFI and environmental quality due to atmospheric carbon dioxide pollution and a positive impact on EG.

In line with the linkage between FI and monetary policy effectiveness, Lenka & Bairwa, (2016) investigate the influence of FI on monetary policy effectiveness using the generalized least squares (GLS) approach during the period 2004 to 2013 in SAARC countries. The findings reveal a negative impact of FI, interest rate and exchange rate on inflation. However, another study by Mehrotra & Yetman, (2014) investigated the impact of FI on monetary policy. The findings indicate that the ratio of output instability to inflation fluctuation and the proportion of households with capital are positively correlated with efficient monetary policy. They claimed that the main source of the research findings is central banks, due to their greater discretion over monetary policy choices, and they may be best suited to determine the cause of action.

In relation to FI, EG, income inequality and poverty alleviation. Several empirical studies have investigated the influence of FI on inequality and poverty using diverse methodologies (Fouejieu et al., 2020; Kling et al., 2020; Lacalle-Calderon et al., 2019; Martínez Turégano & García Herrero, 2018; Omar & Inaba, 2020; Ouechtati, 2020; Sarma & Pais, 2011). Park & Mercado, (2018) explored that FI is one of the key factors for inclusive growth, as an increase in formal financial accessibility for economic participants can dramatically boost the consumer price index and investment in the long run. FI innovations and improvements can have a substantial effect on the economic members involved in productivity.

Furthermore, the literature review highlights the impact of FI on EG across various regions and contexts. Numerous studies presented in the literature review, such as Sarma & Pais, (2011) investigated the influence of FI and EG and declared that FI is critical for EG and poverty elimination. In addition, Omar & Inaba, (2020) explored the nexus between FI and poverty alleviation and income inequality in 116 developing countries. The findings reveal that FI has a substantial effect on diminishing income inequality and poverty in the selected nations. Fouejieu et al., (2020) examined the linkage between financial inclusion usage, accessibility and income inequality. The study offers empirical literature estimates of the affiliation between FI and

economic inequality through the availability and utilization of financial facilities. It further took into consideration possible nonlinearities in this nexus by emphasizing the influence of current financial and economic conditions. Diniz et al., (2012) claimed that FI significantly contributes to the people's welfare and well-being as well as the sustainability of socio-economic growth. Ouechtati, (2020) employed a dynamic panel data method to assess the influence of FI on income inequality and poverty in 53 developing countries. They stated that an increase in credit accessibility and a high bank penetration rate diminish income inequality.

2.5.2 The Linkage Between FI and EG in Ghana and SSA Countries

Empirically, several studies attempt to explore the linkage between FI and EG in SSA countries, including Ghana, using a panel dynamic GMM model and discover a positive linkage between FI and EG. For instance, Inoue & Hamori, (2016) examined the correlation between EG and financial access in 37 SSA nations for the period 2004 and 2012, using panel dynamic model indicator. The findings discover a significant relationship between economic growth and the number of commercial bank branches. Moreover, financial deepening has a positive and significant effect on SSA nations economic expansion. In the same vein, Adedokun & Ağa, (2023) employ panel dynamic data of SSA nations and find that FI plays a significant role in SSA economic expansion. Their study is in agreement with empirical studies by Alhassan et al., (2021) and Emara & El Said, (2021) which declare that FI positively affects economic expansion and sustainability. Additionally, Abor et al., (2018) assess whether mobile telephony promotes efficient consumption and poverty alleviation for households in Ghana. The findings confirm that FI and mobile telephony positively and significantly impact household consumption and further reduce poverty, indicating the potential of increasing consumption of products and services, which boosts economic growth.

In relation to the linkage between FI and EG. Ifediora et al., (2022) employ a panel dynamic GMM technique for their research data analysis during the period 2012 and 2018 to examine how FI affects EG in 22 SSA countries, using both individual FI indicators and a composite index of FI. The findings discovered that EG is positively and significantly affected by composite FI and availability and penetration dimensions of FI, whereas the usage dimension has a positive but negligible impact. Asante et al., (2023) investigated the influence of financial development on EG

for the period 2000 to 2019 by focusing on the linkage of the quality of financial organizations in 29 SSA nations, using the panel GMM estimation approach. The findings discovered a positive and significant influence between financial development and EG. Moreover, the findings further highlighted the key beneficial effect of financial development on economic expansion is amplified in environments with strong political stability and strong quality regulations. Similarly, Odame et al., (2024) examined the nexus between FI and EG in Ghana during the period 2005 to 2016, using datasets from Heritage Foundations and the World Bank by applying dynamic OLS and FMOLS. The study findings revealed that variations in Ghanaian macroeconomic variables and FI metrics contribute to variations in the country's EG. Adabor et al., (2023) explored the impact of FI on urban population growth in Ghana using three different dimensions of FI during the period 1960 to 2020, using ARDL estimation techniques. The results showed that FI indicators meaningfully contributed to urban population growth over time in Ghana.

Similarly, Sarpong & Nketiah-Amponsah, (2022) employed GMM analysis techniques on a dataset from 2004 to 2018 to investigate the correlation between FI and inclusive growth in SSA countries, using three factors of FI: availability, knowledge, and usage. The study discovered that the usage of financial products and services has a positive and significant impact on inclusive growth compared to knowledge and availability in SSA nations through financial services. This finding is in accordance with studies by Babajide et al., (2015) and Demirgüç-Kunt & Klapper, (2012) which quantified that effective usage of financial services with strong financial accessibility has a significant effect on the EG rate and economic sustainability. Furthermore, Shen et al., (2021) stated that EG is positively and significantly influenced by DFI. Similarly, Ibrahim & Alagidede, (2018) find a positive effect of financial development and services on EG in SSA nations. Several studies further showed the nexus indication of FI on GDP, and revealed that FI has a significant correlation with GDP (Hajilee et al., 2017; Iqbal & Sami, 2017; Maune et al., 2020). In the same vein, Iddrisu & Danquah, (2021) discovered a positive and significant impact between FI and poor household welfare, indicating the potential benefits for poverty alleviation and reducing income inequality in Ghana.

In addition to the linkage of FI and EG. Mawejje & Lakuma, (2019) further declared that MOMO has a positive and substantial effect on aggregate economic activity in Uganda and SSA countries, respectively. Several studies revealed that ICT and FI with MOMO have a positive and

substantial influence on economic expansion (Kpodar & Andrianaivo, 2011; Pradhan & Sahoo, 2021). Kpodar & Andrianaivo, (2011) examine how FI is effective with the widespread use of phones in Africa, using panel data techniques for 44 African nations from the period 1988 to 2007. They discovered that mobile phone penetration has a substantial impact on inclusive growth. Additionally, Abbey, (2021) estimated that MOMO platform services in Ghana has introduced over 140,000 jobs and further expanded the EG. Ouma et al., (2017) examine the impact of MOMO financial services in terms of FI and savings mobilization in SSA countries. Their findings revealed that the spread of MOMO financial services and banking has boosted savings in Zambia, Kenya, Malawi, and Uganda by encouraging savings among low-income and rural people with a lack of access to formal financial systems. Suri et al., (2012) emphasized that MOMO has a substantial effect on saving behavior, poverty and household consumption. Additionally, Takyi et al., (2022) investigate the influence of MOMO on saving behavior in Ghana. The findings revealed that MOMO has a positive and substantial effect on saving behavior in Ghana. Furthermore, Asongu & Nwachukwu, (2016) found that lower Gini coefficients were linked to higher mobile penetration in Africa. Similarly, a study by Suri & Jack, (2016) stated that in Kenya, high availability of MOMO services has helped more than 100,000 households escape poverty and raised consumption levels per capita.

On the relationship between FI and its impact on monetary policy efficiency. Mbutor, (2013) employed the Johansen cointegration estimation approach, using time series from 1980 to 2012 to investigate the impact of FI on monetary effectiveness in Nigeria. The findings revealed that higher availability of FI enhanced monetary policy effectiveness. In the same vein, Evans, (2016) implemented the panel vector error correction model (VECM) technique over the period 2005 to 2014 to assess the linkage between FI and monetary policy effectiveness and efficiency in Africa. The study revealed an LR correlation between FI and the effectiveness of monetary policy in African countries.

Numerous empirical studies have further discovered that human capital has a substantial correlation with FI (Assefa & Mollick, 2017; Hajilee et al., 2017). For instance, Hajilee & Niroomand, (2019) investigated the influence of financial market inclusion on trade in 18 emerging economies and revealed that FI has a significant effect on trade both in the LR and SR. Furthermore, Hajilee et al., (2017) and Kim et al., (2018) revealed that employment (labour force)

has a substantial and positive impact on FI and EG. Waverman et al., (2005) employed a Barro-type growth model to investigate GDP average growth in per capita across 92 countries for the period 1980 to 2003. The findings revealed that MOMO penetration has a positive and substantial effect on inclusive growth compared to fixed-line telephony, particularly in middle- and low-income nations.

Another study titled on FI, income inequality and EG by (Erlando et al., 2020) stated a positive linkage and significant impact between FI, poverty reduction and income inequality in East Indonesia. In the same vein, Ratnawati, (2020) investigated the influence of FI on Asian countries and discovered that FI has a positive and substantial impact on poverty, EG, income inequality and financial stability. Another study conducted by Park & Mercado, (2015) examined the influence of FI in diminishing poverty and income inequality for 37 Asian economies, using diverse dimension of FI for example usage and availability. They discovered in their analysis that FI dramatically reduced unemployment rate, poverty, and income inequality in 37 Asian emerging economies.

Nevertheless, Iddrisu & Danquah, (2021) investigated the influence of FI on Ghanaian household welfare, applying micro-level datasets from Ghana by implementing a multi-dimensional index of FI. The findings revealed that households with a lack of financial access have lower welfare in response to their financially included counterparts. They discovered that FI has a substantial and positive effect on poor household welfare and further reduces income inequality. In the same vein, Koomson et al., (2020) explored the influence of FI on vulnerability and poverty in Ghana. They discovered that an increase in FI accessibility diminishes the possibility of being poor and vulnerable, indicating the potential of FI to reduce income inequality and poverty in Ghana. According to Babajide et al., (2015) if political indicators are steady and socio-economic factors remain constant, financial inclusiveness will increase the degree of EG effectively and efficiently. This study scope and context are different from the existing literature since it employs the ARDL cointegration and PCA techniques to examine both long-run and short-run relationships between financial inclusion and economic growth in Ghana. There is a significant gap in the literature because limited empirical studies have investigated the impact of financial inclusion on economic growth using both long-run and short-run dynamics, especially in Sub-Saharan African countries and developing countries like Ghana. This study aims to add to the body of literature in

this sector on the Ghanaian economy and the effect of financial inclusion. Therefore, an assessment of financial inclusion impact on economic growth in Ghana is necessary to see whether financial inclusion's has a positive or negative impact on Ghanaian economic growth in the long run and short run. Furthermore, there is limited research on the role of digital financial inclusion in Islamic finance and banking development.

Chapter Three

Research Methodology

3.0 Introduction

This chapter discusses the research methodology. It includes the research design, method of data collection and their sources, variable description in terms of measuring dependent and independent variables using statistical tools, and finally, data analysis and method, such as ARDL cointegration effect and other techniques such as PCA etc.

3.1 Research Design

This study uses a quantitative research approach, concentrating on financial analysis data. This study collects secondary data from the Financial Access Survey (FAS) and World Development Indicators (WDI) from the World Bank Global Findex database between 2004 and 2023. The data is available to examine the impact of FI on Ghanaian EG. The time series was chosen based on data availability. In this study the data analysis included descriptive statistics, a unit root test using the Augmented Dickey-Fuller (ADF) and Phillips and Perron (PP) approaches, a bound test, a correlation test, a regression test, etc. This study implements ARDL estimation techniques to investigate the LR and SR cointegration effect between FI and EG in Ghana. Moreover, they study further included various analyses, such as PCA estimation.

3.2 Method of Data Collection

This study intends to examine the impact of FI on Ghanaian EG using time series from 2004 to 2023. For FI indicators (commercial banking branches per 100,000 adults, commercial bank deposit accounts per 1,000 adults, outstanding deposits per percentage of GDP, and outstanding loans per percentage of GDP). FI indicators were received from the International Monetary Fund, conducted mainly by FAS. This study further obtained GDP per capita and control variables (inflation rate, trade openness, and population growth rate) from the World Bank,

conducted mainly from World Development Indicators. The rationale for applying data from FAS and WDI is that these sources are very relevant to this study, and they provide information which can play a significant role in measuring the influence of FI on EG. Moreover, this study provides insights into how FI accessibility, availability and usage are suitable for fostering EG. This study uses a comprehensive data source and mainly focuses on FI. It aims to provide comprehensive insights for policymakers, stakeholders, entrepreneurs, and the government in understanding the LR and SR dynamics of financial inclusion's impact on Ghanaian economic growth.

3.3 Variables Description

This study divides the variable description into three sections, which are dependent variable, independent variables and control variables. Henceforth, the dependent variable is GDP per capita (GDPPC) as a determinant of EG. The value of GDP per capita is stated in natural logarithms and US dollars (current US$). On the other hand, the control variables to measure macroeconomic stability which are inflation, trade, and population. Lastly, the independent variable is structured into three magnitudes: availability, accessibility and usage of FI. These dimensions were adopted as indicators of FI and a general FII. Numerous studies have used these dimensions as indicators to measure FI (see, Adabor & Mishra, 2023; Adedokun & Ağa, 2023; Ifediora et al., 2022; Ismail & Laidin, 2023; Lenka, 2022; Lenka & Sharma, 2017; Misati et al., 2024) indicating that the implication of separate indicators may lead to misleading data and faulty outcomes (Demirgüç-Kunt & Klapper, 2012; Ifediora et al., 2022; Sarma, 2008; Sharma, 2016).

FI inclusion indicators are as follows:

First, the penetration (accessibility) dimension index of financial institutions in terms of deposit accounts with commercial banks per 1,000 adults. An inclusive financial system requires a vast number of financial users, indicating that it needs to access financial services deeply. Henceforth, this dimension measured the natural logarithm of the number of deposit accounts.

Second, usage dimension index. This dimension measures the usage of banking services by the public concerning outstanding deposits as a percentage of GDP and outstanding loans as a percentage of GDP. This dimension answers the question, "How often or frequently do economic members or bank customers use the financial products and services available to them?

The third is the availability dimension index; this dimension measures the availability of banking financial products and services in the financial sector in terms of commercial banking branches per 100,000 adults. Sarma, (2015) stated that the availability dimension is significantly important and an essential factor in FI indicators and should be affordable and obtainable to the public for inclusive growth. Furthermore, numerous macroeconomic indicators were utilized in this study to control the possible features that can affect the EG and financial sustainability. Hence, this study set up three macroeconomic control variables, for example, trade openness, inflation, and population growth, by following (Chinoda & Kapingura, 2024; Kim et al., 2018; Nizam et al., 2020).

Moreover, to investigate the nexus between FI and EG in Ghana, it is extremely crucial to include some relevant control variables of economic growth footprints to avoid bias and make sure the data estimates are accurate. Therefore, based on the theoretical and empirical studies, this study selects inflation, population growth and trade openness as control variables. These variables are the core factors of macroeconomic stability that can affect the strength of the nexus between FI and EG in Ghana. Hence, control variables are as follows:

Inflation: To maintain macroeconomic stability, inflation is included as a control variable, which has a significant impact on investment, sustainability, savings and consumption of goods and services. High inflation can have a negative impact on economic growth, which will reduce the real value of assets and discourage long term investments and savings. Therefore, adjusting inflation makes it easier to distinguish the precise impact of FI on EG.

Trade openness: Trade openness is included in the control variables to estimate the ratio of import and export of GDP in Ghana. Trade openness plays a significant role in Ghanaian economic development. Additionally, trade can support financial inclusion initiatives by bringing disadvantaged people into the formal economy, which indirectly affect economic growth. Open trade has a significant impact on sustainable growth by boosting productivity, promoting technology and improving competition in the financial market.

Population growth: To account for demographic volatility and labour force levels, population growth is selected as a control variable. It can have both direct and indirect impacts on economic growth through labour supply and financial demand. Henceforth, a fast-rising population growth may put additional strain on the financial sector and public services, which could affect

how FI results in positive economic consequences. As stated earlier in Chapter One, it is important to note that this study does not directly measure variables of Islamic finance in the empirical test because Ghana does not have any Islamic financial institutions or Islamic finance windows yet. Therefore, Islamic finance was discussed only in the literature review.

Figure 1: Description of variables summary

SN	*Variables*	*Type*	*Definition*	*Dimension*	*Source*
1	GDPPC	DV	GDP per capita growth		WDI
2	NCB (F1)	IV	CB branches per 100,000 adults	Availability	FAS
3	NDEP (F2)	IV	Deposit accounts with CB per 1000 adults	Accessibility	FAS
4	OUTD (F3)	IV	Outstanding deposit with CB per Percentage of GDP	Usage	FAS
5	OUTL (F4)	IV	Outstanding loans with CB per Percentage of GDP	Usage	FAS
6	Inflation Rate	CV	Annual % change of CPI		WDI
7	Population GR	CV	The rate of total population over time		WDI
8	Trade openness	CV	Export + import as a % of GDP		

Note: DV (dependent variables), **IV** (independent variables), **CV** (control variables), **CB** (commercial banks). **CPI** (consumer price index). Source: Author estimation

3.4 Data Estimation Techniques

As stated earlier in Chapter One, the main focus of this research is to examine the impact of FI on Ghanaian EG while considering the influence of control variables. Therefore, the control variables include inflation (INF), trade openness (TRADE), and population growth ages 15-64 (POP1564). This study follows Solow's economic model to investigate the influence of FI on EG by utilising numerous FI indicators, for example, number of commercial bank branches per 100,000 adults (NCB), number of deposit accounts per 1,000 adults (NDEP), outstanding deposits

per % of GDP (OUTD), and outstanding loans per % of GDP (OUTL). This study mainly uses the ARDL estimation technique to examine the impact of FI on EG using time series from 2004 to 2023. The model was advanced by Pesaran et al., (2001) for cointegration analysis. This method seeks to find the LR and SR causality between FI and EG. Therefore, the essential Solow's neoclassical EG theory and production function can be modified as in equation 1 Solow, (1956):

$$\boldsymbol{Y_t = A_t \cdot k^a \cdot L^{1-a}} \qquad \text{(Equation 1)}$$

Where, Y = output (GDP)

K = Capital

L = Labor

A = Total factor productivity

Henceforth, consider the objectives of this study, which is to investigate the impact of financial inclusion on economic growth. This study proposes the following model based on Solow's economic production function theory as an initial model that links FI to EG. Following Lenka & Sharma, (2017) and Sethi & Acharya, (2018) this study formulates the equation (2) below based on the equation (1) stated earlier as follows:

$$\boldsymbol{Y_t = \beta_0 + \beta_1 FI_t + \beta_2 X_t^* + \varepsilon_t} \qquad \text{(Equation 2)}$$

Y_t represents GDPPC (GDP per capita), while FI_t denotes the FI indicators. X^*represents EG control variables; it includes inflation (INF), trade percentage of GDP (TRADE), and population aged 15-64 (POP1564) as a percentage of total population. β_0 is the constant term, while ε_t donates the white noise error term.

Furthermore, this study implements a PCA model to determine a composite index for FI to guarantee efficiency in data estimation, avoiding multicollinearity and reducing dimensionality in the regression model. Therefore, this study uses multidimensional variables for the FI, namely, number of commercial bank branches (NCB), number of deposit accounts (NDEP), outstanding deposits (OUTD), and outstanding loans (OUTL). The PCA technique FII can be displayed as follow:

$$\boldsymbol{FII_t = W_{1,i} NCB_i + W_{2,i} NDEP_i + W_{3,i} OUTD_i + W_{4,i} OUTL_i} \qquad \text{Equation (3)}$$

where FII_t is the index of FI, $\boldsymbol{i^{th}}$ year and $\boldsymbol{W_1 + W_2 + \cdots W_5}$ are the respective weight of different factors. Furthermore, the general log-linear form is adopted to obtain empirical estimation of equation (4) which is presented as follows;

$$\boldsymbol{\ln(GDPPC_t) = \beta_1 \ln(FII_t) + \beta_2 \ln(INF_t) + \beta_3 \ln(POP1564_t) + \beta_4 \ln(TRADE_t) + \varepsilon_t} \quad \text{Equation (4)}$$

$\ln(GDPPC_t)$: is the log of GDP per capita (EG – dependent variable). $\ln(FII_t)$: is the log of FII (proxy for FI – independent variable). $\ln(INF_t)$: is the log of inflation rate which denotes macroeconomic stability (control variable). $\ln(POP1564_t)$: is the log of labor which represent working age population (control variable). $\ln(TRADE_t)$: is the log of trade % percentage of GDP (proxy for productivity, export plus import (control variable), while ε_t: indicates white noise error term.

Furthermore, this study implements the ARDL model to provide a robustness check as an alternative methodology which can investigate both LR and SR relationships between FI and EG. Following the previous equation (4), we formulate equation 4 in ARDL form as in equation (5). This method seeks to find the LR and SR relationship and causality between FI and EG. This study uses the ARDL estimation technique because of its capability to hold and estimate variables of different orders of integration. For instance, a combination of **I(0)** and **I(1).** It further estimates both short-run and long-run relationships efficiently and effectively in a given model. Moreover, it has the potential advantages as we can use it for a single equation model, and identical variables can assign different log lengths, which makes it very simple to interpret and implement in the equation model. In addition, the ARDL model enhances the endogenous issues that can happen from the estimation of regressors and provides unbiased outcomes. Therefore, the ARDL LR and SR dynamic model is represented as follows:

$$\Delta \ln(\boldsymbol{GDPPC_t}) = \boldsymbol{a_0} + \sum_{\boldsymbol{i=1}}^{\boldsymbol{p}} \boldsymbol{a_1^{(i)}} \Delta \ln(\boldsymbol{GDPPC_{t-i}}) + \sum_{\boldsymbol{j=0}}^{\boldsymbol{q}} \boldsymbol{a_2^{(j)}} \Delta \ln(\boldsymbol{FII_{t-j}}) + \sum_{\boldsymbol{k=0}}^{\boldsymbol{r}} \boldsymbol{a_3^{(k)}} \Delta \ln(\boldsymbol{TRADE_{t-k}}) + \sum_{\boldsymbol{m=0}}^{\boldsymbol{s}} \boldsymbol{a_4^{(m)}} \Delta \ln(\boldsymbol{POP1564_{t-m}}) + \sum_{\boldsymbol{l=0}}^{\boldsymbol{u}} \boldsymbol{a_5^{(l)}} \Delta \ln(\boldsymbol{INF_{t-l}}) + \boldsymbol{\delta_1} \ln(\boldsymbol{GDPPC_{t-1}}) + \boldsymbol{\delta_2} \ln(\boldsymbol{FII_{t-1}}) + \boldsymbol{\delta_3} \ln(\boldsymbol{INF_{t-1}}) + \boldsymbol{\delta_4} \ln(\boldsymbol{POP1564_{t-1}}) + \boldsymbol{\delta_5} \ln(\boldsymbol{TRADEE_{t-1}}) + \boldsymbol{\varepsilon_t}$$

Equation (5)

$\ln(GDPPC_t)$ is the natural logarithm of GDP per capita (dependent variable). $\ln(FII_t)$ is natural logarithm of Financial Inclusion Index, which is this study independent variable. While $\ln(INF_t) + \ln(POP1564_t) + \ln(TRADE_t)$ are the proxies of EG control variable which can affect the dependent variable. These control variables are same as equation (4) in terms of parameters interpretation. Moreover, Δ is the first difference operator, whiles a_0 indicates a constant tenure, while ε_t is noise error term. The parameters of $\sum_a(i)$ indicates the SR coefficients while the LR multipliers are present by $\delta_1 + \delta_2 + \delta_3 + \delta_4 + \delta_5$. In addition, p, q, r, u, s are represents as a log length for each variable selected by Akaike Information Criterion (AIC) and Schwarz Information Criterion (SIC). Nevertheless, after determining the optimal log, and variables are co-integrated, we present the linkage between FI and EG by Error Correction Model (ECM), using ARDL model where error correction term (ECT) examines the variables short-run causality without avoiding any of LR variables information. Henceforth, this study presents the error correction model as follows:

$$\Delta \ln(\boldsymbol{GDPPC_t}) = \boldsymbol{a_0} + \sum_{\boldsymbol{i=1}}^{\boldsymbol{p}} \boldsymbol{a_1^{(i)}} \Delta \ln(\boldsymbol{GDPPC_{t-i}}) + \sum_{\boldsymbol{j=0}}^{\boldsymbol{q}} \boldsymbol{a_2^{(j)}} \Delta \ln(\boldsymbol{FII_{t-j}}) + \sum_{\boldsymbol{k=0}}^{\boldsymbol{r}} \boldsymbol{a_3^{(k)}} \Delta \ln(\boldsymbol{TRADE_{t-k}}) + \sum_{\boldsymbol{m=0}}^{\boldsymbol{s}} \boldsymbol{a_4^{(m)}} \Delta \ln(\boldsymbol{POP564_{t-m}}) + \sum_{\boldsymbol{l=0}}^{\boldsymbol{u}} \boldsymbol{a_5^{(l)}} \Delta \ln(\boldsymbol{INF_{t-l}}) + \emptyset \cdot \boldsymbol{EMC_{t-1}} + \boldsymbol{\varepsilon_t}$$

Equation (6)

$\emptyset \cdot EMC_{t-1}$ indicate error correction term which donates the speed adjustment of EG (dependent variable) and FI (independent variables) to long-run equilibrium. The rest of the parameters are same as equation (5) in terms of interpretation. Hence, equation 6 (error correction term) is formulated from the long run equation (5) as follows;

$$\boldsymbol{ECM_{t-1} = \ln(GDPPC_{t-1}) - \delta_1(FII_{t-1}) - \delta_2(INF_{t-1}) - \delta_3(POP1564_{t-1}) - \delta_4(TRADE_{t-1})}$$

Chapter Four

Data Analysis and Interpretation

This chapter discusses the data analysis based on the selected variables used in this study, and interpretation of the research findings is presented, signifying the results of the study. Therefore, this chapter is divided into several sections: The first section looks at descriptive statistics by summarizing the statistical data, such as mean, standard deviation, median, and skewness, while the second section shows the unit root test to check if the selected variables are stationarity at level or first difference. The third section discusses the bound test to estimate the cointegration of LR relationships among the research variables. The fourth section presents the correlation test to discover the linkage between the dependent variable and explanatory variables. The fifth and sixth sections examine the long-run and short-run dynamics between FI and EG, while the seventh section presents the post-estimation results to examine the parameter stability, and the last section presents findings and discussion of the study.

4.1 Descriptive Statistics

Table-1: Descriptives statistics

Descriptives	lnGDPPC	lnINF	lnPOP	lnTRADE	lnFII
Mean	7.375	2.614	4.06	4.291	-4.01e-09
Median	7.45	2.487	4.058	4.246	0.198
Maximum	7.643	3.640	4.097	4.602	1.399
Minimum	7.01	1.966	4.025	4.107	-2.481
Std Dev.	0.217	0.427	0.021	0.147	1
Skewness	-.386	0.764	0.143	0.991	0.994
Kurtosis	1.7	3.253	2.207	2.866	3.978
Sum	147.493	52.287	81.207	85.819	-5.22e-08
Observation	19	19	19	19	19

Sources: Author estimation from WDI and FAS

Table 1 indicates the descriptive statistics analysis of the research variables, using natural logarithms: log of GDP per capita (lnGPPC), log of FI indicators (lnFII), log of inflation (lnINF), log of trade as a percentage of total commerce to GDP (lnTRADE), and log of population ages between 15 and 64 (lnPOP). The analysis of this section provides a comprehensive understanding of the data structure by focusing on measures of central tendency, symmetrical probability distribution, leptokurtic distribution, and platykurtic distribution.

LnGDPPC has a median and mean of 7.45 and 7.375, respectively. This suggests that the GDP per capita over the sampled periods in the data is 7.375 on average, indicating that Ghana's GDP per capita has been stable within the observed datasets under this study. The closeness of the median and mean indicates a generally symmetrical probability distribution. The skewness score of -0.386 indicates a minor negative skewness, showing that some lower GDPPC observations drive the mean downward, while this skewness is insignificant. This proposes that although Ghana's GDPPC has been reliable and stable, certain observations with unstable economic performance led the mean to go downward. A platykurtic distribution is indicated by a kurtosis score of 1.7, which is less than the typical score of 3. This implies that the data distribution of GDP per capita in Ghana has shorter tails than the normal distribution, indicating less significant values or outliers from the mean. A substantial dispersion around the mean is indicated by the standard deviation of 0.217, which shows some variation in GDP per capita levels throughout the dataset, albeit within a comparatively small range, indicating low volatility in Ghana's economic productivity per individual within the dataset.

LnINF minimum and maximum ranges from 1.996 to 3.640, respectively, with an average of 2.614 and a median of 2.487. Given the relatively higher average than the median and positive skewness of 0.764, the distribution appears to be right-skewed with a longer tail on the upper end of the inflation rate range. This suggests that there have been times within the sampled period where Ghana has experienced remarkably high inflation rates, which have caused the mean to increase above the median, even though most of the observations inflation rates are lower. The kurtosis score of 3.253, which is marginally greater than 3, suggests a leptokurtic distribution. This implies that Ghana is more likely to have excessive inflation rates since it has a sharper peak and comparatively significant tails than the normal distribution. This replicates the historical background of the Ghanaian economic environment, where the inflation rate is connected with

fiscal deficits and exchange rate volatility which often disturbs Ghana economic development. Moreover, macroeconomic sustainability variations are indicated by the moderate range of inflation rates, as indicated by the standard deviation value of 0.427.

The median and mean of LnPOP variables are 4.058 and 4.06, respectively. This indicates a very steady distribution with minimal fluctuation over time, while the standard deviation is merely 0.021, indicating Ghana's population growth shape is comparatively consistent, which is characteristic of a developing country going through demographic transitions. Moreover, the population data observation appears to be nearly platykurtic and symmetrical probability distribution, with less significant values, as indicated by the kurtosis and skewness with value of 0.143 and 2.207, respectively. LnTRADE has a median value of 4.246 and a mean value of 4.291, together with a skewness of 0.991, which points to times when Ghana's trade openness was greater than usual. This might align in tandem with liberalization of policy and expansions in commodities such as cocoa, oil and gold, or times of economic recovery after the global financial crisis in 2007. Furthermore, there are comparatively less significant variations in trade openness, despite being a more normal distribution but slightly platykurtic, as indicated by the kurtosis value of 2.866, which is mostly close to the normal distribution. The 0.147 standard deviation indicates moderate fluctuation, which is indicative of shifts in Ghanaian trade policy, dynamics of the currency rate, and the dynamics of global commodities markets over time.

On the other hand, lnFII has a maximum of 1.399, a minimum of -2.481, and a median of 0.198, while its mean is quite close to zero: -4.10e-09. This wide range, combined with the high level of skewness, suggests large differences in the Ghanaian FI system. The data observations suggest that there were significant eras or groups of populations that had limited access to financial services, even when other population segments had a comparatively better level of FI services. Furthermore, by emphasizing a leptokurtic distribution with high tails and a strong peak, the kurtosis of 3.978 further draws attention to the presence of significant values or outliers. Normalization is probably the reason for the standard deviation of 1, which is the intended variability to change the range of experiences with FI services. This is aligned with the FI environment in Ghana, where systemic obstacles, including income inequality, rural and urban divides, and restricted loan availability for SMEs, have coexisted with the growth of mobile money, digital finance, and financial sector modernization.

4.2 Unit Root Estimation

4.2.1 Stationarity Test

According to Pesaran et al., (2001) ARDL model cointegration can be implemented based on the order of the combination of selected variables, which means that studies with time series variable cointegration estimation could be integrated based on the order of I(0), I(1) or combination of I(0) and I(1). However, it is crucial to double-check if there is any variable that is in the order of I (2). Therefore, to check the stationarity of the research variables, this study employed the Augmented Dickey-Fuller (ADF) test and Phillips and Perron (PP) test to examine whether all the selected variables are stationary at the level or stationary at first differences. Hence, the findings of the time series unit root test are summarized and presented in Table 2.

Table-2: Unit root estimation

Variables	ADF	First difference	PP	First difference	Order of Integration
	Levels		Levels		
lnGDPPC	1.379	-3.801***	1.809	-3.335***	I (1)
lnINF	-2.978**		-1.569**		I (0)
lnPOP	1.363	-2.699**	-1.051	-1.467**	I (1)
lnTRADE	-3.610**		-3.575**		I (0)
lnFII	-2.455***		8.886***		I (0)

Notes: ***, **, * present the significance level at 1%, 5% and 10% respectively.

Sources: Author estimation from WDI and FAS

Table 2. The results of both ADF and PP indicate that GDP per capita (lnGDPPC) and population ages (POP) are stationary at first differences level I (1), while inflation (lnINF), trade % of GDP (lnTRADE), and FII (lnFII) are stationary at level, which means we do not need to generate first differences. This study confirms that the selected variables are integrated with mixed order I(1) and I(0). Hence, after conducting the stationarity test behaviour, the study employed the bound test

to investigate whether there is a long-run cointegration among dependent variable and indicator variables. The bound test is presented and summarized in Table 3.

4.3 Bound Test

After conducting the unit root test. This study uses a bounds cointegration test to investigate the cointegration relationship between FI and EG. To check the cointegration, it is crucial and essential to find the optimal lag length. Therefore, the optimal lag length selected in this study is the Akaike information criterion with lag 2.

Table-3: Bound test

F-statistic					
Critical value bounds	**Bound**		**Test Statistics**	**Value**	**k**
Significance level	I (0)	I (1)	F-statistic	23.196	**4**
10%	2.45	3.52			
5%	2.86	4.01			
2.50%	3.25	4.49			
1%	3.74	5.06			
T-statistic					
Critical value bounds	**Bound**		**Test Statistics**	**Value**	**k**
Significance level	I (0)	I (1)	T-statistic	-7.700	**4**
10%	-2.57	-3.66			
5%	-2.86	-3.99			
2.50%	-3.13	-4.26			
1%	-3.43	-4.60			

Sources: Author estimation from WDI and FAS

The findings in Table 3 indicate that there is a cointegration effect among all estimated variables. This can be seen from table 3, where the F-statistic value (23.196) is greater than all the upper-bound critical values at all significance levels (10%, 5%, 2.50% and 1%). While the t-statistic value (-7.700) is less than the I(1) critical values at all significance levels (10%, 5%, 2.50% and 1%). This simply means that there is a LR relationship among the selected variables, which can be seen as the F-statistic being greater than all critical values and the T-statistic being less than

all critical values. These findings discover solid indication of an LR relationship between the dependent variables and their regressors at all significance levels. Figure 2 bellow summarized conclusions from the bound test format:

Figure 2: Summary of Bound Test Conclusion

Test	Statistic	Conclusion	Decision
F-bound	23.196	Strong Long-run cointegration	Reject H0 (F > than I (0) bound)
T-bound	-7.700	ECM significant support cointegration	Reject H0 (T < than I (0) bound)

4.4 Correlation Test

Table 4: Correlation Test

Variables	(1)	(2)	(3)	(4)	(5)
(1) lnGDPPC	1.000				
(2) lnINF	-0.102	1.000			
	(0.667)				
(3) lnPOP	0.865	0.154	1.000		
	(0.000)	(0.518)			
(4) lnTRADE	-0.638	0.020	-0.448	1.000	
	(0.002)	(0.933)	(0.048)		
(5) lnFII	0.709	0.149	0.691	-0.244	1.000
	(0.007)	(0.628)	(0.009)	(0.422)	

Sources: Author estimation from WDI and FAS

According to Table 4, there is a positive and substantial correlation between GDP per capita and population growth, with a coefficient value of 0.8645 and a p-value of 0.0000. This indicates that an increase in the Ghanaian population tends to grow GDP per capita. Moreover, the findings of this study further discovered a substantial and positive correlation between GDP per capita and FII, with a coefficient value of 0.7089 and a p-value of 0.0067. This indicates the idea that

upgraded financial accessibility, availability, and usage improve Ghanaian economic productivity and per capita income.

A -0.1024 coefficient and p-value of 0.6675 indicate a weakly significant negative relationship between GDP per capita and inflation. Similarly, the -0.6385 coefficient and 0.0024 p-value show a strong and significant negative correlation between GDP per capita and trade openness in Ghana. Furthermore, the findings reveal a weak and negative correlation between inflation and other variables. This indicates that inflation in Ghana throughout the study period might be affected by endogenous factors or exogenous factors. Similarly, trade and other variables are significantly negatively correlated, indicating that trade openness in Ghana might not have led to inclusive growth during the observation period. However, the findings show a positive and significant correlation between the FII and population growth.

In summary, the findings indicate that GDPPC in Ghana is substantial and positively supported by FII and population growth. Henceforth, this shows that enhanced access of financial products and services alongside population growth contributes significantly to Ghanaian economic welfare and enhanced income inequality. However, inflation and trade openness appeared to be weakly correlated with all variables. These could be possible obstacles faced by Ghana throughout the study observations, such as currency depreciation and strong reliance on exports, which can hurt inclusive income expansion.

4.5 Long-Run Estimation

Table-5: Long-run estimation result

Variable	Coefficient	Std. Error	t-Statistic	Probability
LlnGDPPC*** ECM	-1.008	0.131	-7.700	0.000
LlnINF*	-0.179	0.082	-2.180	0.061
LlnPOP	2.703	4.569	0.590	0.570
LlnTRADE***	-0.880	0.178	-4.930	0.001
LlnFII***	0.282	0.080	3.520	0.008

$$LlnGDPPC = -0.179\text{LlnINF} - 2.703\text{LlnPOP} - 0.880\text{LlnTRADE} + 0.282\text{LlnFII} + \varepsilon$$

Table 5 presents the long-run impact of FI, inflation, trade, and population growth on Ghanaian EG. LlnGDPPC findings show a negative coefficient value of -1.0078 and a negative t-statistic value of -7.700. This indicates a shred of strong evidence and a steady long-run existence between the study variables. The value of -100.78 measure how much disequilibrium from the previous year is adjusted in the current year. The value of -100.78 per cent indicates the variation from the LR equilibrium is adjusted in a single period throughout the study period. This indicates rapid strong speed correction along any SR shocked in the study period. LlnINF finding discovers a coefficient value of -0.1793 and a p-value of 0.061, which shows that a one per cent increase in inflation decreases GDP per capita by approximately 0.18% in the LR. Similarly, a one per cent increase in trade openness (coefficient -0.8804, p-value 0.002) affects GDP per capita by 0.88%, which suggests a high significance. This indicates import expansion imbalances, or trade openness imbalances and inefficiency in the Ghanaian economic environment. While LlnPOP results show statistical insignificance in the long run at all significant level, suggesting a positive effect on GDPPC.

Furthermore, a one per cent increase in the FII (coefficient 0.2821 and p-value 0.008) increases GDP per capita by 0.28% in the long-run. In summary, inflation and trade openness hurt GDP per capita in the LR, while FII enhances and supports GDP per capita in LR. However, the population growth impact is statistically insignificant in the long run. Hence, the government of Ghana and policymakers should focus on expanding FI access in the long run and further take into consideration managing inflation and trade openness policies. Nevertheless, the population growth rate in Ghana should also be taken into account due to the strong negative effect in the short-run, as the resources and services are limit in Ghana if any unexpected population growth occurs in the SR.

4.6 Short-Run Estimation

Table-6: Short-run estimation

Variable	Coefficient	Std. Error	t-Statistic	Probability
D.GDPPC	0.075	0.129	0.580	0.075

D.INF	0.122	0.082	1.490	0.176
D.POP***	-70.333	18.441	-3.810	0.005
D.FII*	0.237	0.1284	1.84	0.108
Coin Eq(-1)*** ECM	-1.008	0.131	-7.700	0.000
R-Squared	0.9489			
Adjusted R-Squared	0.8977			
F-statistic	40.85			

Sources: Author estimation from WDI and FAS

Table 6 presents the short-run dynamics of FI, inflation, and population growth on Ghanaian EG. D.FII indicates that a one per cent increment in the FII (coefficient value 0.2369 and p-value of 0.108) increases GDP per capita in the short run. However, the impact is not statistically strong, indicating a weak short-run effect; the p-value is not significant at the 5% level and only marginally significant at the 10% level. This suggests that financial inclusion growth takes time to significant affect Ghanaian EG, implying that FIIs contribute more to the Ghanaian EG in the long run compared to the short run.

Furthermore, a one per cent unexpected increase in Gnana's population growth rate (coefficient -70.33 and p-value of 0.005) reduces GDP per capita by 70.33% in the SR. This suggests a strong and negative effect on the SR of sudden population expansion on GDP per capita income. This could be that the unexpected increase in population growth rate may lead to pressure on limited resources and services available in the short run, or in other words, deflation may occur due to a horde of people chasing limited resources in the market.

Moreover, the inflation coefficient of 0.1217 and p-value of 0.176 indicate that a one per cent increase in inflation causes GDP per capita to increase by approximately 0.12% in the short run. However, the 0.176 p-value indicates a weak significant at the 5% level, but is moderate at the 10% level. The effect is insignificant, suggesting that it shows a positive short-run cointegration and might have a weak impact on the economic development in the SR. This aligns with Keynesian economic theory, which suggests that moderate inflation could be a reflection of growing demand and momentarily boost GDP expansion.

Furthermore, the ECM cointegration (Eq (-1)) indicates that about 100.78% is adjusted within a year for any SR variation from the LR equilibrium throughout the study period, which suggests extremely rapid adjustment correction. In addition, the model fit diagnostics statistics are indicated by R-squared (0.9489), adjusted R-squared (0.8977), and F-statistic (40.85). The model indicates approximately 95% of short-run variation in GDP per capita, while F-statistics suggest a highly significant level, which means the model fitness is good.

4.7 Post Estimation Results

Table-7: Post estimation result

Test	Probability	Decision
Serial Correction	0.6185	Fail to Reject H0 if P-value is > 0.05
Heteroscedasticity	0.985	
Ramsey	0.074	

Sources: Author estimation from WDI and FAS

Table 7 shows that there is no serial correction, no heteroscedasticity, and no omitted variables; therefore, we are not able to reject or rule out the null hypothesis because the p-value is greater than 0.05. Henceforth, we can conclude that there is a strong stability parameter in the post-estimated model.

4.8 Discussion

Table 1 presents descriptive statistical estimates of the dependent and independent variables. It provides a comprehensive consideration of FI and the macroeconomic landscape in Ghana throughout the study observation period. The findings of GDPPC indicate a stable economic expansion in Ghana, as demonstrated by the relatively close alignment between the mean and median, respectively (7.375 and 7.45). This result is aligned with the Bank of Ghana, (2018; 2021) which stated that, in general, Ghana's economy has been stable over the period. Moreover, FI findings show a high variability and significant positive skewness with high kurtosis over the study period, indicating that there were tremendous groups of populations that still had a lack of and limited access to formal financial products and services, although some of the population had a

comparatively better level of financial service access. This finding is aligned with some studies in Africa, which indicate that most African countries lack financial accessibility. Demirgüç-Kunt & Klapper, (2012) discovered that most developing countries have limited access to FI. Similarly, Beck et al., (2015a) reveal that the vast majority of Africa's adult population lacks access to formal financial products and services to meet their financial needs.

Furthermore, inflation findings show a right skew, which suggests that Ghana has experienced high inflation over the study period, which caused the mean to increase above the median (2.614 and 2.487, respectively). Moreover, a leptokurtic pattern is also revealed in inflation data, as evidenced by a kurtosis score of 3.253, which is greater than 3. This suggests that Ghana is likely to have an excessive inflation rate over the study period due to Ghana's historical economic environment instability, where the inflation rate is linked with exchange rate fluctuation and fiscal deficit. This finding aligns with some empirical studies that indicate that inflation hurts EG and income inequality. Beck et al., (2007) reveal that inflation has a significant impact on the lowest income segment compared to average individuals in the economy and is positively linked with the growth of income inequality. Similarly, Lenka & Sharma, (2017) show that inflation harms EG in India but is statistically insignificant. Nevertheless, the distribution of trade openness is somewhat skewed to the right, as evidenced by the standard deviation score of 0.147, indicating moderate fluctuation into international markets, particularly after trade liberalisation laws were put into place. This result is per some study findings in SSA countries, which included Ghana. Adedokun & Ağa, (2023) investigate the influence of FI on SSA economic expansion, using trade openness as a control variable. They revealed a negative and substantial correlation between trade openness and EG in Sub-Saharan African countries.

Before starting the main analysis, this study employed PCA estimation to measure the FI composite index to ensure data efficiency, avoid multicollinearity, and reduce dimensionality. In addition, the study used the ADF and PP unit root test estimation techniques to assess the stationarity test between the selected variables. Table 2 confirms that all the selected variables are mixed in the order of I (1) and I (0). This indicates that some variables are stationary at level I (0) while other variables are stationary at first differences I (1). This finding is consistent with some empirical studies, such as Lenka & Sharma, (2017) and Sethi & Sethy, (2019).

Based on the ARDL bound test analysis in Table 3, the findings revealed that there is a piece of strong evidence from this empirical analysis that the major macroeconomic variables in Ghana have long-run cointegration. The ARDL bounds test discovers a high F-statistic of 23.196, which is higher than the bounds critical value at all significant levels (5.06 at 1%). This indicates an LR cointegration effect among the selected variables. In addition, the t-statistic of -7.700 is less than the I(1) bound test at all significant levels (-4.60 at 1%) (Pesaran et al., 2001). This suggests that Ghana's macroeconomic indicators (GDP per capita, trade openness, population growth, inflation, and FII) are interconnected over the long run; thus, any short-run imbalances will eventually correct themselves to reach a stable equilibrium. The existence of cointegration indicates that policies aimed at improving macroeconomic solidity, trade reform to protect vulnerable industries, and enhancing access to financial products and services will have more long-term benefits compared to short-term benefits for Ghanaian EG. This result supports earlier studies from Ghana using ARDL estimation techniques. The authors confirmed that there is a long-run cointegration between FI and EG (Adabor et al., 2023; Ofori-Abebrese et al., 2017; Ricky-Okine & Amankwaa, 2022). Similarly, some studies conducted in Nigeria and India further confirm an LR linkage between FI and EG (Lenka & Sharma, 2017; Olarewaju Afolabi, 2020; Sethi & Sethy, 2019).

Following the correlation test analysis findings presented in Table 4 shed light on the linkage between Ghana's main macroeconomic variables. The findings demonstrate a positive and substantial statistical correlation between GDP per capita and population growth ($r = 0.8645$, $p < 0.01$), showing that demographic expansion has been linked to higher per capita income. This result might be a reflection of demographic expansion, which states that a growing working-age population boosts economic productivity. This result is consistent with Adabor et al., (2023) and Aboagye & Anong, (2020) who stated that increasing FI access has a substantial and positive impact on Ghanaian urban population growth and enhanced household welfare. Furthermore, the findings revealed a strong positive and statistically significant correlation between FII and GDP per capita ($r = 0.7089$, $p < 0.01$), indicating that enhanced financial digital inclusion and easy accessibility to formal financial products and services played a significant role in improving Ghanaian economic growth and further reducing poverty in the country. This encourages the idea that fostering accessibility and availability of financial products and services can substantially raise the level of investments, improve economic stability, and reduce income inequality among the

economic participants, especially disadvantaged people. This finding is consistent with Adedokun & Ağa, (2023) who conducted a study on the impact of FI on EG in SSA countries. The findings of the study revealed a positive and statistically significant influence of FI on EG. Similarly, Ifediora et al., (2022) discovered a positive and significant correlation between FI and EG in Sub-Saharan African countries.

Conversely, our analysis findings in Table 4 discovered a strong negative and significant correlation between trade openness and GDPPC ($r = -0.6385$, $p < 0.01$). This could suggest a trade openness structural limitation in Ghana due to changes in global trade dynamics and too much focus on exports and reliance on primary exports commodities, which may not effectively add sufficient value positively to per capita income. Moreover, this study reveals that inflation shows a negative correlation with all other variables, including GDP per capita, indicating that Ghana's inflationary pressure throughout the study might occur due to exogenous factors such as global exchange rate fluctuation or supply-side shock rather than FI or domestic growth. The findings for inflation and trade openness support some empirical studies conducted by Ifediora et al., (2022) who stated a strong negative relationship between trade openness, inflation, and EG in SSA countries. Similarly, a study conducted on financial inclusion and economic expansion in developed and underdeveloped countries reveals that the coefficient of inflation and trade has a weak significant influence on EG (Nizam et al., 2020).

Tables 5 and 6 present the ARDL long-run and short-run cointegration effect between FI and EG. The findings show that ECM is highly significant and negative (-1.0078), which indicates a rapid correction of the variation from the LR equilibrium in a single period.

The ARDL long-run dynamic model provides crucial insights into the Ghanaian EG dynamic and its contributing factors (FII, INF, TRADE, and POP). In particular, the FII shows a strong optimistic and statistically substantial effect on Ghanaian EG in the long run, supporting both empirical and theoretical predictions for emerging economies. This dynamic finding is consistent with some empirical studies in Asia and Africa. Sahay et al., (2015) stated that an increase in financial access enhancement can lead to a substantial effect on economic stability and inclusive growth for emerging markets. This suggests that if the emerging markets enhance their financial development systems, they can boost EG and economic resilience against any risk. In the context of Ghana, Ofori-Abebrese et al., (2017) examine the nexus between financial development

and EG over the period 1970 to 2013. They discover a positive impact between domestic credit to the private sector and EG. Similarly, Adedokun & Ağa, (2023) assess the correlation between FI and EG in SSA countries; the findings show that FI has a strong positive and significant impact on EG in SSA countries. Conversely, Table 6 short-run dynamic results reveal that the impact of FII on GDP per capita is positive but not statistically strong, suggesting a weak short-run impact. This indicates that FI requires time to have a stable and substantial effect on Ghanaian EG, which means FI contributes more to Ghanaian EG in the LR compared to the SR. This is aligned with Sethi & Sethy, (2019) who stated that FI has an asymmetric impact on GDPPC and a statistically insignificant effect on EG in the SR.

Based on the control variables long-run dynamic analysis, trade shows a negative and statistically substantial effect, while inflation reveals a marginally negative impact on Ghanaian EG. For trade openness, the finding indicates that when trade openness increases, EG decreases, which means an inverse correlation exists between trade openness and EG in Ghana. The main reason is that Ghana focuses more on primary goods imports and services from developed countries, which do not have a direct positive effect on EG. This result is consistent with some empirical studies conducted by (Hajilee et al., 2017; Hajilee & Niroomand, 2019; Kleemann & Abdulai, 2013), they reveal a negative and statistically substantial relationship between trade openness and EG. In the context of Ghana, Yeboah et al., (2023), find a negative and statistically significant trade effect on EG due to reliance on primary export commodities. Furthermore, the result for inflation indicates that inflationary pressure may harm EG in the LR. This finding is consistent with some empirical studies, such as Nizam et al., (2020) for 63 developed and underdeveloped countries to investigate the influence of FI on EG; Ifediora et al., (2022) for 22 SSA countries; Lenka & Bairwa, (2016) for SAARC countries; and Frimpong & Oteng-Abay, (2010) for Ghana. Following the SR dynamic control variables, it is noteworthy that SR changes in trade openness and inflation have a weak effect on EG. This suggests that their significant effect is greater over the long-term dynamic compared to the short-term dynamic. The results for inflation align with Lenka & Sharma, (2017) who discover that inflation has a negative effect on EG in the short run but is statistically insignificant. The results of trade in the SR dynamic align with Hajilee & Niroomand, (2019) which finds that trade has an asymmetric impact both in SR and LR.

Based on the Islamic finance and FI nexus literature, Kanwal et al., (2023) assess the affiliation between financial technology and Islamic finance. They discovered that FinTech innovation in Islamic finance can enhance transparency, operational efficiency, and adherence to Shariah compliance. Sajid et al., (2024) demonstrate that DFI has a substantial and positive impact on Islamic finance and banking efficiency, which can improve financial sustainability, enhance inclusive growth, and reduce default risks, income inequality, and poverty alleviation. Hassan et al., (2020) find that FI plays an essential role in improving the efficiency of Islamic finance and banking since the 2007 global financial crisis. This indicates that digital FI can help Islamic banks to meet our modern demands, which can improve and support banking stability and promote EG and further lead to progress towards SDG achievement, such as reducing income inequality and poverty alleviation. Moreover, FinTech platforms can help the Islamic finance and banking industry to function more efficiently and reduce transaction costs. This makes it easier for disadvantaged and vulnerable people to have access to financial products and services (Bashir, 2024).

Furthermore, the implementation of digitalisation in the Islamic finance industry can assist in simplifying financial services and transactions and enhance adherence to Shariah principles. This boost in MOMO accounts and the switch toward digital payment could have a substantial effect on FI and reduce financial exclusion in society. Additionally, DFI plays a vital role in the Islamic banking sector's stability by improving financial stability and decreasing default risks (Hassan et al., 2020). Moreover, R. Hasan et al., (2020) and S. M. Ahmad & Mamun, (2020) stated that the combination of FinTech and Islamic finance enhanced FI, which could lead individuals, the vulnerable, and SMEs to access Shariah-complaint financial products and services. In addition, FinTech can enhance the efficiency and transparency of the Islamic finance and banking sector by reducing transaction costs (Qudah et al., 2023). Moreover, FinTech provides prospects for the Islamic finance and banking sector to pursue to modernise and simplify financial products and services that align with Shariah standards (Putri & Hanif, 2024).

Following the literature on Islamic finance and control variables (trade and inflation). In Islam, Prophet Mohammed (PBUH) encouraged his ummah to engage in trade-based transactions. He introduced many instruments during his time, such as Musharakah, Mudarabah, Murabaha, Istisna, Salam, etc., which are trade-based. Dusuki & Abdullah, (2007) stated that the combination

of trade openness and Islamic finance has a significant impact on Malaysian exports through SMEs financing. Therefore, the Islamic finance and banking sector can promote the halal industry and agricultural exports that are align with Shariah principles to support Ghanaian EG. Furthermore, concerning inflation, Islamic finance principles prohibit inflationary practices, such as interest (riba) transactions, gambling (maysir), and uncertainty (gharar). Islamic finance encourages asset-backed financing, which can decrease inflation speculation. This aligns with a study by Chapra, (1998) who states that Islamic finance principles prohibited excessive interest lending and other prohibit elements that can lead to inflation. In summary, Demirguc-Kunt et al., (2014) reveal that Islamic finance mechanisms in Malaysia significantly contribute to the accessibility of formal financial products and services for disadvantaged and vulnerable people. This result aligns with Mohieldin et al., (2011) who state that Islamic finance enhances FI by focusing more on socio-economic justice, asset-backed financing, equity-based and risk-sharing financing, and it can also help to enhance FI accessibility, particularly for disadvantaged people through Islamic finance instruments such as Waqf, Zakat, microfinance, and Islamic crowdfunding, etc.

Chapter Five

5.1 Conclusion

FI has attracted considerable attention from policymakers and researchers worldwide, especially in underdeveloped and low-income countries, and is further considered a fundamental element for EG. Several empirical studies have stated that FI is vital to EG, and it contributes to numerous countries EG. However, the lack of financial accessibility and inadequate usage of formal financial products and services in African countries are some of the main factors that hinder Africans' economic growth, consequently leading to a negative effect on EG in Africa. Hence, this study attempts to investigate the influence of FI on Ghanaian EG, using annual data received from FAS and WDI for the period 2004 to 2023 in accordance with data availability. The study employed the ARDL cointegration effect to investigate the long-run and short-run dynamics between FI and EG. The study also used other methods, like the PCA model to create a combined index for FI to ensure efficiency and avoid multicollinearity.

The findings reveal that an increment in FII to economic participants is essential for inclusive growth and financial sector stability. The study findings reveal that FI has a positive and significant effect on Ghanaian EG, more in the LR compared to the SR. The findings of the study show that increased accessibility, availability, and usage of financial services are essential for inclusive, growth and reduce exclusion. This indicates that an increase in the FII is associated with increased EG. Henceforth, the findings of this study are associated with some of the studies mentioned in the literature review. Therefore, these findings indicate that FI is one of the key factors for EG. Conversely, the findings of the study revealed a negative correlation between GDP per capita and control variables (trade openness and inflation). Moreover, the findings of trade openness indicate that the Ghanaian economy has been more focused and reliant on imported goods from developed nations, which does not have a direct positive effect on Ghanaian EG. Additionally, inflation findings indicate that the historical economic structure in Ghana has experienced inflationary pressure, for example, exchange rate volatility and fiscal deficit, which can harm EG in the LR.

Furthermore, findings from the literature reveal that DFI has a significant impact on Islamic finance and Islamic banking stability, which can promote EG and financial sustainability. DFI can play a significant role in enhancing financial access and adherence to Shariah-compliant financial services, which leads to inclusive growth. DFI enhances Islamic banking efficiency and sustainability, further lowering bank default risk and promoting EG. Despite the role Islamic finance plays in leveraging FinTech innovations and improving FI, however, the empirical model in this study, as stated earlier in Chapter One, does not directly measure Islamic finance variables because Ghana still does not have any Islamic windows in the country.

In summary, the empirical analysis provides a comprehensive relationship between LR and SR dynamics of FI and the main macroeconomic control variables in the Ghanaian EG. In the long-run dynamics, FI revealed a positive and substantial effect on EG, indicating that FI is the core driver of EG. Inflation findings revealed a moderate effect, while trade openness showed a negative and significant impact on GDPPC. Conversely, in the short-run dynamic, population growth discovered a negative and statistically substantial influence on EG, while inflation and FI show insignificant influence on economic growth. This indicates that inflation and FI do not have an immediate effect in the SR compared to the LR.

5.2 Recommendation

The results of this study reveal the essential nature of a well-strategized plan, effective policies and an efficient FI system in Ghana and its linkage to EG. Hence, in respect of the study findings, we recommend the following:

Based on ARDL results, increases in financial inclusion dimensions are the main driver of EG and reduce exclusion. However, the descriptive statistics findings show that despite the significant role FI plays in contributing to Ghanaian economic growth, there is still a significant population or group of individuals in the country that have lack of financial services. Therefore, governments and policymakers should increase FI accessibility by targeting vulnerable and disadvantaged people who lack financial services. Additionally, policymakers should organize programmers, for instance: education and digital skills that should be supported towards all economic members, especially the disadvantaged and vulnerable people. These policies will boost

and increase financial inclusion accessibility and usage for the majority of unbanked individuals, which can enhance EG and financial stability, and further promote FI in the long run.

Moreover, based on the ARDL findings, inflation can have a negative impact on Ghanaian economic growth in the LR. We recommend that there is a need for intervention from the government to stabilize inflation pressure for EG. Therefore, monetary policies should be strongly taken into consideration to stabilize inflationary pressure, to enhance investment stability and to improve EG. In addition, government and policymakers should consider macroeconomic stability, such as human capital investment and government productivity expenditure, to expand inclusive growth and protect vulnerable financial industries.

The ARDL results discovered a negative and significant long-run correlation between trade and GDP per capita in Ghana. We recommend that policymakers should strongly reconsider the trade policy structure by focusing more and emphasizing export goods and services which can directly add value to economic growth, and the government should protect the local industries and enhance trade attractiveness via education, infrastructure and innovation. In addition, policymakers should reconsider a well-strategic import substitution, which can help maximize benefits and minimize destructive impact on economic growth in the long run.

Moreover, based on the ARDL findings, population growth has a negative and statistically significant effect on GDP per capita in the short run. We recommend that policymakers should reconsider human capital investment development by emphasizing on access to quality healthcare and education, and creating job opportunities and entrepreneurship for the young growth generation, which can help to increase living standard and consequently lead to economic growth in the long run.

Furthermore, based on the literature, Islamic finance can contribute to the current demand for financial inclusion and reduce exclusion and inequality. Henceforth, we recommend that policymakers and stakeholders in the Islamic finance and banking development sector can contribute to ways of increasing FI accessibility among vulnerable people by introducing Islamic finance instruments such as Waqf, Zakat, microfinance, profit and loss sharing, Islamic crowdfunding, etc.

In summary, the government, financial institutions, and policymakers in Ghana need to intervene to target both LR and SR dynamics. In the long run, there is a need for intervention to increase FI accessibility and stabilize the key macroeconomic control variables to promote EG, while in the SR, there is a need for intervention to manage and control population growth and enhance resilience to avoid any short-run incident. Finally, the government should introduce Islamic finance and banking instruments that could contribute to FI accessibility, which can lead to inclusive growth and reduce exclusion.

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