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Understanding Financial Inclusion in Africa: A Multidimensional Banking–Insurance Index and its Key Influencing Factors

Abraham Nii Adoteye Saka[1]*, Eric Schaling[2], Williams Kwasi Peprah[3], Akwasi Agyei[4], Anthony Yaw Nsiah[5], Fred Bortey Kyeremeh[6], Ebenezer N. Kumah[6], Benjamin Baafi[7]

[1]University of Media, Art and Communication, Accra, Ghana, [2]University of the Witwatersrand, Johannesburg, South Africa, [3]Andrews University, Michigan, United States, [4]Spiritan University College, Ejisu-Kumasi, Ghana, [5]Bank of Ghana, Accra, Ghana, [6]Adventist University of the Philippines, Cavite, Philippines, [7]First National Bank Ghana Ltd., Accra, Ghana.
*Email: asaka@adjunct.unimac.edu.gh

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ABSTRACT

Financial inclusion is widely recognized as a multidimensional concept, hence, it is best measured using a composite index. However, previous studies have often relied on single indicators that fail to capture the multidimensional nature of financial inclusion, or have constructed indices based solely on banking data, overlooking other critical financial services such as insurance. To address this gap, the present study incorporates both banking and insurance sector data in constructing a financial inclusion index (FII) for a purposive sample of 14 African countries over the period 2000-2021, based on data availability. The results indicate that, apart from Sierra Leone, which recorded an average FII of 0.30, the remaining countries exhibited average indices below 0.30. Consequently, Sierra Leone is classified as a medium financial inclusion economy, while the other countries fall within the low financial inclusion category. The study further investigates the long-run and short-run determinants of financial inclusion using panel data and cointegration techniques. The empirical findings reveal that dependency ratio, GNI per capita, education, inflation, money supply, and urbanization exert statistically significant and positive effects on financial inclusion in the long run, whereas domestic credit to the private sector shows no significant long-term impact. In the short run, none of the variables exhibit statistically significant effects, underscoring the structural and persistent nature of financial inclusion challenges in the region. These results highlight the need for sustained, long-term policy interventions focused on promoting economic growth, improving education, and deepening financial systems to enhance financial inclusion across Sub-Saharan Africa.

Keywords: Financial Inclusion, Sub-Saharan Africa, Economic Growth, Principal Component Analysis
JEL Classifications: G21, G22, O16, O55, C43

1. INTRODUCTION

The African continent can boast of many natural resources, but due to a lack of inclusive growth and equitable distribution (access and use) of these resources, the continent remains the poorest in the world (Beegle and Christiaensen, 2019; Candia et al., 2020; Jemli and Chtourou, 2022; Nwani and Osuji, 2020; Triki and Faye, 2013). In recent, however, the conversation has shifted towards the need for the world to move towards inclusive growth and development. Many developed economies have adopted policies and strategies centered on inclusive growth and development (Ali and Son, 2007; Triki and Faye, 2013). Inclusive growth refers to the existence of equal opportunities for every economic agent (Ali and Son, 2007; Candia et al., 2020; Jemli and Chtourou, 2022). It is where every citizen can participate in and contribute to - the growth process irrespective of the individual's station of life (Ali and Son, 2007; Candia et al., 2020; Jemli and Chtourou, 2022). The existing literature suggests that finance is a key driver of inclusive growth, which means access to finance (financial inclusion) could be critical in

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achieving this growth (Demirgüç-Kunt and Singer, 2017; Triki and Faye, 2013).

Financial exclusion remains a major global concern as it continues to hinder economic growth and contributes to persistent poverty and income inequality among households (Agyemang-Badu et al., 2018; Ahamed, 2016; Akram, 2018; García Moritán, 2020). In recent years, however, there has been a growing push towards improving financial inclusion, largely because of its recognized potential to enhance economic participation and resilience among individuals and communities (Nguyen and Mogaji, 2021; Ozili, 2021; Park and Mercado, 2021; Tang, 2022).

Despite the importance of the concept of financial inclusion, there is no universally accepted definition of the concept (Nsiah et al., 2021; Tang, 2022). To this end, existing literature has defined financial inclusion in different ways (Ifediora et al., 2022; Nsiah et al., 2021; Tang, 2022). Some authors suggest that financial inclusion is where all economic agents have equal access to finance (Demirgüç-Kunt et al., 2020; Nsiah and Tweneboah, 2023; Ozili, 2020a; 2020b). Economic agents here refer to households (especially the poor, vulnerable, and women), firms (especially small and medium-sized enterprises [SMEs]), and the central government (Yoshino and Morgan, 2016). Financial inclusion ensures that formal financial services are available, accessible, and affordable to all adults on an equitable basis (Demirgüç-Kunt et al., 2020; Nsiah and Tweneboah, 2023; Ozili, 2020a; 2020b). The literature suggests that enhancing the level of financial inclusion attracts more economic agents into the formal financial system (Ozili, 2018; Ozili et al., 2023).

In the past, financial inclusion was measured primarily by the number of individuals who had access to and/or used formal financial services and products (Honohan, 2008). In recent years, financial inclusion has been assessed based on the extent to which formal financial services are available, accessible, and affordable to all adults; especially groups that are often financially marginalized, such as women and low-income populations (Sarma, 2008; Triki and Faye, 2013). From the World Bank's perspective, financial inclusion refers to a situation where economic agents are able to access financial products and services (such as savings, credit, insurance, payments, and remittances) in an equitable and sustainable manner (Cámara and Tuesta, 2014; Ghosh, 2020; Ghosh and Vinod, 2017; Nguyen, 2021).

The literature suggests that demand-side (household characteristics), supply-side (financial infrastructure), and regulatory factors (policy environment) collectively influence the level of financial inclusion within an economy (Aterido et al., 2013; Nsiah et al., 2021; Yoshino and Morgan, 2016; Zins and Weill, 2016). Demand-side factors refer to the drivers of financial inclusion from the perspective of consumers of financial services, emphasizing the characteristics, needs, and behaviors of individuals and households that determine their ability and willingness to access and use formal financial products (Nsiah and Tweneboah, 2023; Yangdol and Sarma, 2019; Zins and Weill, 2016). Demand-side factors include, but are not limited to, socio-economic variables such as gender, religion, age, income level, educational or literacy level, demographic location (urban or rural), and marital status (Allen et al., 2016; Barik and Lenka, 2022; Nsiah et al., 2021; Yangdol and Sarma, 2019; Zins and Weill, 2016). On the other hand, supply-side factors emanate from providers of financial services within an economy (Adil and Jalil, 2020; Bashiru et al., 2023; Célerier and Matray, 2019; Njenga and Irungu, 2024; Nsiah and Tweneboah, 2023; Wokabi and Fatoki, 2019; Yoshino and Morgan, 2016). The supply-side approach use financial institutions' factors such as infrastructure, quality of financial services, distance of financial service providers, channels (such as number of ATM and insurance/bank branches), collateral requirements, transaction cost/charges, and regulatory factors to determine the level of financial inclusion (Njenga and Irungu, 2024; Oke and Adamson, 2023; Yoshino and Morgan, 2016; Zins and Weill, 2016). Supply-side determinants can originate both domestically and externally, reflecting factors within the country's financial system as well as influences from international markets and institution (Nsiah and Tweneboah, 2023).

The World Bank's vision of Universal Financial Access (UFA) forms a central pillar of the global agenda to ensure that every adult has access to and can effectively use formal financial services (Chitimira and Warikandwa, 2023; Ho, 2023; Sharma and Changkakati, 2022; Swaiss, 2024). The gateway to the financial inclusion framework (Figure 1) provides a roadmap for transitioning economic agents from being unserved to being served within the formal financial system (World Bank, 2016). It underscores that access to financial services such as savings, credit, payments, insurance, and remittances is crucial for transitioning adults from financial exclusion to financial inclusion (World Bank, 2016). This implies that adults would be able to own and operate accounts for saving and investment purposes, access credit facilities, conduct financial transactions, purchase insurance policies, and send or receive remittances (World Bank, 2016).

The existing literature suggests that financial inclusion is a multidimensional concept; consequently, recent studies have employed various dimensions to construct comprehensive financial

Figure 1: The gateway to financial inclusion



Source: World Bank (2016)

inclusion indices (Cámara and Tuesta, 2014; Cámara and Tuesta, 2017; Triki and Faye, 2013; Tsouli, 2022). Widely used dimensions of financial inclusion include, but are not limited to, access, usage, depth, quality, and barriers (Cámara and Tuesta, 2014; Ho, 2023; Park and Mercado Jr, 2018; Sarma, 2012; Triki and Faye, 2013).

Similar to its definition, there is no universal consensus in the literature on how financial inclusion should be measured (Park and Mercado, 2021; Triki and Faye, 2013). Historically, financial inclusion has been measured using either a single indicator or a collection of proxy variables (Cámara and Tuesta, 2017; Demirgüç-Kunt et al., 2020; Nguyen, 2021; Park and Mercado, 2021). More recently, financial inclusion has been recognized as a broad, multidimensional concept that is best measured using a composite index rather than a single indicator (Cámara and Tuesta, 2017; Demirgüç-Kunt et al., 2020; Nguyen, 2021; Park and Mercado, 2021). To this end, recent studies have developed composite indices of financial inclusion that incorporate various dimensions (such as access, usage, and quality) to provide a more comprehensive representation of the concept (Gupte et al., 2012; Nsiah et al., 2021).

To address these limitations, our study offers several key contributions.

Firstly, instead of relying on proxies or individual indicators, this study constructs a comprehensive, multidimensional financial inclusion index. This approach enables us to capture the multidimensional nature of financial inclusion in our study. Furthermore, unlike previous studies that have relied solely on banking sector data to construct their financial inclusion indices, we incorporate both bank and insurance data into the index, offering a more holistic measure of financial inclusion. Finally, by using our comprehensive index to analyze the determinants of financial inclusion, we provide a fresh perspective compared to prior studies that relied solely on banking data for their financial inclusion index. This approach offers a richer understanding of financial inclusion dynamics in Africa.

The rest of the paper is organized as follows. Section two presents a brief review of relevant literature. Section three discusses data and methodology of the study. Section four discusses the empirical results and findings. Section fives concludes the paper with policy recommendations and recommended direction for future studies.

2. REVIEW OF THEORETICAL AND EMPIRICAL LITERATURE

2.1. Review of Theoretical Literature

Financial intermediation refers to the process through which financial institutions channel funds from surplus units (savers) to deficit units (borrowers) to facilitate investment, consumption, and other productive economic activities within an economy (Adu et al., 2013; Boot et al., 2020; Kwakye, 2012). In Ghana, financial institutions are depository institutions (such as banks and savings and loans companies), insurance companies (such as life and non-life companies), pension funds companies, investments banks, amongst others (Danquah et al., 2021; Kuada, 2019; Kwakye, 2012). According to the literature, the existence of financial intermediaries is largely attributed to imperfections within the financial system. Hence, as long as these market imperfections remain, financial intermediaries will continue to exist and perform essential functions (Gorton and Winton, 2003; Levine, 1997; Scholtens and Van Wensveen, 2003).

In the absence of financial intermediaries, information asymmetry and excessive transaction costs would prevail, thereby undermining the efficiency of financial markets and adversely affecting participants such as surplus units (savers), deficit units (borrowers), and insurance policyholders (Boot et al., 2020; Jiang et al., 2021; Li et al., 2020). Information asymmetry arises when one party in an economic transaction possesses more or better information than the other, leading to inefficiencies and potential market distortions (Ahearne et al., 2022; Boot et al., 2020; Kwakye, 2012). Information asymmetry occurs when one party in a transaction has access to more or better information than the other, thereby gaining an advantage in decision-making or negotiation (Boot et al., 2020; Grassi et al., 2022). Information asymmetry gives rise to market imperfections by creating conditions such as adverse selection and moral hazard, which ultimately contribute to different forms of market failure (Degryse and Ongena, 2005; Hauswald and Marquez, 2006; Kwakye, 2012; Nouren, 2009). Both adverse selection and moral hazard increase the cost and pricing of financial services, which can, in turn, hinder financial inclusion by limiting access and affordability for vulnerable groups (Izquierdo and Tuesta, 2015; Leland and Pyle, 1977). Financial institutions reduce information asymmetry by collecting, processing, and disseminating information evenly among financial market participants (Boot et al., 2020).

Adverse selection arises when, due to information asymmetry, a less desirable or higher-risk party is selected or favoured over a more suitable or lower-risk party in a financial transaction (Bessler et al., 2011; Djankov et al., 2007; Powell and Goldman, 2021).

An example of adverse selection is when a bank, due to imperfect information, grants a credit facility to a high-risk or non-creditworthy borrower instead of a financially sound applicant. Similarly, in the insurance industry, adverse selection may occur when an insurance company offers a generous policy (such as low premiums or high claims coverage) to a fraudulent or high-risk client rather than to a genuine, low-risk applicant. Financial intermediation helps address this issue by enabling financial institutions to collect and assess information about prospective borrowers or insurance policy applicants. Through due diligence, credit assessments, and risk scoring, intermediaries are able to screen out high-risk or fraudulent applicants, thereby reducing adverse selection and improving market efficiency (Ioannidou et al., 2022; Powell and Goldman, 2021). Moral hazard, on the other hand, refers to the situation where a financial service is sold to an applicant who applied for it for the wrong reason (Ioannidou et al., 2022; Powell and Goldman, 2021). Moral hazard can lead to increased impairments (bad loans) for banks and insurance fraud for insurance companies (Ioannidou et al., 2022; Powell and Goldman, 2021). Financial intermediaries help to mitigate the incidence of moral hazard by developing the skills, institutional

capacity, and structural mechanisms necessary to evaluate, monitor, and screen out high-risk or unqualified applicants in financial transactions (Saltzman, 2021).

Transaction cost refers to the money and time that market participants incur when engaging in financial sector activities or transactions (Benston and Smith, 1976; Scholtens and Van Wensveen, 2003). Transaction cost includes but are not limited to the money and time spent in searching, exchanging, and monitoring financial goods and services among economic agents within the financial system (Allen and Santomero, 1997; Benston and Smith, 1976; Cummins and Doherty, 2006; Hamdouni and Khaldi, 2011; Scholtens and Van Wensveen, 2003). The cost associated with obtaining and processing information to support financial decision-making and transactions underscores the critical role of financial institutions and markets as intermediaries for participants in the financial system (Levine, 1997). By bringing together various players within the financial sector, financial intermediaries help to reduce transaction costs (Boď a and Zimková, 2021; Hamdouni and Khaldi, 2011; Zeier Röschmann, 2018). Thus, in the absence of financial intermediaries, economic agents would face excessive transaction costs. Financial intermediaries, therefore, play a crucial role in eliminating such barriers and reducing fixed costs associated with financial transactions (Claessens and Perotti, 2005; 2007; Levine, 2005).

Existing literature widely acknowledges the crucial role of financial intermediation in ensuring the efficient mobilization and allocation of financial resources, thereby improving productivity and fostering sustainable economic growth (Di Tella, 2019; Gupte et al., 2012; Gurley and Shaw, 1960; King and Levine, 1993a; Muhoza, 2019). For example, by accepting deposits from surplus units and providing credit to deficit units, banks function as financial intermediaries that minimize the search and transaction costs both savers and borrowers would otherwise face in attempting to engage directly in financial exchanges. Through their wide network of brokers and agents, insurance companies facilitate access to insurance products and services, thereby reducing the time and monetary costs customers would have incurred in independently searching for appropriate insurance coverage (Stricker et al., 2023; Zeier Röschmann, 2018).

A well-functioning financial sector, through an efficient financial intermediation process, helps to lower transaction costs, minimize information asymmetry, and spread or mitigate the risks faced by financial sector participants (Boď a and Zimková, 2021; Hamdouni and Khaldi, 2011). Financial intermediation helps to lower transaction costs and improve information availability, thereby reducing information asymmetry. This, in turn, enhances the availability, affordability, and accessibility of financial services to economic agents (both households and businesses) within the economy (Beck et al., 2005; Demirguc-Kunt et al., 2017; Kwakye, 2012; Scholtens and Van Wensveen, 2003; Zeier Röschmann, 2018). Thus, the theory of financial intermediation is closely linked to the concept of financial inclusion. By facilitating the efficient flow of funds between surplus and deficit units, financial intermediaries help reduce transaction costs, mitigate information asymmetry, and enhance access to credit and other financial services. In doing so, they promote inclusive finance by ensuring that all economic agents; particularly marginalized groups such as women, low-income households, and small businesses, can participate meaningfully in the formal financial system (Allen et al., 2016; King and Levine, 1992; King and Levine, 1993b; Knight, 2013; Kwakye, 2012; Ozili et al., 2023; Scholtens and Van Wensveen, 2003; Schumpeter, 1934; Stricker et al., 2023; Zeier Röschmann, 2018).

2.2. Empirical Literature Review

The existing literature suggests that access to finance contributes significantly to economic growth and development. It also plays a crucial role in reducing poverty and income inequality, promoting women's empowerment, and fostering further financial development within an economy (Agbloyor et al., 2016; Koomson et al., 2020; Nizam et al., 2020). There is a need for effective regulation of the formal financial sector to ensure that it operates transparently and sustainably, thereby strengthening public confidence in the system. Enhanced trust in financial institutions can, in turn, encourage greater participation from economic agents; particularly households and vulnerable individuals who are at risk of financial exclusion, and ultimately promote higher levels of financial inclusion (Pal et al., 2021; Park and Mercado Jr, 2018).

Empirical research on the factors that drive financial inclusion; particularly within Sub-Saharan Africa, remains limited and continues to evolve (Aterido et al., 2013; Bashiru et al., 2023; Nsiah and Tweneboah, 2023; Wokabi and Fatoki, 2019). Previous empirical studies suggest that the level of financial inclusion within an economy is influenced by both demand-side and supply-side factors (Aterido et al., 2013; Fahmy and Ghoneim, 2023; Ifediora et al., 2022; Kandari et al., 2021; Nguyen and Luong, 2023; Njenga and Irungu, 2024; Nsiah and Tweneboah, 2023; Uddin et al., 2017).

Demand-side factors capture the drivers of financial inclusion from the viewpoint of financial service consumers (both individuals and businesses) (Nsiah and Tweneboah, 2023). Demand-side factors encompass socio-economic variables such as gender, religion, age, income level, educational attainment or literacy level, marital status, and geographic location (urban or rural) (Asuming et al., 2019; Bashiru et al., 2023; Bekele, 2023; Njenga and Irungu, 2024; Zins and Weill, 2016). Conversely, supply-side factors capture the role of financial service providers in influencing the extent of financial inclusion within an economy (Adil and Jalil, 2020; Bashiru et al., 2023; Nsiah and Tweneboah, 2023). From the supply-side perspective, financial inclusion is assessed using institutional indicators such as the extent of banking and insurance infrastructure, the number of ATMs, and the density of bank and insurance branches (Njenga and Irungu, 2024). Supply-side determinants can originate both domestically (reflecting factors within the country) and externally (reflecting factors influenced by international financial systems and global market dynamics) (Nsiah and Tweneboah, 2023).

Several empirical studies have examined the determinants of financial inclusion across different contexts. For instance, Zins and Weill (2016) found that factors such as gender, age, education, and income significantly influenced the level of financial

inclusion across 37 African countries. Similarly, Yangdol and Sarma (2019) provided evidence suggesting that gender (being a woman), unemployment, and low levels of education are negatively associated with financial inclusion, whereas individuals or households with higher levels of education and income are more likely to be financially included. In a more recent study, Bekele (2023) employed a demand-side approach to investigate the determinants of financial inclusion in Kenya and Ethiopia at both the micro and macro levels. The findings revealed that socio-economic factors such as gender, age, employment status, and mobile phone ownership positively affect financial inclusion, while lack of money remains a key barrier to inclusion.

The empirical literature also identifies age as a driver of financial inclusion in an economy (Allen et al., 2016; Koloma, 2021; Nsiah and Tweneboah, 2023). Recent empirical studies further suggest that age is positively associated with financial inclusion (Allen et al., 2016; Gautier et al., 2020; Rashdan and Eissa, 2020). In other words, as individuals grow older, their participation in the financial sector tends to increase, thereby enhancing the overall level of financial inclusion in the economy. Allen et al. (2016) argue that age is an important factor influencing financial inclusion, noting that younger individuals are more likely to be financially excluded compared to adults. To investigate the determinants and barriers of financial inclusion in India, Dar and Ahmed (2021) employed a probit model and found that; among other factors, age had a positive and significant relationship with financial inclusion. In the context of Africa, Rashdan and Eissa (2020) and Gautier et al. (2020) found evidence of a positive relationship between individuals' age and their level of financial inclusion in Egypt and Cameroon, respectively. The literature further suggests that factors such as educational background, gender, family status, and employment status can influence the relationship between age and financial inclusion (Koloma, 2021; Senou and Manda, 2022). Using a logit estimation approach to examine the determinants of financial inclusion and entrepreneurship among the youth in Mali, Koloma (2021) found that young individuals were more likely to be financially included if they were educated, employed, and came from well-off families; particularly when at least one family member owned a bank account, compared to their less privileged counterparts.

Recent studies suggest that geographical location also plays a significant role in influencing financial inclusion (De Olloqui et al., 2015; Wokabi and Fatoki, 2019; Yorulmaz, 2016). To this end, evidence from the literature indicates that barriers to financial inclusion are more prevalent in rural areas than in urban settings (De Olloqui et al., 2015; Wokabi and Fatoki, 2019; Yorulmaz, 2016). For instance, Allen et al. (2016) found that individuals and households residing in rural communities were more likely to be financially excluded compared to their urban counterparts. Similarly, Wokabi and Fatoki (2019) observed that rapid population growth had a negative impact on the level of financial inclusion in East Africa.

With respect to gender, growing evidence highlights that gender plays a critical role in shaping the level of financial inclusion within an economy (Demirgüç-Kunt et al., 2013; Mohammed et al., 2017). At the micro level, Ghosh and Vinod (2017) found that the probability of financial exclusion is notably higher among female-headed or female-dominated households. Such households are less likely to own bank accounts or access cash and credit facilities compared to their male-headed counterparts. Similarly, Mohammed et al. (2017) reported that women are generally more susceptible to financial exclusion than men. Corroborating these findings, Demirgüç-Kunt et al. (2013) observed that men disproportionately own bank accounts relative to women, which is a disparity often attributed to gender-based discrimination and the persistence of early marriage among women in many developing economies.

Other studies have also attributed income levels and t employment status (employed and unemployed) to the level of financial inclusion in an economy (Altarawneh et al., 2020; Badar et al., 2020). Using a multinomial logistic regression model to estimate the determinants of financial inclusion, Badar et al. (2020) found evidence suggesting that being employed enhances financial inclusion in India, Pakistan, and Bangladesh compared to being unemployed. Similarly, in examining the determinants and barriers to financial inclusion in India, Dar and Ahmed (2021) employed a probit model and found that earning capability is positively associated with financial inclusion.

On the supply side of financial inclusion, the existing literature identifies the presence and reach of financial institutions that offer appropriate products and services as one of the most critical determinants (Adil and Jalil, 2020; Allen et al., 2016; Asuming et al., 2019; Bekele, 2023; Chikalipah, 2017; Ifediora et al., 2022; Kandari et al., 2021). Empirical studies suggest that supply-side factors such as geographic outreach (the proximity of consumers to financial institutions) and the demographic outreach of these institutions significantly influence the level of financial inclusion within an economy (Kandari et al., 2021; Nsiah and Tweneboah, 2023). Using the autoregressive distributed lag (ARDL) approach, Adil and Jalil (2020) found that financial inclusion improved as the size and geographic coverage of banks expanded in Pakistan. This improvement was attributed to increased accessibility, as greater proximity to banking institutions enhanced households' access to consumer credit. Similarly, Mossie (2022), employing a logit model, found supporting evidence that distance to financial access points significantly affects the level of financial inclusion in Ethiopia.

It is important to emphasise that the mere availability of financial institutions and services does not automatically translate into higher levels of financial inclusion within an economy (Kandari et al., 2021). The actual usage of these financial services is what truly determines the extent of financial inclusion (Kandari et al., 2021; Nsiah and Tweneboah, 2023). Using a binary logistic regression model on data from 780 rural households, Kandari et al. (2021) found that factors such as bank account ownership, access to credit facilities, and the use of mobile banking services were significant determinants of financial inclusion in rural India. This finding underscores the idea that financial inclusion is not solely a function of access, but also of the ability and willingness of individuals to engage actively with available financial services.

Beyond the traditional banking infrastructure, recent evidence highlights that technological innovation and regulatory support have become key supply-side drivers of financial inclusion. The emergence of mobile banking, FinTech solutions, and digital payment platforms has helped bridge the gap between the formal financial sector and underserved populations, particularly in rural and remote areas (Allen et al., 2016; Demirgüç-Kunt et al., 2020; Park and Mercado, 2021). Supportive government policies and effective financial sector regulation further strengthen this relationship by ensuring that digital financial services are safe, accessible, and affordable to all. As such, technology-enabled financial services and sound regulatory frameworks are increasingly recognized as essential components of a sustainable and inclusive financial ecosystem.

The existing literature also suggest that financial deepening, financial innovations, and the availability of new and improved financial services and products are important drivers of financial inclusion (Agyekum et al., 2016; Agyekum, 2017; Chipeta and Muthinja, 2018; Laeven et al., 2015; Morgan, 2022; Muthinja, 2016; Oyelami et al., 2017; Qamruzzaman and Wei, 2019). Using a panel autoregressive distributive lag (ARDL) method, Oyelami et al. (2017) found that bank innovations; particularly the introduction of automated teller machines (ATMs), significantly enhanced the level of financial inclusion across sub-Saharan Africa. Financial innovations emerge as mechanisms to reduce transaction costs for economic agents who consume financial products and services (Merton, 1989; Muthinja, 2016). In this regard, financial innovation has the potential to lower transaction costs and mitigate issues of information asymmetry, thereby enhancing access to and usage of financial services. Consequently, such technological innovations can play a critical role in promoting financial inclusion; particularly in developing economies where traditional banking infrastructure is limited (Chipeta and Muthinja, 2018; Chitimira and Warikandwa, 2023; Demirgüç-Kunt and Klapper, 2012; Laeven et al., 2015; Mossie, 2022). Demirgüç-Kunt and Klapper (2012) found that the use of a moble money service (a commonly used proxy for financial innovation) resulted in lower transactions cost of financial services (cost of money transfer) for economic agents. Simialrly, Mossie (2022) found that affordable financial services and products was an important driver of financial inclusion in Ethiopia. In a recent study, high cost of accessing financial services was found to discourage the use of the financial products and services (Mossie, 2022). Moreover, financial innovations enhance the flow and accessibility of information among financial market participants, thereby improving the efficiency of financial intermediation and expanding access to financial services (Broby, 2021). Given these insights, promoting financial innovation; especially in the form of digital and mobile-based financial services, has become an important policy priority for economies seeking to deepen financial inclusion and foster inclusive economic growth (Andrianaivo and Kpodar, 2011; Ozili, 2018).

Other supply-side and regulatory factors that influence financial inclusion include trust and documentation requirements. For instance, know your customer (KYC) procedures are often required to sign up for an insurance product, open a bank account, access a line of credit, or file an insurance claim (Abel et al., 2018; Akudugu, 2013; Nsiah and Tweneboah, 2023; Xu, 2020). By sampling 1,000 adults with varying income levels across Ghana, Akudugu (2013) found that the lack of proper documentation was a significant barrier to financial inclusion. Individuals without the required documents were less likely to be financially included compared to those who possessed them. The study also revealed that a lack of trust in the financial system hindered efforts to improve financial inclusion among individuals during the study period. Similarly, Abel et al. (2018) found that stringent account-opening requirements served as a barrier to financial inclusion in Zimbabwe.

In summary, demand-side factors such as gender, age, education, geographical location, marital status, employment status, and wealth have been identified as significant micro-level determinants of financial inclusion. These factors require substantial attention from governments and policymakers to enhance the level of financial inclusion across Africa (Asuming et al., 2019; Bekele, 2023; Gautier et al., 2020; Irankunda and Van Bergeijk, 2020). On the other hand, supply-side and regulatory factors such as the availability and size of financial institutions, geographic and demographic outreach actual usage of financial services, trust, financial innovation, improved financial products and service offerings, and documentation requirements are also critical determinants of financial inclusion globally (Chipeta and Muthinja, 2018; Demirgüç-Kunt and Klapper, 2012; Mossie, 2022).

Previous studies on financial inclusion have often relied on single indicators that fail to capture its multidimensional nature or constructed indices based solely on banking data, which inadequately represent the broader financial sector. To address these limitations, this study makes several contributions. First, instead of relying on single indicators, we develop a multidimensional financial inclusion index for a sample of sub-Saharan African countries. Second, we extend the literature by incorporating both banking and insurance data into the index, thereby offering a more comprehensive measure of financial inclusion. Third, the study provides focused insights into sub-Saharan African countries, addressing the gap left by cross-country studies that examine multiple nations without an in-depth focus on any particular region. Finally, by employing our comprehensive index to analyze the determinants of financial inclusion, we present a fresh perspective relative to prior studies that relied solely on banking data. This approach offers a richer and more nuanced understanding of financial inclusion dynamics in sub-Saharan Africa.

3. DATA AND METHODOLOGY

3.1. Data

This study adopts a quantitative research design and utilizes secondary data obtained from credible international sources such as the World Development Indicators (WDI), the Financial Access Survey (FAS), and the United Nations Development Programme (UNDP) (Espinosa-Vega et al., 2020; Evans and Adeoye, 2016; Nsiah et al., 2021). Data for constructing the financial inclusion index were drawn from these databases and categorized into three dimensions: depth (measured by private-sector credit to

GDP, pension fund assets to GDP, mutual fund assets to GDP, life insurance premiums to GDP, and non-life insurance premiums to GDP); access (measured by the number of bank branches and ATMs per 100,000 adults); and efficiency (measured by net interest margin, lending–deposit spread, non-interest income to total income, and overhead costs to total assets). The study covers the period 2000-2021, chosen primarily based on data availability and consistency across the selected countries. The sample comprises Botswana, Burkina Faso, Cameroon, the Democratic Republic of Congo, The Gambia, Kenya, Lesotho, Madagascar, Mozambique, Nigeria, Rwanda, Sierra Leone, Tanzania, and Uganda. These countries were selected because they represent a diverse mix of low- and middle-income Sub-Saharan African economies with varying levels of financial sector development and data completeness.

3.2. Financial Inclusion Index

This study employs both banking and insurance data to construct the financial inclusion index for the sampled countries, as this approach provides a more accurate representation of the African financial sector compared to using banking data alone. Recent studies have adopted various dimensions such as penetration, access, availability, usage, barriers, efficiency, and quality in measuring or constructing financial inclusion indices (Cámara and Tuesta, 2014; Sarma, 2008; 2012; Sharma, 2016; Triki and Faye, 2013). In this study, however, the financial inclusion index is constructed using three key dimensions: Depth, access, and efficiency.

3.2.1. Computing the financial inclusion index (FII)

This study employs principal component analysis (PCA) to construct the financial inclusion index, following the approach used in recent empirical studies (Nsiah et al., 2021; Park and Mercado Jr, 2018). The PCA method offers several advantages. First, it effectively addresses the challenges of multicollinearity and over-parameterization that often arise when single indicators are used to represent financial inclusion (Cámara and Tuesta, 2014; Nsiah et al., 2021; Park and Mercado Jr, 2018). Second, PCA enables the extraction of common underlying components across the various dimensions of financial inclusion, thereby isolating and retaining only those components that explain the most significant variance in the data (Bali et al., 2014; Cámara and Tuesta, 2014). In doing so, the approach ensures that the constructed index is both statistically robust and informationally efficient, capturing the essential aspects of financial inclusion while excluding redundant or less informative variables.

This study adopts the model specification proposed by Cámara and Tuesta (2017), as presented in Equation (1) below:

$$\mathrm{FII}_i = w_1 Y_i^d + w_2 Y_i^a + w_3 Y_i^e + \varepsilon_i \quad (1)$$

Where: FII represents the financial inclusion index. Y_i^d, Y_i^a and Y_i^e are the depth, access, and efficiency dimensions respectively. Depth includes private-sector credit to GDP, pension fund assets to GDP, mutual fund assets to GDP, life insurance premiums to GDP, and non-life insurance premium to GDP, access comprises bank branches per 100,000 adults and ATMs per 100,000 adults, and efficiency includes being net interest margin, lending-deposits spread, non-interest income to total income, and overhead costs to total assets represent the causal variables. w_i represents the weight and ε_i represents the error term.

Accordingly, we express the PCA method in the linear Equations (2, 3, and 4) below:

$$Y_i^d = \alpha_1\, Bank\ Credit_t + \alpha_2\, Pension\ Funds_t + \alpha_3\, Mutual\ Fund_t + \alpha_3\, Insurance_t + \mu_t \quad (2)$$

$$Y_i^a = \beta_1\, Branch\ branches_t + \beta_2\, ATMs_t + \epsilon_t \quad (3)$$

$$Y_i^e = \delta_1\, Interest\ margin_t + \delta_2\, Lending\text{-}deposit\ spreads_t + \delta_3\, non\text{-}interest\ income\ to\ total\ income_t + \delta_3\, overhead\ costs\ to\ total\ assets_t + \mu_t \quad (4)$$

Where d, a, and e represent the depth, access, and efficiency dimensions respectively and μ, ϵ, and ϕ are the error terms in equations (2), (3) and (4) respectively. Equations (2), (3) and (4) are estimated using principal components.

Equations (5), (6), and (7) identify the weighted averages of the estimator of each of the dimensions used in this study as follows:

$$Y_i^d = \frac{\sum_{j,k=1}^{p} \lambda_j^d\, p_{ki}^d}{\sum_{j=1}^{p} \lambda_j^d} \quad (5)$$

$$Y_i^a = \frac{\sum_{j,k=1}^{p} \lambda_j^a\, p_{ki}^a}{\sum_{j=1}^{p} \lambda_j^a} \quad (6)$$

$$Y_i^e = \frac{\sum_{j,k=1}^{p} \lambda_j^e\, p_{ki}^e}{\sum_{j=1}^{p} \lambda_j^e} \quad (7)$$

Where:

$Pk = X\lambda_j$, X represents the indicator matrix whilst λ_j represents the variance of the $k-th$ weight. We combine all the individual indexes to estimate the parameter λ in equation (8):

$$\mathrm{FII}_i = \frac{\sum_{j=1}^{p} \lambda_t\, p_{ki}}{\sum_{j=1}^{p} \lambda_j} \quad (8)$$

In equations (9), (10) and (11) below, we present each component Pki is as a linear combination of the three dimensions used in this study as well as the respective eigenvectors of the correlation matrices:

$$P_{1i} = \pi_{11} Y_i^d + \pi_{12}\, Y_i^a + \pi_{13}\, Y_i^e \quad (9)$$

$$P_{2i} = \pi_{21} Y_i^d + \pi_{22}\, Y_i^a + \pi_{13}\, Y_i^e \quad (10)$$

$$P_{3i} = \pi_{31} Y_i^d + \pi_{32}\, Y_i^a + \pi_{33}\, Y_i^e \quad (11)$$

To obtain the financial index, we substitute the *Pki* in equations (9), (10) and (11) into equation (12):

$$FII_t = \frac{\sum_{j=1}^{3} \lambda_j (\pi_{j1} Y_i^d + \pi_{j2} Y_i^a + \pi_{j3} Y_i^e)}{\sum_{j=1}^{3} \lambda_j} \quad (12)$$

Equation (12) can be presented in a linear form as the overall weighted average of the financial inclusion index using equation (13) below:

$$FII_i = w_1 Y_i^d + w_2 Y_i^a + w_3 Y_i^e + e_i \quad (13)$$

FII represents our financial inclusion index for Africa, w_1, w_2 and w_3 are the respective weights of each dimension used in the final financial inclusion index, and e_t represents the error term.

3.3. Determinants of Financial Inclusion in Africa

In addressing research objective 1(b), this study employs a dynamic panel data model to adequately capture the evolving relationship between the factors that influence the degree of financial inclusion in Africa. To this end, the study adopts econometric specifications similar to those used in recent empirical works (see Ben Naceur et al., 2017; Demirgüç-Kunt et al., 2014; Kuri and Laha, 2011; Marshall, 2004; Mehrotra and Yetman, 2015; Nsiah et al., 2021), while selecting explanatory variables based on established literature (Mohieldin et al., 2011; Sarma and Pais, 2011). Modifications were made where necessary to align with the availability of data and to reflect the specific socioeconomic context of African countries.

3.3.1. Model specification

The study deployed the econometric model (equation 14) below to investigate the factors that determine financial inclusion in Africa:

$$lnFII_{it} = \alpha + \beta_1 lnFII_{it-1} + \beta_2 lnGNI_{it} + \beta_3 lnDCP_{it} + \beta_4 lnMSP_{it} + \beta_5 lnEDU_{it} + \beta_6 lnDPR_{it} + \beta_7 INF + \beta_8 lnU2R_{it} + \varepsilon_{it}$$

Where: FII denotes the Financial Inclusion Index (the dependent variable), and the explanatory variables include: GNI representing economic growth, DCP representing financial depth, MSP representing money supply, EDU representing education, DPR representing the dependency ratio, INFL representing inflation, and U2R representing urbanisation. The descriptions of these variables are provided below

3.3.2. Dependent variable

3.3.2.1. Financial inclusion

Financial inclusion is captured by the Financial Inclusion Index (FII) constructed using both banking and insurance data from the sampled countries in this study. The literature suggests that access to finance (through increased and inclusive financial access) is essential for promoting inclusive growth and sustainable economic development (Ofosu-Mensah Ababio et al., 2021; Triki and Faye, 2013). Furthermore, financial inclusion facilitates wealth accumulation and enhances overall well-being by reducing income inequality and alleviating poverty among economic agents (Park and Mercado, 2015; Park and Mercado, 2021; Tsouli, 2022).

3.3.3. Explanatory variables

3.3.3.1. Gross national income

Gross National Income (GNI per capita is widely recognised as a measure of a country's overall wealth and economic performance (Bozkurt et al., 2018; Nsiah and Tweneboah, 2023; Nsiah et al., 2021). Accordingly, this study employs GNI per capita as a proxy for economic growth. In this context, GNI is measured as the sum of value added by all resident producers, including any product taxes not accounted for in the valuation of output, together with net receipts of primary income from abroad (Nsiah and Tweneboah, 2023; Nsiah et al., 2021). The underlying hypothesis is that, ceteris paribus, as GNI increases, the income levels of economic agents; particularly individuals and households, also rise. This income growth enhances their capacity to access and utilise formal financial products and services, thereby improving overall financial inclusion. Park and Mercado (2015) further noted that involuntary financial exclusion in Asia may be largely driven by insufficient income among individuals and households, reinforcing the critical role of economic growth in promoting inclusive financial participation.

3.3.3.2. Financial depth

In line with recent studies, this study employs domestic credit to the private sector (DCP) as a percentage of GDP as a proxy for financial depth (Nsiah et al., 2021; Siddik and Kabiraj, 2018). DCP represents the financial resources (such as loans, trade credits, accounts receivable, and guarantees) extended to the private sector by financial institutions. The private sector plays a pivotal role in the development process of any economy (Evans and Adeoye, 2016; Olowofeso et al., 2015). By providing employment opportunities, it enables individuals and households to earn income, thereby increasing their capacity to engage with formal financial systems and become financially included (Evans, 2016; Evans and Adeoye, 2016; Nsiah and Tweneboah, 2023). Furthermore, the private sector contributes to government revenue through taxes, which can be used to promote economic growth and create an enabling business environment that supports job creation and sustained income generation; both of which enhance participation in the financial sector (Leitao, 2012).

3.3.3.3. Money supply

Money supply refers to total sum of money that is in circulation within an economy (Evans and Adeoye, 2016). All else being equal, an increase in the money supply indicates greater liquidity and enhanced purchasing power among economic agents, which can stimulate aggregate demand and consumption (Nsiah and Tweneboah, 2023). Rising demand for goods and services incentivizes firms to expand production, thereby creating employment opportunities and increasing income levels for individuals and households. Higher employment and income, in turn, encourage economic agents to engage with the financial system; through means such as opening bank accounts, purchasing insurance policies, or accessing credit facilities. Additionally, expanding business activity increases the need for firms to seek credit and investment from financial institutions, which can be reinvested into productive ventures to enhance output and business growth. From a macroeconomic perspective, therefore, an increase in the money supply is expected to stimulate economic

growth through its capacity to boost investment and productivity (Galadima and Ngada, 2017). Consistent with previous studies, this study hypothesizes that growth in the money supply positively affects economic growth, thereby enabling greater participation of economic agents in the formal financial sector (Chaitip et al., 2015; Galadima and Ngada, 2017; Iorember et al., 2022; Mahara, 2020; Nsiah and Tweneboah, 2023).

3.3.3.4. Education

The literature suggests that education is a crucial instrument for combating poverty among individuals and households (Awan et al., 2011; Hofmarcher, 2021). Education enhances employability, thereby increasing individuals' likelihood of gaining employment and earning higher incomes, which raises their disposable income and capacity to participate in the financial sector (Dar and Ahmed, 2021; Zins and Weill, 2016). Moreover, education fosters financial awareness by helping individuals and households understand the relevance of financial services in their lives, thus encouraging greater engagement with formal financial institutions (Allen et al., 2016; Khan et al., 2022; Morgan and Long, 2020). In this study, education is measured as the ratio of gross secondary school enrolment to the total population, irrespective of age. Consistent with previous studies, education is expected to have a positive relationship with the level of financial inclusion in Sub-Saharan Africa (Dar and Ahmed, 2021; Zins and Weill, 2016).

3.3.3.5. Dependency ratio

In this study, the dependency ratio represents the number of dependent individuals relative to the number of active individuals in the workforce within an economy (Nsiah and Tweneboah, 2023; Park and Mercado Jr, 2018). Following the World Development Indicators (WDI), the dependency ratio is measured as the proportion of senior citizens (aged 65 and above) to working-age citizens (aged 15–64), multiplied by 100 (Uddin et al., 2017). The theoretical literature suggests that a higher dependency ratio reduces the disposable income of individuals and households, thereby lowering their savings rates and limiting their ability or inclination to engage with the formal financial sector (Nsiah and Tweneboah, 2023; Uddin et al., 2017). Consequently, the dependency ratio is expected to exhibit a negative relationship with financial inclusion, since individuals with fewer dependents are likely to have more disposable income to participate in financial activities (Park and Mercado Jr, 2018; Uddin et al., 2017).

3.3.3.6. Inflation

Inflation is generally defined as the persistent increase in the general price level of goods and services over time. It is typically measured using the consumer price index (CPI), which reflects the average cost of a representative basket of goods and services. Inflation, therefore, represents the year-on-year percentage change in the CPI (Park and Mercado Jr, 2018; Tsouli, 2022). Consistent with recent studies, this study employs the annual percentage change in the CPI as a proxy for inflation in Africa (Cámara and Tuesta, 2014; Nsiah and Tweneboah, 2023). Rising inflation tends to erode the purchasing power of individuals and households; particularly when income growth fails to keep pace with the rate of inflation, thereby reducing the quantity of goods and services they can afford (Ndoricimpa, 2017; Tsouli, 2022), and reduces economic growth (Ndoricimpa, 2017). Consequently, this study expects that higher inflation will discourage participation in the formal financial sector, while lower inflation will promote the use of financial products and services among individuals and households (Omar and Inaba, 2020; Park and Mercado Jr, 2018; Tsouli, 2022).

3.3.3.7. Urbanisation

To capture the geographical dimensions of financial inclusion, this study introduces urbanisation, which is measured as the ratio of the urban to rural population, as an explanatory variable (Cicchiello et al., 2021; Demirguc-Kunt et al., 2018; Leyshon and Thrift, 1995). As regions become more urbanised, they typically experience higher levels of economic development and infrastructure growth. This transformation promotes business expansion and job creation, which in turn increases the disposable income of individuals and households, thereby enhancing their capacity to participate in the financial sector. Moreover, urbanisation often attracts financial institutions to establish branches and service outlets in these areas, improving the accessibility and availability of financial services to residents (Cicchiello et al., 2021; Demirguc-Kunt et al., 2018; Koomson et al., 2016; Koomson et al., 2023). Accordingly, this study employs the urban-to-rural population ratio as a proxy for urbanisation.

4. EMPIRICAL RESULTS ANALYSIS

This section presents the empirical results and a discussion of the results of this study objective.

4.1. An Analysis of Financial Inclusion Indexes for the Selected Countries in Africa

Table 1 presents the results of the principal component analysis (PCA) for financial inclusion. The PCA involves computing eigenvalues for each component to identify the underlying common factors (Jolliffe, 2002). Following Jolliffe's (2002) criterion, only components with eigenvalues greater than one are retained, as these components explain a substantial proportion

Table 1: Principal component analysis (PCA) for financial inclusion

Principal components/correlation						
Number of obs:			594			
Number of comp.			3			
Trace			3			
Rho			1.0000			
Rotation: (unrotated=principal)						
Variable	**Depth**	**Access**	**Efficiency**	**Proportion**	**Cumulative**	**Eigenvalue**
PC1	0.7018	0.6936	0.1624	0.5652	0.5652	1.69555

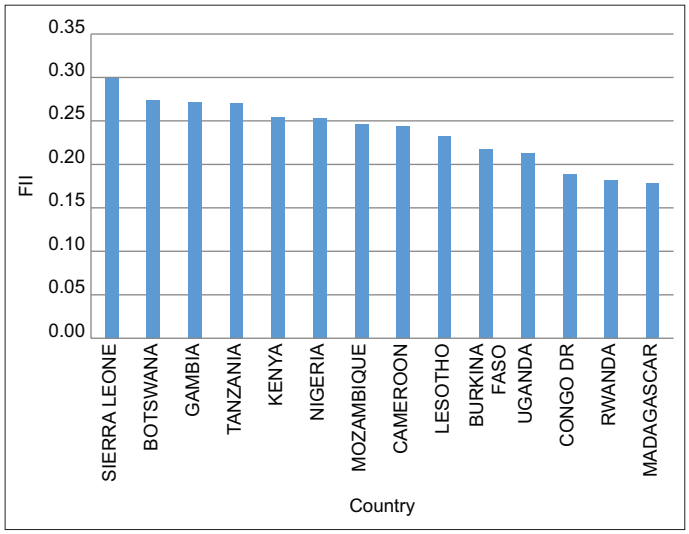
Source: Author's own computations, 2025

of the total variance and are therefore considered significant in representing the common factors of financial inclusion.

According to Sarma (2008), financial inclusion can be classified into low, medium, and high categories as captured in Table 2 below:

Figure 2 presents the average Financial Inclusion Index (FII) for the sampled Sub-Saharan African countries. The results show that Sierra Leone recorded the highest level of financial inclusion (approximately 0.30), followed by Botswana, Gambia, and Tanzania. Conversely, Madagascar, Rwanda, and Congo DR exhibited the lowest levels of financial inclusion, with FII values below 0.20. Based on Sarma (2008)'s classification of financial inclusion indexes, therefore, only Sierra Leone recorded an average financial inclusion index of 0.30, which places it in the medium financial inclusion rated category. The other countries (that is Botswana, Gambia, Tanzania, Kenya, Nigeria, Mozambique, Cameroon, Lesotho, Burkina Faso, Uganda, Congo Dr. Rwanda, and Madagascar), recorded average financial inclusion indexes that were below 0.30, which placed them in the low financial inclusion category. This means that 92.85% of the African countries used in this study fell in the low financial inclusion category. The variation across countries suggests differences in financial sector development, access to financial services, and the effectiveness of policies aimed at promoting financial inclusion within the region. Per the findings of this study, the trend in financial inclusion is consistent with recent studies. Nsiah et al. (2023) found that majority of the African countries in their study also fell in low financial inclusion category.

Figure 2: Financial inclusion indexes for the selected countries in Africa



Source: Author's own construct, 2025

Table 2: Financial inclusion index classification

Financial inclusion score	Overall financial inclusion classification
0-0.3	Low financial inclusion
0.3-0.5	Medium financial inclusion
0.5-1.0	High financial inclusion

Source: Sarma (2008; 2012)

4.2. Determinants of Financial Inclusion in Africa

This section presents and discusses the descriptive statistics, pairwise correlation matrix, and regression results of the determinants of financial inclusion in Africa.

4.2.1. Descriptive statistics

The variables' descriptive statistics are covered in this section. Table 3 provides the findings.

An analysis of descriptive statistics in Table 3 shows that the average financial inclusion index (FII) is 0.24. It has a standard deviation of 0.13, which means that financial inclusion in SSA is relatively stable across the selected countries during the study period. FII also reported a minimum value is 0.003 with a maximum value of 0.45. The average value of domestic private sector credit (DCP) to GDP ratio is 13.84% with standard deviation of 8.49%. The mean value of the dependency ratio (DPR) is 79.78 percent with the deviation of 20.79%. The difference the maximum and minimum values of dependency ratio (DPR) is quite high, which gives the indication that the region has huge dependency burden during the study period. The average value of gross national income per capita is $1192.99. The region recorded an average value of 44.73% of secondary school enrolment with a standard deviation of 27.93%. The secondary school enrolment in the region is quite low giving the indication that enrolment at secondary school level in the region is relatively low. The average inflation rate (INF) is 12.17% for the 14 countries with a standard deviation of 38.69%. The difference between the minimum value of -9.6162% and maximum value of 513.91% show unstable inflation amongst the sample countries during the study period. The mean value of the money supply (MSP) is 29.37% money supply is in levels not in percent with a standard deviation of 18.03% indicating less variability across the sampled countries over the 22-year period. The average urban population to rural population ratio (U2R) is 0.97% across the sampled countries in this study.

4.2.2. Correlation matrix

Table 4 presents the correlation matrix of the variables used in the study. The purpose of conducting the correlation test is to examine whether multicollinearity exists among the variables. According to the decision rule proposed by Farrar and Glauber (1967), the correlation coefficient between any pair of independent variables should be <0.8 to avoid multicollinearity issues. As shown in Table 4, the correlations among the variables are all below this threshold, which indicates no multicollinearity concern within our dataset.

Table 3: Descriptive statistics

Variable	Mean	Standard deviation	Minimum	Maximum
FII	0.2374	0.1291	0.0033	0.4457
DCP	13.8399	8.4891	0.0016	39.3667
DPR	79.783	20.794	1.8875	111.4765
GNI	1192.993	1291.857	309.9712	6319.572
EDU	44.7311	27.9298	5.5574	143.7252
INF	12.1661	38.6871	−9.6162	513.9068
MSP	29.3653	18.0307	2.8574	117.1918
U2R	0.9674	1.3392	0.0899	9.4417

Source: Author's own calculations, 2025

Table 4: Pair-wise correlation matrix

Variable	FII	DCP	DPR	GNI	EDU	INF	MSP	U2R
FII	1							
DCP	0.12	1						
DPR	−0.14	−0.77	1					
GNI	0.0004	0.51	−0.71	1				
EDU	0.33	0.24	−0.23	−0.10	1			
INF	−0.14	−0.06	0.05	0.03	−0.09	1		
MSP	0.34	0.50	−0.25	−0.16	0.40	−0.14	1	
U2R	0.16	0.03	−0.16	−0.12	0.28	−0.09	0.13	1

Source: Author's own computation, 2025

Table 5: Panel cointegration estimates of the determinants of financial inclusion

Variable	Coefficient	Standard error	t-statistic
LR			
lnDCP	0.002226	0.005181	0.43
lnDPR	1.738399***	0.624502	2.78
lnGNI	2.028561***	0.225774	8.98
lnEDU	0.621935***	0.095191	6.53
INF	0.007771***	0.000522	14.89
lnMSP	0.692818***	0.109544	6.32
lnU2R	−0.130226***	0.298071	−0.436896
SR			
ECT	−0.580709***	0.112737	−5.15
ΔlnDCP	0.017693	0.045272	0.39
ΔlnDPR	9.598185	17.61162	0.54
ΔlnGNI	−0.357161	0.698708	−0.51
ΔlnEDU	0.020674	0.202914	0.10
ΔINF	−0.001200	0.003158	−0.38
ΔlnMSP	0.064010	0.366631	0.17
ΔlnU2R	107.0694	94.46118	1.13
Constant	−17.91179***	3.806377	−4.71

Source: Author's own computation, 2025. The asterisks *, ** and *** denote statistical significance at the 10%, 5% and 1% levels, respectively

4.2.3. Discussion of the determinants of financial inclusion

Table 5 presents the results of the regression.

The error correction term (ECM [−1]) displays the endogenous responses to shocks of the dependent variables by depicting the rate of adjustment. The ECM coefficient in Table 5 is negative, demonstrating the co-integration and stability among the model's variables. As a result, the model has a 1% level of significance for stability, and equilibrium in the long run will change following any short-term shock by about 58 annually. The ECM coefficient demonstrates that after short-term shocks, the long-run equilibrium is reached for financial inclusion, private sector credit to GDP ratio, dependency ratio, GNI per capita, education, inflation, money supply, and urban to rural population ratio.

The dependency ratio has a significant positive effect on financial inclusion in the long run across sub-Saharan Africa at the 1% level of significance. We find that a one-percentage-point increase in the dependency ratio is associated with a 1.74% increase in the financial inclusion index in the long run. This finding is somewhat unexpected, as a higher dependency burden is generally anticipated to limit individual and households' ability to fully participate in the financial sector. However, several reasons can be cited for this observed result. A higher dependency ratio may drive increased demand for financial services such as savings products, insurance policies, and pension schemes aimed at securing the welfare of dependents. In addition, households with more dependents may be more inclined to engage in financial planning and risk-mitigation strategies, which necessitate participation in formal financial systems. These factors may explain the observed positive association between dependency ratio and financial inclusion.

The results of this study, however, differ from those of Nsiah and Tweneboah (2023), who found an insignificant effect of dependency ratio on financial inclusion in Africa. In the short run, the dependency ratio exerts an insignificant effect on financial inclusion, even at the 10% significance level, across sub-Saharan Africa.

The results indicate that GNI per capita has a significant positive effect on financial inclusion in the long run at the 1% level of significance across the selected sub-Saharan African countries. The magnitude of the coefficient suggests that a 1% increase in GNI per capita leads to a 2.03% rise in the financial inclusion index. This implies that individuals with higher disposable incomes are more likely to access financial services such as savings, credit, and insurance. Moreover, higher income levels may enhance opportunities for financial literacy, enabling individuals and households to make more informed decisions regarding financial products and services. Increased income also strengthens the capacity to save and invest, fostering greater financial stability and security. This finding is consistent with Park and Mercado (2015), who observed that involuntary financial exclusion in Asia is often driven by insufficient household income. Our finding consistent with recent empirical evidence demonstrating a positive and significant relationship between financial inclusion and GNI per capita (Fungáčová and Weill, 2014; Nsiah and Tweneboah, 2023; Park and Mercado, 2018).

The results further reveal that education has a statistically significant and positive effect on financial inclusion in the long run, even at the 1% level of significance in sub-Saharan Africa. The positive coefficient implies that a higher proportion of individuals who have completed at least primary education is associated with a greater level of financial inclusion. Education equips individuals with the necessary knowledge and awareness about the existence and importance of financial institutions, the benefits of saving, and the relevance of financial products such as insurance policies. Hence, higher literacy rates increase the likelihood of individuals and households participating in the formal financial sector. This finding aligns with Datta and Singh (2019), who also reported a significant positive relationship between education and financial

inclusion. However, the results indicate that education has an insignificant effect on financial inclusion in the short run.

Inflation is found to have a positive and statistically significant relationship with financial inclusion in the long run in sub-Saharan Africa at the 1% level of significance. The magnitude of the coefficient suggests that a one-percentage-point increase in inflation leads to approximately a 0.8% rise in financial inclusion. This finding is somewhat unexpected, as inflation is typically presumed to reduce real household income, thereby lowering the demand for financial services. However, a plausible explanation is that during periods of high inflation, individuals may be encouraged to purchase financial products such as fixed deposits and treasury bills, which tend to offer higher interest rates and thus become more attractive to economic agents. Additionally, during inflationary periods, individuals and households may view financial products as safer stores of value, given fears of currency depreciation (Tsouli, 2022). Therefore, rising inflation may indirectly enhance financial inclusion by motivating individuals to engage more with formal financial institutions. This result is consistent with Tsouli (2022), who also found a positive association between inflation and financial inclusion. Nonetheless, the short-run results show that inflation has an insignificant effect on financial inclusion, even at the 10% significance level.

The study reveals that money supply has a positive and statistically significant effect on financial inclusion in the long run in sub-Saharan Africa, at the 1% level of significance. The estimated coefficient indicates that a 1% increase in money supply leads to a 0.69% rise in the financial inclusion index in the long run. This suggests that an increase in money supply can stimulate greater lending by financial institutions, and enhancing credit accessibility for individuals and businesses. Moreover, expansionary monetary policies, which typically increase the money supply, may lower interest rates and make borrowing more affordable, particularly for marginalized groups (Demirgüç-Kunt and Klapper, 2012). However, in the short run, the effect of money supply on financial inclusion is statistically insignificant, even at the 10% significance level.

The ratio of urban to rural population exhibits a significant negative effect on financial inclusion in the selected sub-Saharan African countries at the 1% level of significance in the long run. This finding is surprising, as it is generally anticipated that an increase in the urban population would stimulate the expansion of the financial sector to meet rising demand for financial services, which would enhance the level of financial inclusion. A plausible explanation is that urbanization in the sampled sub-Saharan African countries may have contributed to the expansion of the informal economy, where many workers operate outside the reach of formal financial institutions. Additionally, the high cost of living in urban areas may constrain the ability of low-income individuals to save or invest in financial products. This finding contrasts with Datta and Singh (2019), who reported an insignificant relationship between urbanization and financial inclusion. In the short run, however, urbanization exerts an insignificant effect on financial inclusion, even at the 10% significance level. The results further indicate that domestic credit to the private sector has an insignificant effect on financial inclusion in both the short and long run across sub-Saharan Africa, even at the 10% significance level. This suggests that credit extended to the private sector does not play a decisive role in enhancing financial inclusion in the region.

5. CONCLUSION AND POLICY IMPLICATIONS

First, the study constructed a financial inclusion index for selected sub-Saharan African countries. Unlike previous studies that relied solely on banking data, this study incorporated data from both the banking and insurance sectors, thereby providing a broader and more comprehensive perspective on financial inclusion in Africa. Using data from 2000 to 2021, the index was constructed employing the Principal Component Analysis (PCA) approach. The results revealed that, apart from Sierra Leone that recorded an average financial inclusion index of 0.30, all other 13 countries in the sample had average indices below 0.30. According to Sarma's (2008) classification, this implies that only Sierra Leone qualifies as a medium financial inclusion economy, while the remaining 13 countries fall into the low financial inclusion category; representing 92.85% of the sample. The overall average financial inclusion index for the entire sample was 0.24, suggesting that Africa can generally be classified as a low financial inclusion region. Encouragingly, however, the study observed a consistent upward trend in financial inclusion across all countries.

The study examined the key determinants of financial inclusion in Sub-Saharan Africa. First, the study results show that the dependency ratio has a significant positive effect on financial inclusion in the long run. Second, GNI per capita is found to be positively and significantly associated with financial inclusion, implying that higher income levels encourage greater participation in financial activities over time. Third, education exerts a significant positive influence on financial inclusion; specifically, an increase in the proportion of individuals who have completed primary education enhances access to and use of financial services. Fourth, inflation is positively related with financial inclusion in the long run, although its short-run effect is insignificant. Fifth, money supply has a significant positive impact on financial inclusion in the long run, as greater liquidity in the economy facilitates access to credit for individuals and businesses. Finally, the study provides evidence that urbanisation negatively affects financial inclusion in the long run, suggesting that increased urban population does not necessarily translate into broader financial access.

Based on the findings of this study, the following recommendations are proposed for policymakers and future researchers.

First, the findings of this study suggest that governments in African countries should implement policies and programmes that promote macroeconomic stability and political environments and certainty to create a conducive business environment that supports private sector development. Growth in the private sector tends to stimulate job creation, increase income levels, enhance economic growth, and reduce both inflation and income inequality among individuals and households. Moreover, governments should ensure that economic growth is inclusive and supports sustainable urban development, which has the potential to positively influence financial inclusion across the continent.

Second, governments and regulators of the financial services industry must design and implement rules and regulations that build confidence in the financial sector and promote financial inclusion; especially since empirical evidence suggests that higher levels of financial inclusion tend to enhance economic growth and reduce income inequality. The study found a positive trend in financial inclusion across the sampled countries, which indicates that the current policies and regulatory frameworks are contributing positively to inclusion efforts. However, regulators should also focus on reducing or eliminating barriers to financial inclusion, such as the excessively high cost of financial services (example borrowing and insurance premiums) and the cumbersome documentation requirements associated with customer due diligence and know-your-customer (KYC) procedures.

Furthermore, financial service providers (including banks and insurance companies), in collaboration with regulators, should invest in financial literacy initiatives and integrated advisory programmes aimed at educating citizens, dispelling misconceptions that the formal financial sector is only accessible to the wealthy or highly educated, and building public trust and confidence in the system. As the literature highlights, actual usage of financial services is essential for deepening financial inclusion, therefore, financial institutions should develop diverse and affordable financial products tailored to different segments of the population. Overall, regulators and financial service providers must work together to expand the depth, increase access, and improve the efficiency of financial systems across Sub-Saharan Africa, thereby enhancing financial inclusion and minimizing barriers to participation in the formal financial sector.

Future studies may consider constructing a financial inclusion index that incorporates other financial sector players, such as the capital market, to further enrich the empirical literature on financial inclusion. Researchers could also expand the scope of their studies to include additional African countries not covered in this study, as well as other regions, to enhance the generalizability of the findings at a global level. Moreover, future research may explore the threshold effects of financial inclusion on economic growth, poverty, and income inequality. Such an analysis would be particularly valuable, as it would provide empirical evidence on the level of financial inclusion that effectively promotes economic growth and reduces poverty and income inequality within an economy.

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