UNIVERSITY OF GHANA

MOBILE MONEY, FINANCIAL INCLUSION AND INSURANCE SECTOR DEVELOPMENT IN AFRICA

BY

REXFORD AKAZUSI ANI

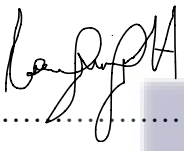
(10876224)

A THESIS SUBMITTED TO UNIVERSITY OF GHANA, LEGON IN PARTIAL FULFILMENT OF THE REQUIREMENT FOR THE AWARD OF MASTER OF PHILOSOPHY DEGREE IN RISK MANAGEMENT AND INSURANCE

JANUARY, 2023

DECLARATION

I, Rexford Akazusi Ani, do hereby declare that this thesis has not been documented for presentation in this or any other University. I, therefore, declare that this thesis is my own work and all references have been duly acknowledged. I take sole responsibility for any shortcomings that may be found in this thesis.



..... 4 Oct 2023 .....

(Rexford Akazusi Ani). (Date)

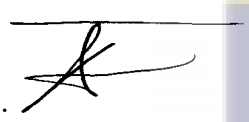
(10876224)

CERTIFICATION

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

…… 04 - 10 - 2023 ……...

Dr Godfred Amewu (Date)
(Principal Supervisor)



…… …… ……04/10/2023……...

Prof Joshua Y Abor (Date)
(Co-Supervisor)

DEDICATION

This thesis is dedicated to my newly born beloved princess Sherylyn and her brothers Shayne and Shawn. Also, to my lovely wife, Abena Adomah Ani who has encouraged me through this thesis process.

ACKNOWLEDGEMENTS

I am eternally appreciative to the Lord Almighty for guiding me through this entire course of study. What I am grateful to him for is the provision of life in me and the ongoing blessings in my life.

I want to thank my supervisors, Dr. Godfred Amewu and Prof. J.Y Abor, for all of their help and advice. Your excellent supervision has made a significant contribution to this thesis.

Finally, I'd want to acknowledge my father, Joseph Akazusi Ani, who encouraged and pushed me to pursue this program.

ABSTRACT

Around 2.5 billion people throughout the world do not have access to traditional financial services. This is now possible thanks to mobile money for many unbanked individuals to be able to make financial transactions. There are also plans to broaden the scope of these financial services in the insurance industry. This study aims to understand the interactive effect of financial inclusion in the mobile money and insurance nexus. It also tries to further appreciate the importance of mobile money on inclusive finance and also takes a look at the individual effect of financial inclusion and mobile money on the insurance industry. The importance that the research conducted on the African insurance industry aims to encourage the usage of mobile money and understand its effect on the sector. This study utilizes System GMM as an estimating technique. The decision to implement this strategy is based on the various arguments that have been presented in previous research. The study revealed that mobile money has an important effect on inclusive finance in Africa, with all of its proxy's having a positive effect. It also found no evidence that mobile money development has affected the insurance sector in the continent. The study also noted that inclusive finance could help the development of the insurance industry in Africa. It said that the relationship between insurance and mobile money could be moderated by this new technology.

Keywords: Mobile Money, Financial Inclusion, Insurance, GMM, Africa

Table of Contents

LIST OF FIQURES

LIST OF TABLES

LIST OF ABBREVIATIONS

GSMA.	Global Systems for Mobile Communications Associations
ATM.	Automated Teller Machine
ICT.	Information and Communications Technology
AFI.	Alliance for Financial Inclusion
FAS.	Financial Access Survey
MM	Mobile Money
OECD.	Organization for Economic Cooperation and Development
GNP.	Gross National Product
GDP	Gross Domestic Product
CSEE	Central and Southeast Europe
TAM.	Technology Acceptance Model
PU.	Perceived Usefulness
PEOU.	Perceived Case of Use
UUT.	Unconventional U-turn Treatment
PC.	Personal Computer
TPB.	Theory of Planned Behavior
TRA.	Theory of Reasoned Action
UTAUT.	The unified theory of acceptance and use of technology
CPT.	Cumulative Prospect Theory
NHIF.	National Health Insurance Fund
OLS.	Ordinary Least Squares
PCA.	Principal Component Analysis
UN.	United Nations

CHAPTER ONE

INTRODUCTION

1.1 Research Background

Through mobile money, users can send and receive money. It has become a vital part of the financial services ecosystem in Africa. Both senders and recipients must typically have an account with mobile telecommunication network providers using their phones. These mobile telecommunication network providers may be found on every corner of the street in Africa, even in isolated areas, which is a distinguishing feature that has made this service known with its consumers. M-Pesa, a mobile money service was first implemented in Kenya in 2007 to assist workers in the cities in sending money to their rural families (Hughes & Lonie, 2007). Mobile money has become an important aspect of financial activity, particularly in Africa, due to the extensive availability of telecom operators and the reduced prices required to transfer money. Through the end of 2020, Africa had about 548 million registered accounts, generating in approximately 490 billion USD in transactions (GSMA, 2020).

Businesses that use mobile money for financial operations such as paying bills, cash receipts from clients, paying energy bills, and paying staff wages can now take advantage of this service. Mobile money has drastically changed the way businesses operate in Africa's emerging markets. It enables them to process transactions and save time and money by allowing suppliers and customers to use it (World Bank, 2014). This is not different in the insurance sector. Insurance companies across the African continent are working to integrate the mobile technology in their day-to-day operations.

The concept of inclusive finance refers to the availability of low-cost financial services to a large segment of the population (Mahendra, 2006). Besides being able to access traditional

financial services, such as loans and insurance, financial inclusion also includes other forms of financial services such as savings and credit. This can have a positive impact on the economy by increasing the disposable income of rural residents. Inclusive finance may increase the participation of people across the world in the economic mainstream, increasing the reach and effectiveness of monetary policy (Evans, 2016).

Mobile money certainly continues to play a major role in bringing the African population into the financial mainstream. One out of every four adult in African marketplaces where mobile money is available today uses it. Consumer behavior and demand are being influenced by increased urbanisation and falling smartphone pricing. Mobile money agents in remote areas and hard-to-reach locations continue to play a critical role in the digitalization of currency in several African marketplaces. According to GSMA, mobile money agents can reach out to about 26 times and 58 times more than ATM's and bank branches respectively. As of December 2019, there were 3.4 million agents throughout Africa, 1.9 million of whom have been operational for at least 30 days. Comparatively, there are just 6 bank branches and 13 ATMs per 100,000 adult Africans, or about 340 agent locations per 100,000 Africans. In 2019, $124 billion was digitized on the continent, thanks to this enormous distribution network**.** In Ghana, there were about 180,448 mobile money agents in 2019 compared to about 8 commercial bank branches per 100,000 people and 11 ATMs per 100,000 people.

In many developing countries, insurance penetration is still as low as 3% (as a percentage of GDP) that's according to GSMA (2020). When the lack of institutional safety nets is paired with low earnings and a lack of understanding, low-income groups can become extremely vulnerable to financial shocks, with catastrophic short and long-term repercussions. With 67% of the world's population owning a mobile phone, there is a huge market opportunity for mobile phone to "leapfrog" existing models by supporting under-insured people in safeguarding themselves against unforeseen emergencies and shocks (GSMA, 2018).

Multiple community shocks, such as flooding and other natural catastrophes make it difficult for the poor. There are extremely few options for insuring against these dangers. Insurance that is legally binding is rarely available. Informal insurance networks, however, can be developed within household or network members minimizing perils through intermittent transfers and monitored by members of the network trust ties (De Weerdt & Dercon, 2006). The mobile money service can help mitigate various risks. It can also expand the reach of networks, and it can prevent major decreases in the amount of money transferred. Its ability to provide more frequent and smaller money transfers can also help manage negative shocks (Jack and Suri, 2011). Informal insurance networks can be more effective than traditional ones, as they can make more informed decisions and reduce the risk of loss. Mobile money can also help mitigate negative shocks by providing microinsurance.

Several researches have looked into the relationship between mobile money and economic development (Aron, 2018), (Jack & Suri, 2011), (Yokossi, 2017), (Ritzén & Hussein, 2021). Only a few researches have looked into the impact of ICT on insurance development (Akinlo, 2023), (Sapa et al. ,2014), (Asongu, Nnanna, & Acha-Anyi, 2019), (Mutegi, 2018), (Safitri, 2020), (Asongu, & Odhiambo, 2019). However, particularly in Africa, the relation between mobile money, inclusive finance and insurance development has not been adequately examined. Due to this, empirical study on the effect of mobile money and the moderating role of financial inclusion on the development of insurance is inadequate. This is likely a result of the company's inability to keep up with new developments. Insurance businesses can increase demand for their products by employing modern ways to reach out to countryside residents.

Africa's insurance industry is very young and has a small market share with the exception of South Africa, but it has the likelihood to grow into one of the best in the industry (EY, 2015).

Consequently, one of the solutions for turning around the sector in Africa could be to use technology to produce mobile money related services to reach out to the rural poor.

1.2 Problem Statement

The African continent has witnessed a remarkable surge in the adoption of mobile money services over the past decade. As highlighted by Mbiti and Weil (2015), these services have become integral to the daily lives of millions, providing convenient and accessible means for financial transactions, savings, and even access to credit. However, amidst this rapid growth of mobile money, there exists a significant gap in our understanding of its intricate relationship with financial inclusion and its potential impact on the development of the insurance sector in Africa. This research aims to address this gap by delving into the multifaceted dynamics that link mobile money adoption, financial inclusion, and the growth of the insurance sector across the diverse African landscape.

A substantial body of literature, exemplified by Hughes and Lonie (2007), contends that mobile money services hold the promise of fostering financial inclusion by extending access to financial services to previously unbanked or underbanked populations. This transformative potential arises from the convenience and affordability of mobile money, enabling individuals to participate more actively in the formal financial system. However, while the theoretical basis for the impact of mobile money on financial inclusion is robust, there is a dearth of empirical evidence and context-specific insights, particularly regarding its implications for insurance uptake.

The insurance sector in Africa faces a unique set of challenges, as underscored by Lester (2011). These challenges include low insurance penetration rates, limited awareness of insurance products, and a lack of affordability for insurance coverage among the majority of

the population. Addressing these challenges is vital for enhancing risk management and resilience in the face of economic shocks and disasters. Given the critical role of insurance in sustainable development, it becomes imperative to investigate whether and how the growth of mobile money can bridge the gap between the underserved populations and the insurance sector, thus contributing to broader financial stability and development goals in the African context.

In today's rapidly evolving global financial landscape, the interaction between mobile money and financial inclusion stands as a pivotal force reshaping economic empowerment, poverty reduction, and inclusive development, particularly in emerging economies. As access to traditional banking services remains limited for a substantial portion of the world's population, mobile money emerges as a powerful catalyst for change. It democratizes financial access by providing a user-friendly, low-cost, and widely accessible platform that transcends geographical barriers. This transformational potential of mobile money extends beyond mere convenience; It has the capacity to unlock new realms of financial participation for marginalized and unbanked individuals, fostering economic resilience, promoting entrepreneurship, and ultimately, paving the way for more equitable societies.

Mobile money's motivation lies in its inherent ability to bridge geographical, logistical, and infrastructural divides, enabling individuals, even in remote and underserved regions, to engage in secure financial transactions, savings, and payments. As affirmed by Hughes and Lonie (2007), mobile money provides a lifeline to those excluded from formal financial services, offering a pathway towards financial inclusion. This inclusive vision aligns closely with the global commitment to the United Nations Sustainable Development Goals (SDGs), specifically Goal 1 (No Poverty) and Goal 8 (Decent Work and Economic Growth), highlighting the central role of financial inclusion in eradicating poverty and fostering economic growth.

Furthermore, the symbiotic relationship between mobile money and financial inclusion extends to areas such as access to credit, microfinance, and insurance. As financial inclusion expands, so do opportunities for entrepreneurship and economic self-sufficiency, thereby reducing income inequality and enhancing social stability. The potential for mobile money to catalyze these transformations cannot be understated. Hence, understanding and harnessing the dynamics of this interaction becomes not only a matter of economic significance but also a moral imperative. In an era marked by unprecedented technological advancement, the synergy between mobile money and financial inclusion has the power to redefine the financial landscape, improve livelihoods and ultimately uplift communities worldwide.

1.3 Research Objectives

The objectives of this study are:

I. To determine if the growth of mobile money has any impact on financial inclusion.

II. To research whether mobile money development and financial inclusion independently affect the development of insurance in Africa

III. To identify whether the interactive effect of mobile money and financial inclusion affect the insurance sector

1.4 Research Questions

These following research questions are addressed in this study:

I. Does the growth of mobile money have any impact on financial inclusion?

II. Do Mobile Money and Financial Inclusion independently affect the Insurance Sector

III. Does the interactive effect of Mobile Money and Financial Inclusion affect the Insurance Sector?

1.5 Significance of the Study

This research will be used by researchers, decision-makers, and professionals to analyze the various factors that affect the expansion of the insurance industry in Africa. It will additionally add to the body of data related to financial inclusion. This is one of the few research works in Africa that looks at the interaction between mobile money, inclusive finance, and insurance.

The study's findings will be used to develop various modules that will help promote financial inclusion within the insurance industry. The findings of the study will be used to inform policymakers and other decision-makers in the insurance sector.

1.6 Limitations of the Study

The purpose of this study was to look into the relationship between the development of mobile money, financial Inclusion and the development of the insurance sector in Africa. This study did not look into the elements that influence customer acceptance of mobile money, nor did it look into the factors that influence merchant preference for mobile money as a payment channel. This is because, unlike finance and economic growth, the fundamental theories for technology adoption come from the field of information and communication technology (ICT).

Another stumbling block was the lack of appropriate data. The gathered information spanned the years 2011 to 2019. This was due to the lack of pertinent data previous to 2010 and after 2019.

1.7 Chapter Disposition

The scope of the research will be divided into five sub-chapters. The first chapter will introduce the study's background and its objectives, while the second chapter will look into the literature to find out what kinds of authors are involved in the development of financial inclusion and

insurance sectors. Also, the second chapter will analyse the multiple perspectives of the authors on the development of mobile money and financial inclusion. The research approach will be explained in chapter three. This chapter will focus on the study region, data source, and study population, as well as the data analysis method. The fourth chapter will cover data presentation, analysis, discussion, and conclusions. The summary, conclusions, and recommendations will be included in Chapter 5.

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

This chapter examines existing literature related to the research. The review of literature is separated into two parts: theoretical and empirical. The theoretical study includes fundamental concepts related to mobile money, inclusive finance, and the evolution of the insurance industry, as well as how the various variables interact with one another. The literature review concludes with an empirical evaluation of the current literature to demonstrate the study's contribution.

2.2 Theoretical Review

2.2.1 Definition and Importance of Financial Inclusion

Financial Inclusion has various meanings in literature. The World Bank's Global Financial Report terms inclusive finance as the percentage of people who use financial services. Limited does not in itself necessarily indicate a lack of accessibility, according to the report. Due to the increasing price, known obstacles, and market imperfections, some consumers may accept access to finance yet decline to use particular services (World Bank, 2014). In accordance with Sarma (2008), inclusive finance is a method that assures that all economic actors have simple access to, accessibility of and usage of financial services. This definition of financial inclusion by Sarma (2008) covers a wide range of topics, including usage, availability and access, all of which are debatable in their own right.

According to Rangarajan (2008), inclusive finance is a process that aims to ensure that vulnerable groups have access to adequate credit and financial services. It involves providing timely and affordable credit to these groups.

The idea of inclusive finance involves regulating and ensuring that various types of financial services are made publicly available to all segments of society, especially vulnerable groups (Chakrabarty, 2010). According to Hannig and Jansen (2011), financial inclusion is the absence of barriers that prevent people from accessing financial services. It provides a variety of financial products and services to help individuals make informed decisions (Goland , Bays & Chaia, 2010 ; Hannig and Jansen, 2011).

The importance of financial inclusion cannot be overstated. One important tactic for achieving the SDG of the UN is financial inclusion (Demirguc-Kunt, Klapper, & Singer, 2017). It enables participants to effectively, safely and convincingly manage their finances on a daily basis, plan for the future, and deal with economic stress by managing their resources in a way that protects them from short-term changes in income and expenses and stay one step ahead in the long-term benefit prospects, as well as appropriately dealing with financial difficulties, should unforeseen events lead to serious financial difficulties (HM Treasury, 2007). In many economies, increasing financial inclusion also raises the sense of social inclusion (Bold, Porteous, & Rotman, 2012). It can assist in bringing down poverty rates to the targeted level, that's according to Neaime & Gaysset (2018) and contribute to bringing about other socioeconomic advantages (Sarma & Pais, 2011).

The dangers that the poor may experience as a consequence of economic adjustments will be reduced by quick access to finance, which will allow those in lower socioeconomic groups to safely retain cash and prevent the buildup of economic power in the hands of a few individuals. Because access to financial services has significant effects on the economy and society, authorities are becoming concerned about it (Garg & Agarwal, 2014).

2.2.2 How to measure Financial Inclusion

Multiple methods have been used to measure financial inclusion in the literature. Some academics look at the demand-side factors that influence the supply of financial services. Klapper and Demirguc-Kunt (2012) analyzed the multiple factors that influence the financial inclusion of individuals. They found that the leading factors that influence the availability of financial services are insurance, payment, and savings. Another way to measure financial inclusion is through the use of supply-side data. This is done through the work of the Financial Access Survey and the Alliance for Financial Inclusion (AFI).

Jansen and Hannig (2010) defined financial inclusion as the ability to access and use a variety of financial services. They also noted that it involves the quality of the product or service that the consumer receives. This is done through the multiple perspectives that are included in the concept. In addition, they noted that the concept of financial inclusion should not be limited to the immediate use of financial services. It should also consider the long-term use of these products and services. This is done through the assessment of the effects of financial inclusion on the consumers' lives.This process can be carried out through various sources, such as the demand or supply aspects. They also believe that it should be done in two ways: First, to measure the level of financial inclusion and second, to identify the factors that contribute to this issue. Both of these goals are set to be achieved through the use of data.

Sarma (2008) developed a Financial Inclusion Index based on a variety of factors, primarily related to the banking industry, such as usage, availability, and bank penetration. In a given year, these data are combined to create an index for a certain country. The index was created using the normalized inverse Euclidean distance as its foundation. The authors believed that employing the euclidean distance method is a suitable way to create an index that meets the

requisite algebraic criteria and allows for simple computations. Pal and Chakravarty (2013) created a financial inclusion index that takes into account various factors related to the availability and access of banking services. They did not explain how they came up with the idea of using equal weights for multiple aspects of their study. Due to the complexity of the index's structure, it has become widely used in the financial inclusion industry. This method of calculating financial inclusion using weights has been derived from the Principal Component Analysis-PCA (Chakravarty and Pal, 2013).

2.2.3 Determinants of Financial Inclusion

Financial inclusion has been studied by several researchers specifically looking at the factors that affect financial inclusion. In 2016, a study conducted by Weill and Zins analyzed the data from the World Bank's Global Findex database to identify the factors that influence financial inclusion in 37 African countries. They found that gender, education, and income were the most important factors that affected the level of financial inclusion (Zins and Weill, 2016). In 2016, a study conducted by Soumaré and colleagues analyzed the data from the World Bank's Global Findex database to identify the factors that influence financial inclusion in West Africa and Central Africa. They found that gender, education, income and residence were the most important factors that affected the level of financial inclusion (Soumaré et al. 2016). The study's findings showed that individual characteristics can have a substantial consequence on financial inclusion in West and Central Africa. In Central Africa, gender was found to be very important, while income was very important in West Africa. A study conducted by Adeoye and Olaniyi in 2016 analyzed the variables that affect financial inclusion in African countries from 2005 to 2014. They found that multiple factors such as per capita income, internet availability, and literacy rates contribute to financial inclusion (Olaniyi and Adeoye, 2016).

Chithra and Selvam (2013) used a composite index of financial inclusion to investigate interstate disparities in access to finance. The survey revealed that social determinants like incomes, human development index, population, investments and credit uptake affected financial inclusion. The study conducted by Akudugu in 2013 identified various factors that contribute to Ghana's financial inclusion. It found that only 40% of the country's adults are currently in a financial institution. Other factors that affected financial inclusion included the distance between the institutions and the social networks of the people.

2.2.4 Definition and Importance of Mobile Money

Upadhyay and Jahanyan (2015) defined mobile money as a type of electronic payment system that enables people to carry out various financial transactions through their mobile phones. They further went ahead to highlight that the service is commonly used to offer financial services such as bill payment and withdrawal. Aside from these, mobile money can also be used to make purchases and withdraw money from a registered bank account. In some countries like Ghana, it is allowed for people to move money from one bank account to another using their mobile money wallet. In order to deposit funds, the users must make a deposit through an agent of mobile money or any authorized bank. After receiving the funds, they can then transfer them to their bank account. Therefore, the introduction of mobile money services by telecommunications operators in a number of nations, particularly in Sub-Saharan Africa, has increased the availability of financial services to poor workers.

Mobile money provides unbanked individuals with the opportunity to access financial services. It can also help small and informal enterprises expand their operations and provide financial products to other communities (Munyegera and Matsumoto, 2016). In Sub-Saharan Africa, over 60% of the population lives in rural areas, which are not economically advantageous for banks. Mobile money can help these enterprises carry out their operations more efficiently.This

technology can help improve the informal part of the economy, which is a huge part of developing nations' economies. According to data from Mozambique, mobile banking has helped improve the trust and financial education of its users (Foster and Heeks, 2013a). Mobile banking can also help promote financial literacy by educating consumers about traditional institutions (Batista and Vicente, 2013). In 2012, the US Agency for International Development noted that mobile money is more productive and cost-effective than cash payments. In 2011, Martin, O'Neill, and Kumar noted that mobile money can help encourage under- and unbanked people to become financially included. It can allow individuals and small businesses to send and receive money using their mobile phones (Kumar, Martin, and O'Neill, 2011). In 2015, Scharwatt and Williamson noted that by lowering transaction costs, mobile money can assist improve access to financial services. This innovation can also help develop financial markets in developing countries by increasing the number of transactions. The use of mobile money can help mitigate risks associated with financial transactions in developing regions.

2.2.5 Measurement of Mobile Money

In 2014, the Financial Access Survey (FAS) included a mobile money component in its annual data gathering activity to collect mobile money records across many series stretching back to 2007. To use these series, it generates 10 mobile money metrics. By 2020, 79 nations will have reported annual mobile payment data to the FAS. Administrative data acquired from mobile financial service providers' regulatory authorities is the basis of mobile payment data in the FAS.

According to GSMA (2021), the paper presented a new index for measuring mobile money called the mobile money prevalence index. The goal of the index is to measure the prevalence of mobile money penetration in a country. It does so by examining the accessibility and active accounts of mobile money networks. The index is composed of three main dimensions. First is

the adoption rate, which refers to the number of people who have mobile money accounts. It then measures the activity rate, which is the share of accounts that are active for 90 days. Finally, it looks at the accessibility of mobile money networks by examining the number of agents.

In order to identify the links between women's economic empowerment and mobile money, Dorfleitner and Nguyen (2022) conducted a study that analysed the various factors that influence the adoption of mobile money. According to the research, the adoption process of mobile money is measured using three measures. These include the active account owner, the mobile money account owner and mobile money user. The value of the mobile money user is computed by taking into account the respondent's financial activities with mobile money services.The variable owner of a mobile money account shows whether or not a person has an account that's registered in their name. The active owner, on the other hand, represents the individuals who have used their account in the past 90 days for financial transactions.

2.2.6 Determinants of Mobile Money

One of the most important factors that affects the adoption of mobile money is the availability of regulations. Although these factors are often cited as the main reason for the rise of mobile money, other sociodemographic factors such as level of education and gender which can also be known to affect the acceptance and use of this technology (Amoah et al. 2020). Various strands that influence mobile money development have also been studied. For instance, according to Rewilak (2017), low-access nations to Fintech companies are much more susceptible to adopt mobile money. In 2012, Donovan noted that the availability of regulations and policies can help support the deployment of mobile money. Mobile money's various benefits have been studied by scholars. Some of these include the reduction of poverty and income, as well as better shock management. In 2014, Jack and Suri noted that the availability

of mobile money has resulted in the reduction of poverty and income. Mobile money can also help households avoid experiencing shocks such as floods and droughts. According to them, this technology can help them manage their financial situations.

Studies have shown that the social network plays an important role in financial decisions. For instance, in 2012, a study noted that the use of mobile payments among rural families was linked to the social network's influence on financial decisions (Zhang et al., 2012). A non-formal study conducted by Intermedia in 2012 revealed that people started using mobile money due to the recommendations from their friends and family members. However, this investigation could not offer enough proof to establish the link between the size of the social network and the adoption of mobile money. In 2018, a study conducted by Murendo and colleagues confirmed that the size of the social network can influence the adoption of mobile money. The effects of the network on the adoption of mobile money were also significant for non-poor households. In 2020, a study conducted by Kiconco and colleagues revealed that the impact of the network on the acceptance and use of mobile money were more pronounced in the rural regions than in the urban areas.

Mobile money services face a challenge in improving their customer service quality due to the increasing number of agents and the cleanliness of their facilities. Besides the availability of their own outlets, mobile money operators also need to expand their network to reach their customers. An agent is a person who is either retail owned by the mobile money operator or a small independent store. They can provide various services such as account registration and cash-in and cash-out transactions. These agents are usually located close to the customers they serve. They can also help promote the service and educate the customers. According to Ishan Sachdev and Rajiv Lal, in 2015, the most important factors that mobile money operators can consider when it comes to increasing the adoption of their service is the availability of agents. They can help improve the efficiency of the transactions by facilitating the cash-in and cash-

out transactions. Another important factor that mobile money operators can consider is the availability of convenient and secure payment methods. Adequate supplies of both physical and electronic money are also important factors that mobile money operators should consider when it comes to increasing the number of agents. This can help them improve the efficiency of their transactions and attract more potential customers.

2.2.7 Definition and Measurement of Insurance sector Development

The development of the insurance market is a method that aims to increase the efficiency and number of companies operating in a country. It involves adopting risk sharing and minimizing the effect of big losses on individuals and enterprises. This eliminates the need for the insurance industry to carry out large financial transactions. This is also beneficial for the manufacturing sector as it allows the industry to expand and improve its competitiveness (Asongu and Odhiambo, 2020).

In 2014, a study conducted by researchers, Pradhan et al revealed that the insurance industry grew by using various strands such as the real income growth rate and the share of life insurance in the country's premium per capita. They also calculated the insurance penetration rate and the total insurance penetration in the country.

Kaushal and Ghosh (2018) attempted to understand the role of financial intermediaries such as insurance in financial development and thus growth. The goal of this study was to look into the long-run link between the development of insurance and banking sectors and economic development. It was conducted by analyzing the various governments that have enacted laws that regulate these sectors. One of the measures that they used to measure the growth of the insurance industry was the insurance premium volume.

2.2.8 Importance of Insurance Sector Development

As part of the overall evolution of financial institutions, insurance, like some of the other financial institutions, has increased in numerical importance. Many developing-country government has historically believed that their legacy financial structures could not effectively fulfill nations' evolving needs. The various reforms that have been implemented in the past few years have resulted in the significant improvement in the framework of the financial institutions. These reforms are aimed at redirecting the savings that these institutions generate to investments (Outreville, 1990).

The insurance industry has had a wide-range impact on the economy. There is a wealth of research describing how insurance has impacted numerous economies throughout the world. The study was conducted by Haiss and Sümegi (2008) in 29 Organization for Economic Cooperation and Development (OECD) countries from 1992 to 2004 discovered that the insurance industry has a significant impact on the growth of the country's economy. For instance, in 15 of the 29 OECD countries, life insurance is more prevalent than non-life insurance. From 1999 to 2008, Ilhan and Bahadir (2011) examined the relationship between economic growth and insurance in the 29 OECD nations. The findings revealed a substantial favorable link between the two. As a financial intermediary and a provider of risk transfer and indemnity, the insurance sector assists the economy by allowing various risks to be managed more efficiently and mobilizing household resources (Ward & Zubruegg, 2000).

The activities of the insurance market are considered to contribute to the development of the economy by facilitating the transfer of risk and providing insurance coverage for various types of risks. They can also encourage the growth of savings by making the accumulation of capital more efficient.

According to Ward and Zurbruegg (2002), insurance contributes to economic growth by providing various services such as financial intermediary, risk transfer and indemnification.They looked into the various economic contributions that insurance can make. They identified the factors that contribute to the development of these services. These include innovation and productivity improvements, investment opportunities and the reduction of waste.

In a study conducted by Webb and colleagues (2002), they noted that property and life insurance can contribute to the economic growth by increasing productivity. They also stated that this type of insurance can reduce the demand for liquidity. According to the researchers, property and liability insurance can also contribute to the economic growth by providing additional risk-financing options. This type of insurance can reduce the likelihood of firms experiencing financial distress.This can influence the decisions that firms make in a particular region. Decreased costs associated with risk financing can result in higher expected returns. Moreover, insurers can offer a variety of services that help companies pool their assets and improve their returns. These include the development of risk-pooling strategies, the establishment of asset-liability matching programs, and the provision of administrative services.

Webb and colleagues (2002) noted that in a neoclassical growth model, which assumes that production growth is influenced by factors such as technology, capital and labor. Additional factors should be added to the equation. These include the financial activities of insurance companies. Banks can then use their savings rate and institutional factors to determine the differences between investments and productivity. It is expected that the activities of insurance can have a significant effect on the economic development of a country. However, this can vary depending on the type of insurance business that is conducted in the country.

2.2.9 Determinants of Insurance Sector Development

Brown and Kim (1993) used samples from 45 countries to investigate the factors driving the spread of life insurance in 1987. Earnings, insurance, rising prices, public social insurance, dependent ratios and religion were highlighted as essential factors of life insurance by the writers. Equally, Outreville (1996) used cross-section data from 45 developing nations in 1986 to offer agriculture condition, general health, higher learning, regional market competitiveness, foreign exposure and foreign exposure to life insurance consumption. They investigated the impact of financial development. The authors have found that discretionary income and financial development dramatically improve the use of life insurance. In addition, competition in the local market has been shown to be strongly associated with life insurance.

By researching the relationship between earnings and insurance consumption, Enz (2000) revealed proof of an S-curve correlation between per capita income and insurance uptake, and the price - elasticity of insurance demand is greater in developing countries than in industrialized ones. Ward and Zurbrueg (2002) discovered evidence confirming the presence of the "S" curve in terms of income elasticity of demand for life insurance from 1987 to 1998 in a comparative investigation of 37 Asian and OECD nations. Beck and Webb (2003) undertook a systematic investigation of the socioeconomic, population and organizational momentum of life insurance use in 68 nations between 1961 and 2000. Life insurance consumption is highly related to inflation, banking industry growth and earnings while literacy, mortality rates, dependencies and social security spending have a marginally significant impact.

The study conducted by Li et al in 2007 supported various positive effects of education, income and financial development. It also found evidence of the link between life insurance consumption and insurance market competition. Spending reduces life insurance consumption. Feyen et al. (2013) concluded that it is the main driver of life insurance consumption in a sample of 90 developed and developing countries.

From 1998 to 2008, Elango and Jones (2011) explored the factors influencing demand for insurance in developing markets. The authors have found data suggesting that per capita GNP, interest rates and commodity transactions have a significant positive effect on total insurance premiums to the population, while GDP growth and economic liberty have a negative impact. In addition, the authors found that demographic variables make life insurance demand more volatile than economic and institutional factors. Using fixed-effects panel regression, Kjosevski (2012) used per capita GDP, inflation, health care and education as the main drivers of life insurance in 14 countries in Central and Southeast Europe (CSEE) since 1998.

2.3 Theoretical foundation

2.3.1 Theories of Financial Inclusion

2.3.1.1 Theory of Asymmetry Information

Information asymmetry leads to a situation where some actors in a transaction have information while others in the same transaction do not. This causes pricing instability and prevents efficient allocation of resources. When applied to financial inclusion, insufficient information regarding prospective borrowing and lending, as well as awareness of certain financial products may lead in some people being denied access to financial services. In 1976, Stiglitz and Rothschild noted that there is a gap between the information that both borrowers and lenders provide. This can lead to poor financial markets outcomes.

According to the theory of financial market systems, financial market inefficiencies can keep poor people from accessing the formal services they need. For instance, Newman and Banerjee (2003) stated that credit market inefficiencies prevent low-income households from starting their own businesses. This concept aims to reduce inequality and poverty by providing financial support to low-income households. It can also help them improve their education and business opportunities.

2.3.1.2 Endogenous Growth Model

An examination of growth begins well with classical endogenous growth hypothesis, which holds that investments in labour and innovations contributes to economic expansion. The primary premise of this approach is that governmental policy measures affect a country's long-term development (Smith,1776). According to Ricardo (1891), saving and investment are derived from the profits of productive means, which fuel development. Financial inclusion is viewed through the lens of financial resources. All things being equal, as more citizens get financially included, a greater number of people are capable of contributing to growth by engaging in productive economic ventures, broadening the economy's base. Endogenous growth Analysts believe that increased productivity could be connected directly to technical excellence and human capital formation (Liberto, 2019).

2.3.2 Theories of Mobile Money

2.3.2.1 Technology Acceptance Model

The main principles that encourage the acceptance of mobile money innovations are flawed. According to Asongu and Odhiambo(2020b) the main reason why the concept of inclusiveness is not widely accepted is due to the lack of a technology acceptance model. According to Rosenberg, in 1988, he believed that people need social and human capital to fully embrace

digital technology. He also noted that there is a large body of evidence supporting the notion that people are constantly adapting to the various innovations that are related to financial inclusion.The literature has presented various theories on the subject of technology adoption. There are three main theories that are commonly used to study the subject: The technology acceptance model (TAM), the theory of reasoned action, and the theory of planned behavior. Although the TAM is the most accurate model, the other two are not as effective in addressing the issue of inclusiveness.The technology acceptance model is based on the key work of Davis in 1989. It states that people are more likely to adopt new technology if it is easy to use and useful in their daily lives. This suggests that people are more likely to use it when it is convenient and helpful in their daily lives.The various characteristics that have been used to promote the use of mobile money technology have helped to accelerate its widespread adoption in developing nations. According to this theory, youths are more likely to adopt new technology due to how easily they can understand its utility.

The updated version of the TAM, which was created by Davis and Venkatesh in 2000, provides a comprehensive view of the various external parameters of the model. It also explains how they relate to the performance of the system. The degree to which a user feels that a particular system can improve their job performance is referred to as PU (Davis, 1989, p.320). The concept of PEOU is related to the extent to which people find a system easy to use. This is a solid framework for developing a multi-level model that can be used to analyze the various factors that affect a user's job performance. For instance, in 2000, Davis and Venkatesh defined the multiple external factors that influence a user's job performance as cognitive tools and social impact. In 2003, Venkatesh and colleagues proposed an integrated version of the UUT, which is a collection of eight different models that deal with the acceptance and use of technology. The six frameworks are: the motivational model, the TAM, the PC utilization

model, the innovation diffusion theory, the TPB, and the TRA. The 32 linked constructs of the UUT are composed of various related theories.

The four basic components of the UTAUT are performance expectancy, social impact, effort expectancy, and enabling conditions. These are also considered as relationship mediators. In 2008, Hillol and Venkatesh merged Davis and Venkatesh's TAM2 and the prototype of the PEOU model into a new integrated framework called TAM3. This new model was able to provide a more accurate and comprehensive view of the model's external parameters.

Recent studies have shown that people are more likely to interact with technology through the acceptance approach. For instance, Adibi and Okocha (2020) focused on the use of mobile banking technology in corporate leaders.

2.3.3. Theories of Insurance

Insurance demand is based on an expected utility theory, which indicates preference for certain types of losses over others (Friedman and Savage, 1948). According to Iyawe and Osamwonyi (2017), there are logical foundations linking economic progress with the expansion of the insurance business. Two theories were examined by the authors: The cumulative prospective theory and the conventional expected utility theory. In accordance to the reasoning, insurance is vital in developing nations owing to a bevy of development implications.

2.3.3.1 Conventional Expected Utility Theory

The utility theory states that people tend to demand insurance due to the need for certainty. This is because they prefer to have losses that are specific to their situation rather than ones that are uncertain. It also states that a person's utility is dependent on their disposable income. For instance, if a customer gets sick, they can potentially spend a certain amount of money on medical care.

If a person wants to have insurance coverage, they should get it at a reasonable price. This would allow them to receive payment transfers if they get sick. The theory also states that the customer's condition would improve if they minimize their chances of loss.The utility theory also states that people tend to buy insurance coverage for their essential expenses. This can include paying for medical bills.

Given how the expected utility theory is quantitatively described, the decision between un-predictability and predictability of actuarial equivalent losses is obvious. The decision to obtain insurance is linked to increased levels of expected utility and certainty. As a result, as Nyman (2001) demonstrates, the certainty associated with insurance premiums drives demand for insurance. Furthermore, insurance-friendly variables such as those discussed in the intuitive portion of this research such as economic development and democratic reform and institutions might enhance the underlying expected benefit.

2.3.3.2 Cumulative Prospective Theory

According to the prospect theory, also known as the theory of choice, given a specified reference frame the benefit realized by people from economic gains grows with size gain, but at a decreasing rate (Tversky and Kahnemann, 1992). Similarly, the value lost by individuals due to income losses grows at a diminishing rate as the severity of the loss increases. The CPT assumes that individuals who are prepared to incur risks in order to achieve their investing goals exhibit risk-oriented behavior on losses. A variety of experimental research have created such behavior (Iyawe and Osamwonyi, 2017). As a result, the risk-taking behavior of fund managers is linked to contract incentives (Tchamyou and Asongu, 2017a).

2.4 Empirical Literature

2.4.1 Insurance and Financial Inclusion

Ishrat (2018) explored how health-care planners, insurers, and other private-sector officials in the healthcare and insurance sectors evaluate the relevance of insurance and its impact on financial inclusion. They discovered that financial inclusion through insurance can be attained through increased insurance literacy and the efficient management of existing projects and strategies. The research concluded with a few recommendations. The healthcare industry's contribution in financial inclusion is essential. Everyone, regardless of income, has to pay for healthcare. Policymakers and other government officials should also pay attention to this industry.

Insurance, according to Taranikanti (2017), would significantly improve financial inclusion by raising its percentage of GDP. It increases the proportion of savings as well as the level of coverage; nonetheless, there are several major challenges, including insurance onboarding, insurance pricing, capital requirements, financial literacy and regulatory actions.

One of the primary ways in which financial inclusion affects the insurance sector in Africa is by increasing access to insurance products. A study by Cull et al. (2009) found that individuals with access to basic financial services, such as savings accounts and mobile money, are more likely to seek and purchase insurance coverage. This suggests that as financial inclusion initiatives expand, more Africans gain the ability to protect themselves and their assets through insurance.

Microinsurance has gained prominence in Africa as a tool for extending insurance coverage to low-income populations. Research by Churchill (2006) highlights the role of microinsurance in promoting financial inclusion. It allows individuals with limited financial resources to access

affordable insurance products tailored to their specific needs, thereby increasing their resilience to financial shocks.

The proliferation of mobile money services in Africa has revolutionized the distribution of insurance products. Research by Muthiora (2015) demonstrates how mobile money platforms provide a convenient and cost-effective channel for insurance distribution. This technological innovation has the potential to significantly expand insurance coverage by reaching previously underserved populations.

Financial inclusion efforts often include financial education and literacy programs. A study by Dupas and Robinson (2013) indicates that improving financial literacy can lead to better understanding and uptake of insurance products. As individuals become more financially literate through inclusion initiatives, they are more likely to make informed decisions about insurance, reducing information barriers.

Effective regulatory frameworks play a crucial role in both financial inclusion and the insurance sector. A study by Anjanappa & Bhattacharya (2023) emphasizes the importance of regulatory environments that encourage the development of affordable and accessible insurance products. Regulatory reforms that support financial inclusion can foster a more robust insurance market.

Financial inclusion contributes to economic development, which, in turn, can drive increased demand for insurance. As African economies grow and income levels rise, there is a natural progression towards seeking protection against risks. Research by Beck et al (2007) suggests that a growing middle class in Africa is likely to lead to higher demand for insurance products, creating opportunities for the insurance sector to expand.

2.4.2 Mobile Money Development and Financial Inclusion

Numerous researches studying how mobile money and financial inclusion are related have made it clear that there is an influence of mobile money on financial inclusion. For example, Davidson and McCarty (2012) are concerned with mobile technology management rather than a formal scientific study of its effects, costs and benefits. According to recent research, mobile phones can aid in inclusive finance (Demirgüç-Kunt et al., 2018). Mobile phones may be used to offer mobile money services and are valuable for transmitting economic and other insights as noted by Jensen (2007), especially in geographic split nations, where bank branch presence is limited (Allen et al., 2014).

The World Bank's Global Findex Dataset report illustrates the development trend on financial inclusion usage of the electronic financial industry on a whole and mobile money to be specific. In Africa, where the accounts of mobile money have grown more than double between 2011 and 2017, the latter's impact is more apparent (Demirgüç-Kunt et al., 2018),

Several studies have been conducted to investigate the relationship between mobile payments and financial inclusion, with conflicting results. Durai and Stella (2019) found that reducing the fees and costs of mobile phones and digital wallets improves financial inclusion. According to the report, digital currency contributes to financial inclusion. Al Amareen (2022) found that digital finance is necessary for people to conduct cash transactions and that the speed at which money transfers can be made through mobile phones and digital wallets increases financial inclusion. The study also found that ease of use and popularity of providers were the most important independent variables determining financial inclusion. According to Jack and Suri

(2011), M-Pesa customers are more likely to be included in the banking sector; however, subsequent consumers include anyone who does not use the regular banking system.

According to Mbiti and Weill (2011), M-Pesa use is linked with lesser dependence on unstructured finance and bigger reliance on formal financial institutions. On the other hand, Yenkey et al., (2015) differ as they confirmed that M-Pesa users were mainly from rural women's populations, but they found little evidence that M-Pesa use leads to system compliance. Many are exchanging money informally for M-Pesa, with no further strides towards formal financial inclusion; others continue to rely on informal funding as they have done in the past. After answering questions from 62 people in Kenya, Johnson and Krijtenburg (2015) provided more details on the interaction between M-Pesa and official money. Formal finance was rejected by respondents because it creates commitments based on "borrowing and lending". They see money transfers as "ask and help," so they are reluctant to switch from M-Pesa to formal banking arrangements.

Alrabei et al (2022) created a questionnaire with two dimensions and 22 interrogations to investigate the relationship between mobile money and inclusive financial rates. The study included samples from the Arab Bank and the Housing Bank. Alrabei et al(2022) then utilized multiple regression to see if there was a utility price's statistically significant impact, service standard, the convenience of use, and service safety offered via the use of mobile payments to increase financial inclusion. It demonstrated that mobile money systems have importance in raising financial inclusion rates and should be integrated in all Jordanian banks. Adoption of mobile money, financial inclusion, and whether mobile money can replace traditional banking are some of the challenges that need more research. The regulatory framework for organizations providing mobile money services is also emphasized.

Thulani et al. (2014) conducted a mixed-methods study that utilized a concurrent dominant design. Both qualitative and quantitative approaches were utilized, with the quantitative method taking over at the end. The study was carried out in the Midlands Province. The researchers conducted a survey to gather data for the study, which was mainly focused on collecting information about the rural communities that use mobile money. Despite the widespread use of mobile money, the researchers found that its features were not widely used. Despite the widespread use of mobile money, the researchers found that many people still rely on traditional methods of borrowing and saving. This suggests that service providers need to step up their efforts in order to convince these individuals to adopt safer and more secure financial transactions.

According to Allen et al (2014), Mobile banking and other innovative financial services have helped overcome various obstacles to financial access in Africa. In 2018, Evans examined the relationship between mobile phones, the internet, and financial inclusion in the continent from 2000 to 2016. He discovered that the rise of the internet and the availability of financial services have led to the improvement of financial inclusion. Ouma et al (2017) noted that various innovations in financial services have been used to promote household savings. In 2019, a study by Kwenda and Chinoda revealed that mobile innovation has led to the financial viability of 49 nations. In 2022, Morgan noted that the rise of internet users and the number of FinTech firms in Southeast Asia have helped raise the financial inclusion level. According to Beck et al (2014), Africa has made significant progress in improving financial inclusion over the past two decades through the use of various financial innovations.

2.4.3 Mobile Money Development and Insurance

In 2020, a study conducted by Colbourn, Seal, and Obadha revealed that the use of mobile money can increase the likelihood that rural residents in Kenya would participate in the country's social health insurance program. They analyzed the data collected from a 2015 FinAccess survey. The study analyzed various factors such as mobile phone ownership, education, wealth quintile, age and bank account usage. After controlling for these variables, it was revealed that mobile money use increased the likelihood of people participating in the national health insurance program. It also resulted in shorter travel times and lower travel costs.

Ahmed and Cowan's (2021) study on mobile money use and healthcare used a differentiated methodology to quantify the impact of mobile money transfer technology on healthcare usage. Health in the face of serious health shocks. The census data spans from 2013 to 2016, including quarterly observations of approximately 1,800 households in ten communities in the Kisumu region, western Kenya. It found evidence that, compared with non-tech users, mobile money technology helps households improve their consumption of formal health services in terms of visits, consultations and drug spending.

In 2016, a study conducted by Chukwu, Garg, and Eze revealed that the use of mobile money can increase the likelihood of people participating in the country's health insurance program. They analyzed the data collected from various care facilities in Abuja, Nigeria. The researchers then developed a software prototype that allows them to collect essential expenditures.

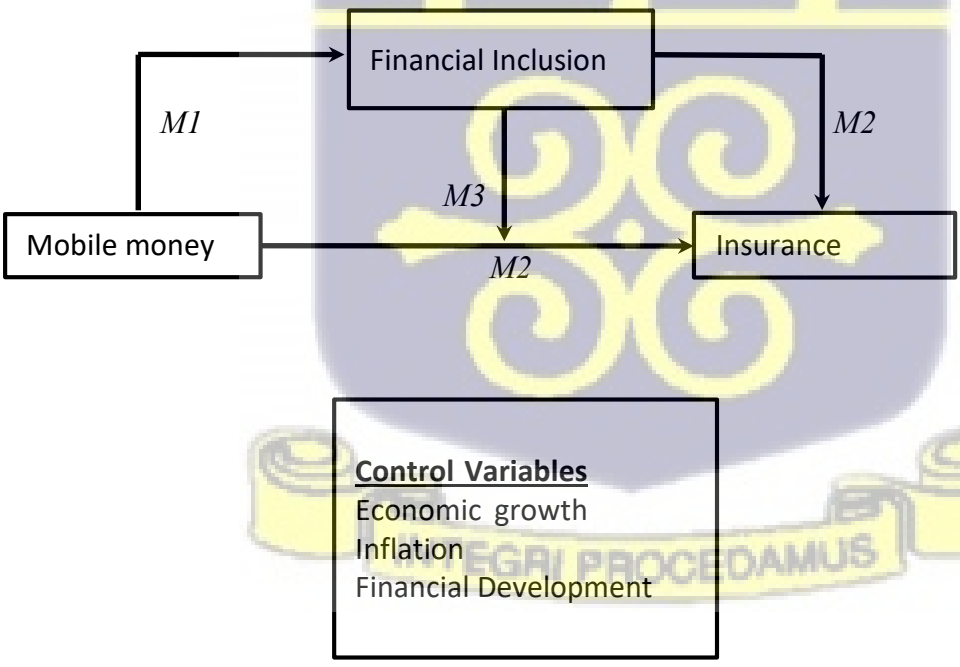
In addition to distributing social insurance payments, governments have also utilized working money to fund programs. After experiencing negative shocks in 2016, a study conducted by Aker, Boumenijel, and colleagues revealed that implementing online money transfer services

could help improve the development of countries. The study found that the severity of the drought in some households that were randomly assigned to receive cash payments was reduced by 50%. Families saw a significant increase in the variety of their meals and the amount of money they spend on children's clothing. The effects of other government payments also seemed similar when they went online (Banerjee et al., 2020; Grossman & Tarazi, 2014).

2.5 Conceptual framework

Figure 2.1 below shows how inclusive finance interact to moderate the effect of mobile money on insurance in Africa. This is indicated as *M3*. It further shows the effect of mobile money on inclusive finance and given *M1*. Finally, Figure 2.1 the individual effect of mobile money and financial inclusion on insurance, *M2*.

Figure 2. 1 Conceptual framework



Source: Authors own construct

2.6 Chapter Summary

This chapter describes the literature backing the study. The chapter starts with looking at the theoretical literature that explains the definition, measurement and determinants of mobile money, financial inclusion and insurance. The chapter further describes the various theories used. Again, the chapter highlights various empirical literature used to support the study. Finally, the study constructed a conceptual framework to support the objective of the study

CHAPTER THREE

METHODOLOGY

3.1 Introduction

This chapter describes the technique used by this thesis to meet the study's aims and attempts to outline the methods used to investigate the relationship between mobile money, financial inclusion and insurance sector. We begin the debate with thoughts on the research design, analysis, method and study sample. We present justifications for each independent variable and we conclude with the expected signs of the control variables.

3.2 Research Approach

A quantitative research approach is used in the study. This method allows for the measurement of study variables, the establishment of variations, and the identification of correlations. Using a quantitative research method will aid in achieving this goal. Furthermore, this type of inquiry makes assumptions about deductively testing theories, so incorporating safeguards against bias and alternate forms of explanation that allow for the generalization and reproducibility of study findings.

3.3 Sample Data

This research uses dynamic panel data from 22 African countries and spans the years 2011 to 2019. Data availability has influenced the countries selected and the extent of this thesis. Data was sourced from three different places based on the proxy used. Table 3.1 shows the list of countries and Table 3.2 below shows the proxies used and data sources and also giving examples of past literature that used those proxies for their research.

Table 3. 1 List of countries

List of African Countries	
1. Cameroon	12.Guinea
2.Chad	13.Rwanda
3.Botswana	14.Namibia
4.Angola	15.South Africa
5.Congo	16.Nigeria
6.Kenya	17.Mozambique
7.Madagascar	18.Seychelles
8.Malawi	19.Mauritius
9.Lesotho	20.Zambia
10.Ghana	21.Uganda
11.Eswatini	22.Sudan

Source: Authors own Construct

Table 3. 2 Definition and description of variables and data source

Variable	Proxies	Proxy Measure	Research Used	Data Source
Insurance Sector	Life insurance	Premiums from life insurance as a % of GDP	Lee et al. (2016)	Global Financial Development Database
Insurance Sector	non-life insurance	Premiums from non-life insurance as a % of GDP	Lee et al. (2016)	Global Financial Development Database
Mobile Money	Adoption Penetration Rate	The number of adult mobile money accounts	Jamil, and Elheddad (2019)	The World Bank's Global Findex dataset
Mobile Money	Activity Rate Index	Number of active mobile money accounts per 1,000 adults	Bagchi (2018)	The World Bank's Global Findex dataset
Mobile Money	Agent Distribution Index	The number of agents per 100,000 adults	Sadorsky (2012)	The World Bank's Global Findex dataset
Financial Inclusion	Usage of financial services	Number of deposit accounts with commercial banks per 1,000 adults	Evans (2018)	IMF's Financial Access Survey dataset
Financial Inclusion	Service Point (Number of Branches)	Number of Branches per 100,000 adults	Evans (2018)	IMF's Financial Access Survey dataset
Financial Inclusion	Service Point (Number of Branches)	number of ATMs per 100,000 adults	Evans (2018)	IMF's Financial Access Survey dataset
Financial Inclusion	Usage of financial services	Outstanding deposits with commercial banks (% of GDP)	Evans (2018)	IMF's Financial Access Survey dataset

3.4 Model Specification

The data is organized and arranged in accordance with the empirical technique to be used thus, the Generalised Method of Moments will be used in the research. The number of nations must be greater than the study period in order to use the Generalised Method of Moments (**N > T**). As a result, this study complies with this criterion by making sure that the number of countries studied exceeds the period. Some criteria were chosen as control variables based on the research on financial growth. One control variable is used based on each model. In modelling GMM, the number of instruments should be less than the groups (in this case the number of countries). Including more control variables will lead to weak instrumentation because there is limited number of panels. Financial development, economic development and inflation are the control variables. When choosing these control variables, the financial functions of the variables were taken into account. All of the control variables come from the World Bank's World Development Indicator (2020).

Based on the objectives of the study, there will be 3 models using GMM estimation techniques.

Model 1: Assessing the effect of Mobile Money on Financial Inclusion.

The specified equation is as follows

$$F_{it} = \alpha + \alpha_1 F_{it-1} + \alpha_2 MM_{it} + \alpha_3 Z_{it} + \mu_i + \theta_t + \epsilon_{it} \quad \text{----------(1)}$$

From the equation above, F_{it} is the Financial Inclusion, F_{it-1} represents lagged Financial Inclusion, MM_{it} indicates Mobile Money proxies, Z_{it} represents the control variables and α is the constant.

Model 2; The impact of Mobile Money and Financial Inclusion on Insurance Sector

We first look at the impact of mobile money on the insurance sector and then access the effect financial inclusion has on the insurance sector in Africa.

The specified equations are as follow:

$$I_{it} = \alpha + \alpha_1 I_{it-1} + \alpha_2 MM_{it} + \alpha_2 Q_{it} + \gamma_i + \tau_t + \delta_{it} \quad \text{----------(2)}$$

$$I_{it} = \alpha + \alpha_1 I_{it-1} + F_{it} + \alpha_2 Q_{it} + \gamma_i + \tau_t + \delta_{it} \quad \text{----------(3)}$$

From Model 2, I_{it} is the Insurance Sector for a particular country, I_{it-1} represents lagged Insurance Sector, MM_{it} indicates Mobile Money proxies, Q_{it} represents the control variables and α is the constant.

Model 3; Interactive effect of Mobile Money and Financial Inclusion affect Insurance Sector

The specified equation is as follow:

$$I_{it} = \alpha + \alpha_1 I_{it-1} + \alpha_2 MM_{it} + \alpha_3 F_{it} + \alpha_4 MM_{it} F_{it} + \alpha_5 G_{it} + \pi_i + \varepsilon_t + \zeta_{it} \quad \text{----------(4)}$$

From Model 3, I_{it} is the Insurance Sector a particular country, I_{it-1} represents lagged Insurance Sector, MM_{it} indicates Mobile Money proxies, G_{it} represents the control variables and α is the constant

3.4 Description of Variables

This phase of the research involves the formulation and empirical justification of our independent and dependent variables. All of them are clearly recognized and have their data sources specified.

3.5 Estimation Technique

System GMM is employed as an estimating technique in this work. The decision to use this strategy is based on some key arguments from past research works (Asongu and Odhiambo, 2020). First, how the dataset is structured in this study met the needed criteria for employing the technique, as the number of countries is bigger than the study time. Second, the dataset is panel in nature and thereby the estimation technique has taken into account cross-country differences. Third, endogeneity: To address this issue, The GMM model controls the endogeneity of a given variable by internally transforming the data and adding the lagged values (Ullah, Akhtar and Zaefarian, 2018). This technique is superior to the OLS model's approach and present as a robustness check. GMM by Blundell and Bond (1998) will be employed because it has been said that it produces a superior estimated coefficient, particularly in a small sample.

Diagnostic tests are performed to ensure that the model is correct. The GMM estimator requires two types of diagnostics: a serial correlation test: The Arellano and Bond serial correlation will be used, and a tool validity test using the Sargan test. The Arellano-Bond test for null hypothesised autocorrelation without self-correction was used for the discriminant residuals of Mileva, Bruhn and Weickert (2007). In most cases, the null hypothesis of the AR (1) process test in the first differences is predicted to be rejected. On the other hand, the AR (2) test of the

first difference is more important because it reveals the autocorrelation of the levels and thus accepts its null hypothesis.

The Sargan's tests will be applied to confirm the correctness of the instruments in order to account for over-identifying limitations (Arellano, 1993). The tests' inability to disprove the null hypothesis suggests that the model is clearly specified. First-order autocorrelation must exist and higher-order autocorrelation must not exist for the estimation to be accurate. The number of instruments will be less than the number of countries in order to reduce instrument proliferation in the estimation (Roodman, 2009b).

3.6 Expected Signs of Control Variables

To begin with the projected directions of the control variables, **economic growth** is tied to one's income, and statistics indicates that as one's income rises, so does one's consumption. As a result, as income rises, insurance demand is likely to climb as well. As a result, we expect a favourable correlation between economic growth and financial inclusion.

Inflation is measured as the changes of prices of goods and services. Low and moderate changes of prices of goods and services may not be destructive to the development of insurance. High consumer price index, on the other hand, may be unfavourable to the development of insurance products because they are tied to long-term financial gains (Beck and Webb, 2003). The economic concepts' unpredictability has a detrimental impact on insurance product projected returns.

Inflation and insurance development are projected to have a negative or positive relationship based on this. **financial development** is determined by domestic credit by banks. The development of finance is predicted to have a favourable and considerable impact on the development of insurance. The financial sector offers insurers with an efficient payment

mechanism, and the financial system's stability can improve consumers' confidence in insurance products.

Similarly, insurance can help the financial industry develop, implying that there is a bidirectional causality between insurance and the financial sector's development. The development of the insurance sector is influenced by institutional factors such as political stability of the country.

3.7 Chapter Summary

This chapter describes the research methods used to conduct this study. This study took a strictly quantitative approach. The exploratory approach was also used because the independent variables influenced the dependent variables. Based on data available, the study includes 22 Sub-Saharan African nations. Furthermore, the study's model intended to evaluate three hypotheses. They are; Mobile money has no effect on financial inclusion in Africa. Mobile money and financial inclusion do not independently affect Insurance sector in Africa. The interactive effect of Mobile money and financial Inclusion does not affect Insurance sector in Africa. Furthermore, to achieve the study's objectives, the Generalized Method of Moment estimation approaches were used.

CHAPTER FOUR

RESULTS AND DISCUSSION

4.1 Introduction

This chapter summarized the findings of the empirical study and discussed them. In order to provide an overview of the development of mobile money, financial inclusion, and the insurance sector in several African economies, descriptive statistics on all the variables are first reviewed. The following section of the chapter provides a correlation matrix to help prevent problems with multicollinearity in the empirical specification. We will go over the pre-estimation tests and also considers post-estimation tests, and the outcomes of the two-step System GMM estimation technique in more detail, paying special attention to the significant factors and the variables of interest. The chapter presents the various models used in the study and their formal discussions.

4.2 Descriptive Statistics

Due to the lack of data for some of the economies in the area, the descriptive statistics are offered for a selection of 22 African economies. The descriptive statistics included in this chapter highlight the various statistical measures used in the study. These include the mean, standard deviation, and maximum and minimum values for each variable. Table *4.1* shows the results for the descriptive statistics.

Table 4. 1 Descriptive Statistics for variables

Var	Obs	Mean	Std. Dev.	Min	Max
mm_agent	154.	256.764	357.386	0	2135.025
mm_activity	154	177.079	255.714	0	1055.317
mm_adoption	154	494.823	502.076	0	1858.965
Life_insu	154	1.153	2.348	0	10.664
Nonlife_insu	154	0.548	0.652	0	2.569
atm	154	20.024	22.902	0	89.993
num_bank	154	8.021	10.781	0	55.071
deposit	154	597.158	699.865	0	2946.407
o/s accounts	154	33.774	33.845	0	191.769
infl	154	178.006	130.763	107.941	1344.193
fin dev	154	26.946	29.401	0	129.17

Source: authors own computation (2022)

Note: **mm_agent:** agent distribution of mobile money. **mm_activity:** activity of mobile money **mm_adoption**: adoption of mobile money. **Life_insu:** life insurance premiums as a percentage of Gross domestic Product. **Nonlife_insu**: non-life insurance premiums as a percentage of Gross domestic Product. **Atm:** count of Automated Teller Machine per 100,000 adults. **num_bank**: count of bank branches. **Deposit:** number of commercial bank deposit accounts. o/**s accounts**: number of deposit accounts with commercial banks **Infl**: inflation and **fin dev:** financial development.

The table above shows the descriptive statistics results for the model. The mean, determined as a representation of the central tendency and outliers in the sample, together with the corresponding standard deviations for each variable. The number of observations(obs), the minimum(min) and maximum(max) values of each of the values used in the study is shown.

The mean values of the mobile money variables, including the distribution of agents, activity, and adoption, are 256.764, 177.079, and 494.823, respectively. This means that for mobile money agent distribution, There is an average of 257 agents per 100,000 adults. Looking at the raw data, some countries like Ghana, Mali and Zambia have made significant progress in making sure that people have access to mobile money services by constantly increasing the agent distribution network. Ghana for example is an above average agent distribution of 1609 agents per every 100,000 Ghanaians. For mobile money activity having a mean of 177.079 is

translated as to show the rate of mobile money activity in the African region. From the data, there is an average of 177 active mobile money accounts per ever 1000 adult in Africa. In the southern African countries like Botswana, the number of active mobile money registered accounts is higher.

Furthermore, Insurance average numbers for both life and non-life premiums are 1.153 and 0.548 respectively. This means that, for life insurance penetration in Africa there is on average 1.153 underwritten premiums per GDP in between the years 2011 to 2019. This records a very low penetration rate for the life insurance sector in Africa compared to the global average. Alhassan and Biekpe (2016) discovered that a reduction in life insurance usage in Africa is correlated with factors like income, inflation, dependency ratio, and life expectancy. With increased participation, involvement, and expansion from established insurance companies and emerging microinsurance companies, the opportunity for development across the African region is considerable. The average percentage growth for the non-life insurance sector in Africa is relatively low. In order to increase demand for non-life insurance in Africa, Bah and Abila (2022) identified regulatory quality, corruption control, and government effectiveness as having a positive relationship. They advise governments to do this by strengthening the political environment and the business climate.

Looking further into average numbers for some financial inclusion variables, Number of ATM shows about 20 ATM's per every 100,000 adults. According to the Financial Access Survey data released by the IMF, South Africa has 60 ATMs for every 100,000 adults, while in sub-Saharan Africa, this number is less than 6 for every 100,000 individuals. There were also 27 ATMS per 100,000 people in Botswana, and in countries such as Chad, Burundi, Congo, Liberia, and Sierra Leone, there were around one ATM for every 100,000 individuals. For the number of bank branches, Statistics have shown that there is around 1 bank branch for every

thousand kilometers2 in Sub-Saharan Africa. There are varying variations across different countries, with Angola and South Africa having the most branches per 100,000 individuals. On the other hand, there are less than five branches per 100,000 adults in the Chad, the Democratic Republic of the Congo, and the Central African Republic.

Table 4. 2 Correlation Matrix.

Variables	mm_agent	mm_activity	mm_adoption	life_ins	nonlife_ins	atm	num_bank	deposit	o/s accounts	infl	fin_dev
mm_agent	1.000										
mm_activity	0.460	1.000									
mm_adoption	0.706	0.665	1.000								
life_ins	-0.216	0.052	-0.065	1.000							
nonlife_ins	-0.174	-0.121	-0.089	0.577	1.000						
atm	-0.274	0.081	-0.112	0.636	0.342	1.000					
num_bank	-0.161	-0.083	-0.201	0.116	0.133	0.746	1.000				
deposit	-0.062	0.030	0.062	0.495	0.334	0.804	0.742	1.000			
o/s accounts	-0.200	0.066	-0.084	0.348	0.301	0.614	0.518	0.723	1.000		
infl	0.015	-0.013	-0.068	-0.145	-0.241	-0.201	-0.156	-0.222	-0.180	1.00	
fin_dev	-0.211	0.001	-0.083	0.826	0.500	0.673	0.286	0.706	0.643	-0.187	1.000

Note: **mm_agent:** agent distribution of mobile money. **mm_activity:** activity of mobile money **mm_adoption**: adoption of mobile money. **Life_insu:** life insurance premiums as a percentage of Gross domestic Product. **Nonlife_insu**: non-life insurance premiums as a percentage of Gross domestic Product. **Atm:** count of Automated Teller Machine per 100,000 adults. **num_bank**: count of bank branches. **Deposit:** number of commercial bank deposit accounts. o**/s accounts**: number of deposit accounts with commercial banks **Infl**: inflation and **fin dev:** financial development.

The table shows the various parameters of the study that are related to the correlation coefficient. The test statistic used by Pearson is a statistical measure that establishes a link between two or more continuous variables. It provides details about the strength of the relationship between the two.A significant correlation can be found if the coefficient values are at 0.50 to 1. In accordance with Kennedy's 2008 guidelines, the study sets a correlation threshold of 0.8 to show that there is strong collinearity between independent variables. The variables used show no evidence of multi-collinearity (also a reason why System GMM was employed as against the OLS). There is multi-collinearity between the number of ATMs and deposit accounts, with a coefficient of 0.804. This is not a problem because they are in different models, and individual models tackle multicollinearity difficulties.

The correlation findings also demonstrated a significant and favorable association between the number of ATMs and active mobile money accounts. Meaning that there is a correlation between the availability of ATMs and the use of mobile money in African nations. Looking at the data, financial inclusion variables are mostly negatively correlated with measures of mobile money variables. Also, we can see that financial inclusion variables are mostly positively correlated with insurance development variables.

After the estimating exercise, the requirements are made to limit worries about instrument proliferation. In four of the five requirements, the conditioning information set is only used once for this purpose. A conditioning information set is not present in the initial specification. It is important to emphasize that specifications without control variables or with only minimal control variable participation are common in the GMM-centric literature. If the goal is to prevent instrument proliferation that invalidates the estimated model, then doing so is acceptable. In order to avert the proliferation of instruments, some examples of related studies

that didn't use a control variable include: Osabuohien and Efobi (2013) and Asongu and Nwachukwu (2017).

4.3 Pre- and Post- Estimation Diagnostic Tests

To check for autocorrelation, the Arrelano-Bond (1991) test in first difference errors was used. The first-order autoregressive process AR (1) must have considerable autocorrelation (the existence of autocorrelation) while the second-order autoregressive process AR (2) must have minor autocorrelation (the absence of autocorrelation). After carrying out a comprehensive review of the data, we have found that the null hypothesis about the first difference's autocorrelation is not supported by the findings. For our other models, the null hypothesis about the second difference's autocorrelation is not rejected. This means that the errors in our model would have persisted if the OLS method had been used to estimate the models. The use of the System GMM resulted in the reduction of the number of errors in our model.

The F-test looks into how much of the changes in the explained variable can be attributed to the explanatory factors. The coefficients being jointly significant is the null hypothesis under consideration. To arrive at the conclusion that one of the coefficients has significant differences from zero, we have to determine that at least one independent variable affects the dependent variables in each estimable equation. This means that the null hypothesis should not be accepted. We reject the null hypothesis because the p-values of the three models show that the coefficients in each are different from zero. Although we did not reject the Segant test's null hypothesis, we still found the restrictions valid. This means that the instruments used in the study are still valid.

4.4 Estimation Results

4.4.1 Impact of Mobile money on financial inclusion

We estimate to find how mobile money has an impact on financial inclusion. The results of the estimates are reported in Tables 4.3 to 4.5. First, we anticipated that mobile money would have an influence on inclusive finance because, according to the findings, mobile money agent distribution is positively associated with bank branches at the 1% significance level. It implies that as more mobile money agents are added it increases the access to banking services through agent deposits and bank branches. This as a result increases bank branch. From the raw data, mobile money agent distribution keeps increasing across all the countries of the study year on year. This as a result, increases the access to banking services through mobile banking platforms Also, mobile money activity through the number of active mobile money accounts per 1,000 adults has significant effect on bank branch and outstanding accounts. For the adoption of mobile money through the number of active mobile money accounts, this has a significant effect on the number of ATM's, the number of bank branches and deposit accounts.

The performance of the banking sector has been significantly improved by the emergence of mobile money transactions. They are considered to be complementary to the operations of commercial banks, which means that they can continue to expand their services and attract more potential customers. Mobile money can also help mobilize deposits and allow customers to use various bank services.The lower cost of financial services is also expected to benefit the banking sector due to the link between mobile money products and bank accounts. This will allow banks to expand their product selection and attract more potential customers. On the other hand, due to the widespread acceptance of such transactions, most of the funds will probably stay outside the financial industry for a while. Unbanked individuals will eventually replace their bank accounts with electronic wallets. This will affect the profitability of the

financial sector as the number of credits in banks' assets decreases. A decline in revenues can affect how the industry performs. In a study conducted in Kenya, Ahmed and Wamugo in 2018 noted that the various innovations introduced by the financial sector have a positive impact on the country's commercial banks' performance. These include the emergence of internet banking, mobile money, and ATM banking. They also noted that these changes have led to lower costs and improved efficiency. From the results, we can conclude that mobile money development has an effect on financial inclusion.

Table 4. 3 Effect of mobile money agent distribution on Financial Inclusion

Var	(1) atm	(2) Num_bank	(3) deposit	(4) o/s_account
Constant	-1.905*** (0.4460)	-0.288* (0.1410)	-32.670** (14.6380)	8.330** (3.0010)
atm (t-1)	0.968*** (0.03)			
Num_Bank(t-1)		1.009*** (0.022)		
Deposit (t-1)			0.927*** (0.036)	
O/s deposit(t-1)				0.460*** (0.048)
Mm_agent	(0.001) 0	**0.0005*** 0**	0.0260 (0.019)	(0.002) (0.003)
Mm_activity				
Mm_adoption				
Economic growth	**0.0005*** 0**	0.00002 0	**0.027*** (0.01)**	**0.003*** 0**
Year effect	Yes	Yes	Yes	Yes
Autoregressive(1)	(0.0390)	(0.1210)	(0.0100)	(0.2680)
Autoregressive(1)	**(0.3560)**	**(0.2410)**	**(0.8920)**	**(0.2830)**
Sargan Over I R	(0.0110)	(0.0960)	0	(0.0630)
Hansen Over IR	**(0.4240)**	**(0.4330)**	**(0.4080)**	**(0.4810)**
DHT for instruments				
(a) Instruments in levels				
H excluding group	**(0.1210)**	**(0.6660)**	**(0.6260)**	**(0.3680)**
Diff(null, H=exogenous)	**(0.7890)**	**(0.2710)**	**(0.2660)**	**(0.5090)**
(b) IV(years, eq(diff))				
H excluding group	**(0.6510)**	**(0.4050)**	**(0.3260)**	**(0.5490)**
Diff(null, H=exogenous)	**(0.2180)**	**(0.4210)**	**(0.4820)**	**(0.3470)**
Fisher test	107667.1***	254586.3***	52209.3***	2200.7***
No. of Instruments	20	20	20	20
No. of Countries	22	22	22	22
No. of Observations	132	132	132	132

Note: **mm_agent:** agent distribution of mobile money. **mm_activity:** activity of mobile money **mm_adoption**: adoption of mobile money. **Life_insu:** life insurance premiums as a percentage of Gross domestic Product. **Nonlife_insu**: non-life insurance premiums as a percentage of Gross domestic Product. **Atm:** count of Automated Teller Machine per 100,000 adults. **num_bank**: count of bank branches. **Deposit:** number of commercial bank deposit accounts. o/s **accounts**: number of deposit accounts with commercial banks **Infl**: inflation and **fin dev:** financial development.

***, ** , * : 1%, 5%, and 10% statistical significance, respectively. Robust standard errors in parenthesis. Diff means Difference. I R: identifying Restrictions Test. The bold significance values is twofold. 1) The significance of estimated coefficients and the Wald statistics. 2) The failure to reject the null hypotheses of: the validity of the instruments in the Sargan and Hansen OIR. DHT represents Difference in Hansen Test for Exogeneity of Instruments Subsets

Table 4. 4 Effect of mobile money activity on Financial Inclusion

Var	(5) atm	(6) Num_bank	(7) deposit	(8) o/s_account
Constant	(0.1630) (0.2250)	-0.690*** (0.1900)	-37.767** (17.1100)	12.143*** (1.9580)
atm (t-1)	0.969*** (0.027)			
Num_Bank(t-1)		1.000*** (0.0190)		
Deposit (t-1)			0.789*** (0.065)	
O/s deposit(t-1)				0.428*** (0.038)
Mm_agent				
Mm_activity	0.001 (0.001)	**0.001**** **0**	0.063 (0.043)	**0.010**** **(0.0040)**
Mm_adoption				
Economic growth	**0.0005*** **0**	**0.0001*** **0**	**0.052*** **(0.011)**	**0.003*** **0**
Year effect	Yes	Yes	Yes	Yes
Autoregressive(1)	(0.0320)	(0.1150)	(0.0080)	(0.2720)
Autoregressive(1)	**(0.4940)**	**(0.2540)**	**(0.8520)**	**(0.2910)**
Sargan Over I R	(0.0060)	(0.0460)	0	0
Hansen Over IR	**(0.4230)**	**(0.2620)**	**(0.5480)**	**(0.4950)**
DHT for instruments				
(a) Instruments in levels				
H excluding group	**(0.1370)**	**(0.2370)**	**(0.5850)**	**(0.3720)**
Diff(null, H=exogenous)	**(0.7490)**	**(0.3350)**	**(0.4320)**	**(0.5240)**
(b) IV(years, eq(diff))				
H excluding group	**(0.621)**	**(0.238)**	**(0.534)**	**(0.596)**
Diff(null, H=exogenous)	**(0.233)**	**(0.358)**	**(0.449)**	**(0.326)**
Fisher test	134174.00***	56179.37***	127858.46***	729.61***
No. of Instruments	20	20	20	20
No. of Countries	22	22	22	22
No. of Observations	132	132	132	132

Note: **mm_agent:** agent distribution of mobile money. **mm_activity:** activity of mobile money **mm_adoption**: adoption of mobile money. **Life_insu:** life insurance premiums as a percentage of Gross domestic Product. **Nonlife_insu**: non-life insurance premiums as a percentage of Gross domestic Product. **Atm:** count of Automated Teller Machine per 100,000 adults. **num_bank**: count of bank branches. **Deposit:** number of commercial bank deposit accounts. o/**s accounts**: number of deposit accounts with commercial banks **Infl**: inflation and **fin dev:** financial development.

***, ** , * : 1%, 5%, and 10% statistical significance, respectively. Robust standard errors in parenthesis. Diff means Difference. I R: identifying Restrictions Test. The bold significance values is twofold. 1) The significance of estimated coefficients and the Wald statistics. 2) The failure to reject the null hypotheses of: the validity of the instruments in the Sargan and Hansen OIR. DHT represents Difference in Hansen Test for Exogeneity of Instruments Subsets

Table 4. 5 Effect of mobile money adoption on Financial Inclusion.

Var	(9) atm	(10) Num_bank	(11) deposit	(12) o/s_account
Constant	(0.3610) (0.257)	-0.458** (0.189)	-70.238*** (17.481)	9.940*** (1.631)
atm (t-1)	0.997*** (0.026)			
Num_Bank(t-1)		1.017*** (0.0260)		
Deposit (t-1)			0.729*** (0.0590)	
O/s deposit(t-1)				0.545*** (0.0370)
Mm_adoption	**0.001*** **0**	**0.000***** **0**	**0.109***** **(0.0230)**	0.002 (0.002)
Economic growth	**0.0003**** **0**	0.00003 0	**0.065***** **(0.011)**	**0.002***** **0**
Year effect	Yes	Yes	Yes	Yes
Autoregressive(1)	(0.035)	(0.140)	(0.013)	(0.265)
Autoregressive(1)	**(0.400)**	**(0.292)**	**(0.923)**	**(0.272)**
Sargan Over I R	(0.003)	(0.049)	(0.001)	(0.014)
Hansen Over IR	**(0.537)**	**(0.644)**	**(0.560)**	**(0.652)**
DHT for instruments				
(a) Instruments in levels				
H excluding group	**(0.226)**	**(0.235)**	**(0.439)**	**(0.494)**
Diff(null, H=exogenous)	**(0.749)**	**(0.866)**	**(0.551)**	**(0.626)**
(b) IV(years, eq(diff))				
H excluding group	**(0.401)**	**(0.429)**	**(0.287)**	**(0.353)**
Diff(null, H=exogenous)	**(0.590)**	**(0.729)**	**(0.809)**	**(0.848)**
Fisher test	254918.28***	189162.58***	15613.05***	988.41 ***
No. of Instruments	20	20	20	20
No. of Countries	22	22	22	22
No. of Observations	132	132	132	132

Note: **mm_agent:** agent distribution of mobile money. **mm_activity:** activity of mobile money **mm_adoption**: adoption of mobile money. **Life_insu:** life insurance premiums as a percentage of Gross domestic Product. **Nonlife_insu**: non-life insurance premiums as a percentage of Gross domestic Product. **Atm:** count of Automated Teller Machine per 100,000 adults. **num_bank**: count of bank branches. **Deposit:** number of commercial bank deposit accounts. o/**s accounts**: number of deposit accounts with commercial banks **Infl**: inflation and **fin dev:** financial development.

***, ** , * : 1%, 5%, and 10% statistical significance, respectively. Robust standard errors in parenthesis. Diff means Difference. I R: identifying Restrictions Test. The bold significance values is twofold. 1) The significance of estimated coefficients and the Wald statistics. 2) The failure to reject the null hypotheses of: the validity of the instruments in the Sargan and Hansen OIR. DHT represents Difference in Hansen Test for Exogeneity of Instruments Subsets.

4.4.2 Impact of Mobile Money on Insurance

In the second objective, we estimate the individual effect of mobile money and financial inclusion on insurance development. We first look at the effect of mobile money on insurance development. From the result in tables 4.6 all the indicators of mobile money that is agent distribution, adoption and activity have no significant effect on life and non-life premiums of the insurance sector in Africa. This means that the development of mobile in Africa does not increase the impact of insurance coverage in the region. The more agent distribution increases, this does not have any significant effect life and non-life premiums. This is evident from the fact that even though mobile money impacts the banking sector with huge expansion drive in that sector, the story is different in the insurance sector with low penetration rate in Africa except for South Africa. Akinlo (2023) also discovered that the mobile phone has not made any significant improvement in the areas of non-life, life and total insurance in Africa.The low number of people using mobile phones for insurance transactions is an indication that the practice is not widely used in the region.

Table 4. 6 The impact of mobile money on the growth of insurance

Var	Life insurance			Non-life insurance		
	mm_agent	mm_activity	mm_adoption	mm_agent	mm_activity	mm_adoption
Constant	-0.1475 (0.0955)	-0.2378 (0.1554)	**-0.3999** (0.1724)**	**-0.3062*** (0.0998)**	**-0.1994*** (0.0313)**	**-0.2424*** (0.0753)**
Life_ins (t-1)	**0.9523*** (0.0691)**	**0.8920*** (0.1249)**	**1.0181*** (0.0764)**			
Nonlife_ins (t-1)				**0.9313*** (0.0771)**	**0.8794*** (0.0738)**	**0.9514*** (0.0616)**
mm_agent	0.00006 (0.0001)			0.00014 (0.0001)		
mm_activity		0.00029 (0.0003)			0.000001 (0.0001)	
mm_adoption			0.00008 (0.0001)			(0.00001) (0.0001)
Fin_devt	**0.01485*** (0.00304)**	**0.02147*** (0.00325)**	**0.02120*** (0.00359)**	**0.01123*** (0.00252)**	**0.01121*** (0.00218)**	**0.01065*** (0.00206)**
Year effect	.Yes.	.Yes.	.Yes.	.Yes.	.Yes.	.Yes.
Autoregressive(1)	(0.082)	(0.091)	(0.073)	(0.002)	(0.006)	(0.003)
Autoregressive(1)	**(0.732)**	**(0.767)**	**(0.587)**	**(0.656)**	**(0.625)**	**(0.608)**
Sargan Over I R	(0.084)	**(0.515)**	**(0.609)**	**(0.761)**	**(0.190)**	**(0.417)**
Hansen Over IR	**(0.676)**	**(0.572)**	**(0.626)**	**(0.164)**	**(0.592)**	**(0.294)**
	DHT for instruments					
(a) Instruments in levels						
H excluding group	**(0.760)**	**(0.291)**	**(0.316)**	**(0.463)**	**(0.362)**	**(0.217)**
Diff(null, H=exogenous)	**(0.505)**	**(0.660)**	**(0.705)**	**(0.113)**	**(0.619)**	**(0.370)**
(b) IV(years, eq(diff))						
H excluding group	**(0.312)**	**(0.722)**	**(0.928)**	**(0.545)**	**(0.628)**	**(0.801)**
Diff(null, H=exogenous)	**(0.772)**	**(0.407)**	**(0.401)**	**(0.091)**	**(0.463)**	**(0.156)**
Fisher test	632.14***	486.54***	229.99***	1182.97***	2932.51***	1564.13***
No. of Instruments	16	16	16	16	16	16
No. of Countries	22	22	22	22	22	22
No. of Observations	132	132	132	132	132	132

Note: **mm_agent:** agent distribution of mobile money. **mm_activity:** activity of mobile money **mm_adoption**: adoption of mobile money. **Life_insu:** life insurance premiums as a percentage of Gross domestic Product. **Nonlife_insu**: non-life insurance premiums as a percentage of Gross domestic Product. **Atm:** count of Automated Teller Machine per 100,000 adults. **num_bank**: count of bank branches. **Deposit:** number of commercial bank deposit accounts. o/**s accounts**: number of deposit accounts with commercial banks **Infl**: inflation and **fin dev:** financial development.

***, ** , * : 1%, 5%, and 10% statistical significance, respectively. Robust standard errors in parenthesis. Diff means Difference. I R: identifying Restrictions Test. The bold significance values is twofold. 1) The significance of estimated coefficients and the Wald statistics. 2) The failure to reject the null hypotheses of: the validity of the instruments in the Sargan and Hansen OIR. DHT represents Difference in Hansen Test for Exogeneity of Instruments Subsets

4.4.3 Impact of Financial Inclusion on Insurance

In assessing the impact of financial inclusion on insurance, we estimated using the financial inclusion indicators number of ATM's, number of bank branches, the number of deposit accounts and outstanding accounts against life and non-life premiums in Insurance development. The results showed that bank branches are positively associated with both life and non-insurance premiums. Banks have made it possible for insurance premiums to be paid at various branches and as a result, the more branches we have, the more people are able to pay for their premiums and thereby increasing the development of the insurance sector. Due to the rising competition and the need to cut expenses, insurance companies are looking for new sources of income. This is why they are establishing a bank-insurance structure that will allow them to distribute their products and services through a network of bank branches. This will allow them to increase their customer base and reduce their dependence on agents. Through the establishment of a bank-insurance structure, insurance companies can save money on their operations. This will allow them to develop and provide more competitive services to their customers. In addition, the relationship between the bank and the insurance company will allow them to improve their brand image. Due to the increasing number of people who are worried about their retirement and investing funds, the development of a bank-insurance arrangement is very topical.

Also, the number of atms is positively associated with non-life premiums in the insurance sector in Africa. This means that as more atms are established it increases the premiums from the non-life insurance sector. It is obvious that number of atms does not affect the life insurance premiums. This is because a lot more banks introduce bancassurance products related to savings options where customers can have access to funds through atms. A study conducted by Taranikanti (2017) supports the claim that Insurance improves when financial inclusion of a country gets better.

Table 4. 7 Effect of financial inclusion on life insurance

	Life insurance			
Var	atm	num_bank	deposit	o/s account
Constant	**-0.21013*** **(0.1112)**	-0.02066 (0.0973)	0.04539 (0.0486)	**-0.12085**** **(0.0513)**
Life_ins (t-1)	**0.79972***** **(0.0828)**	**0.87372***** **(0.0251)**	**0.73846***** **(0.0905)**	**0.93452***** **(0.0355)**
Nonlife_ins(t-1)				
atm	0.01205 (0.0099)			
Num_bank		**0.01988*** **(0.0105)**		
Deposit			0.00033 (0.0002)	
O/s deposit				0.00336 (0.0025)
Inflation	**0.00018*** **(0.0001)**	0.00006 (0.0001)	-0.00003 (0.0000)	0.00009 (0.0001)
Year effect	Yes	Yes	Yes	Yes
Autoregressive(1)	(0.0610)	(0.0750)	(0.0690)	(0.0770)
Autoregressive(1)	**(0.9830)**	**(0.9430)**	**(0.8400)**	**(0.9980)**
Sargan Over I R	**(0.4180)**	**(0.4230)**	**(0.3360)**	**(0.1490)**
Hansen Over IR	**(0.9350)**	**(0.3970)**	**(0.7310)**	**(0.3190)**
	DHT for instruments			
(a) Instruments in levels				
H excluding group	**(0.8100)**	**(0.9420)**	**(0.7360)**	**(0.5070)**
Diff(null, H=exogenous)	**(0.8520)**	**(0.2070)**	**(0.5790)**	**(0.2360)**
(b) IV(years, eq(diff))				
H excluding group	**(0.9870)**	**(0.2490)**	**(0.2170)**	**(0.6220)**
Diff(null, H=exogenous)	**(0.7960)**	**(0.4750)**	**(0.9290)**	**(0.2060)**
Fisher test	1232.70***	5749.32***	648.58***	4631.98***
No. of Instruments	16	16	16	16
No. of Countries	22	22	22	22
No. of Observations	132	132	132	132

Note: **mm_agent:** agent distribution of mobile money. **mm_activity:** activity of mobile money **mm_adoption**: adoption of mobile money. **Life_insu:** life insurance premiums as a percentage of Gross domestic Product. **Nonlife_insu**: non-life insurance premiums as a percentage of Gross domestic Product. **Atm:** count of Automated Teller Machine per 100,000 adults. **num_bank**: count of bank branches. **Deposit:** number of commercial bank deposit accounts. o/**s accounts**: number of deposit accounts with commercial banks **Infl**: inflation and **fin dev:** financial development.

***, ** , * : 1%, 5%, and 10% statistical significance, respectively. Robust standard errors in parenthesis. Diff means Difference. I R: identifying Restrictions Test. The bold significance values is twofold. 1) The significance of estimated coefficients and the Wald statistics. 2) The failure to reject the null hypotheses of: the validity of the instruments in the Sargan and Hansen OIR. DHT represents Difference in Hansen Test for Exogeneity of Instruments Subsets.

Table 4. 8 Effect of financial inclusion on non-life insurance

Non-life insurance				
Var	atm	num_bank	deposit	o/s account
Constant	**-0.12047**** **(0.04710)**	**-0.19833***** **(0.05324)**	**-0.17677***** **(0.05603)**	**-0.31064***** **(0.06531)**
Life_ins (t-1)				
Nonlife_ins(t-1)	**1.00480***** **(0.0469)**	**1.03234***** **(0.0416)**	**1.06745***** **(0.0407)**	**0.87756***** **(0.0616)**
atm	**0.00394***** **(0.00101)**			
Num_bank		**0.01436***** **(0.00494)**		
Deposit			0.00007 (0.00004)	
O/s deposit				**0.00659***** **(0.00149)**
Inflation	**0.00028**** **(0.00010)**	**0.00033***** **(0.00009)**	**0.00031***** **(0.00010)**	**0.00049***** **(0.00009)**
Year effect	Yes	Yes	Yes	Yes
Autoregressive(1)	(0.0030)	(0.0030)	(0.0020)	(0.0220)
Autoregressive(1)	**(0.3870)**	**(0.3840)**	**(0.3620)**	**(0.3320)**
Sargan Over I R	**(0.1810)**	**(0.0630)**	**(0.3970)**	(0.0110)
Hansen Over IR	**(0.3680)**	**(0.4860)**	**(0.2460)**	**(0.5610)**
	DHT for instruments			
(a) Instruments in levels				
H excluding group	**(0.1730)**	**(0.2870)**	**(0.3510)**	**(0.3070)**
Diff(null, H=exogenous)	**(0.5350)**	**(0.5520)**	**(0.2210)**	**(0.6300)**
(b) IV(years, eq(diff))				
H excluding group	**(0.372)**	**(0.604)**	**(0.202)**	**(0.215)**
Diff(null, H=exogenous)	**(0.343)**	**(0.362)**	**(0.317)**	**(0.740)**
Fisher test	4683.30***	3064.05***	6853.13***	3599.34***
No. of Instruments	16	16	16	16
No. of Countries	22	22	22	22
No. of Observations	132	132	132	132

Note: **mm_agent:** agent distribution of mobile money. **mm_activity:** activity of mobile money **mm_adoption**: adoption of mobile money. **Life_insu:** life insurance premiums as a percentage of Gross domestic Product. **Nonlife_insu**: non-life insurance premiums as a percentage of Gross domestic Product. **Atm:** count of Automated Teller Machine per 100,000 adults. **num_bank**: count of bank branches. **Deposit:** number of commercial bank deposit accounts. o/**s accounts**: number of deposit accounts with commercial banks **Infl**: inflation and **fin dev:** financial development.

***, ** , * : 1%, 5%, and 10% statistical significance, respectively. Robust standard errors in parenthesis. Diff means Difference. I R: identifying Restrictions Test. The bold significance values is twofold. 1) The significance of estimated coefficients and the Wald statistics. 2) The failure to reject the null hypotheses of: the validity of the instruments in the Sargan and Hansen OIR. DHT represents Difference in Hansen Test for Exogeneity of Instruments Subsets

4.4.4 The Impact of inclusive finance in the link between the distribution of mobile money through agents and insurance

The following conclusions were drawn regarding how financial inclusion affects the links between insurance development and mobile money agent distribution. From table 4.9 below, the net impact of the number of ATMs in moderating the distribution of mobile money agents' effect on life rates is inversely correlated. Thus, the association between mobile money agent distribution in Africa and life insurance premium is negatively affected by the number of ATM's. Furthermore, the net impact of deposit accounts' importance in moderating the influence of the distribution of mobile money through agents on life insurance premiums is inversely related. The net impact from the importance of outstanding accounts in moderating the impact of mobile money agent distribution on life insurance premiums is negatively related. Thus, the association between mobile money agent distribution and life insurance premiums is negatively affected by inclusive finance. Again, the association between mobile money agent distribution and non-life insurance premiums is negatively affected by inclusive finance (number of deposit and outstanding accounts).

Although mobile money agents at levels enhance the insurance industry, the reverse happens in the presence of more bank branches, ATMs, accounts or outstanding loans. This implies that economic agents reduce their business transactions with mobile money agents when the traditional way of banking is present and vibrant. This could mean that economic agents deem the traditional banking system more credible than the mobile money agents. Consequently, insurance registrations or transactions conducted with these mobile money agents will also decline thereby hindering the ability of mobile money agents to improve the insurance industry. This is why the impact of mobile money agents on the insurance industry is negative when moderated by non-mobile money led financial inclusion. The recent global findex database reports that mistrust in the way of conducting or facilitating financial transactions could prevent people from engaging in or be involved in the financial system.

Table 4. 9 The importance of financial inclusion in the growth of mobile money agents and life insurance

Var	Life insurance			
	atm	num_bank	deposit	o/s account
Constant	-0.02909 (0.0414)	**0.18379**** **(0.0880)**	-0.03179 (0.0929)	0.05763 (0.0899)
Life_ins(t-1)	**0.92081***** **(0.0499)**	**0.83132***** **(0.0280)**	**0.68062***** **(0.0655)**	**1.02165***** **(0.0834)**
Nonlife_ins(t-1)				
Mm_agent (mm)	**0.00026**** **(0.00012)**	0.00002 (0.00015)	**0.00027**** **(0.00012)**	**0.00089***** **(0.00013)**
ATM(atm)	**0.01047***** **(0.00306)**			
mm X atm	**-0.00004***** **(0.00001)**			
Num_Bank(nb)		0.00396 -0.0038		
mm X nb		**-0.00003*** **(0.00002)**		
deposit(de)			**0.00067***** **(0.00020)**	
mm X de			**-0.0000007**** **0**	
o/s_account (outs)				0.00127 -0.00095
mm. X outs				**-0.00005***** **(0.00001)**
Net effect	**-0.000541**	na	**-0.000148**	**-0.00008**
Year effect	Yes	Yes	Yes	Yes
Autoregressive(1)	(0.0720)	(0.0750)	(0.0860)	(0.0840)
Autoregressive(1)	**(0.8410)**	**(0.9930)**	**(0.9650)**	**(0.9190)**
Sargan Over I R	(0.0890)	**(0.1230)**	(0.0030)	(0.0210)
Hansen Over IR	**(0.3950)**	**(0.2010)**	**(0.7200)**	**(0.4640)**
	DHT for instruments			
(a) Instruments in levels				
H excluding group	**(0.8250)**	**(0.1750)**	**(0.2650)**	**(0.4360)**
Diff(null, H=exogenous)	**(0.2100)**	**(0.2920)**	**(0.8770)**	**(0.4280)**
(b) IV(years, eq(diff))				
H excluding group	**(0.1720)**	**(0.5440)**	**(0.4470)**	**(0.3260)**
Diff(null, H=exogenous)	**(0.7280)**	**(0.0940)**	**(0.8060)**	**(0.5580)**
Fisher test	19724.33***	12248.31***	57025.17***	16411.97***
No. of Instruments	20	20	20	20
No. of Countries	22	22	22	22
No. of Observations	132	132	132	132

Note: **mm_agent:** agent distribution of mobile money. **mm_activity:** activity of mobile money **mm_adoption**: adoption of mobile money. **Life_insu:** life insurance premiums as a percentage of Gross domestic Product. **Nonlife_insu**: non-life insurance premiums as a percentage of Gross domestic Product. **Atm:** count of Automated Teller Machine per 100,000 adults. **num_bank**: count of bank branches. **Deposit:** number of commercial bank deposit accounts. o/**s accounts**: number of deposit accounts with commercial banks **Infl**: inflation and **fin dev:** financial development.

***, ** , * : 1%, 5%, and 10% statistical significance, respectively. Robust standard errors in parenthesis. Diff means Difference. I R: identifying Restrictions Test. The bold significance values is twofold. 1) The significance of estimated coefficients and the Wald statistics. 2) The failure to reject the null hypotheses of: the validity of the instruments in the Sargan and Hansen OIR. DHT represents Difference in Hansen Test for Exogeneity of Instruments Subsets

Table 4. 10 The importance of financial inclusion in the growth of mobile money agents and non-life insurance

Var	atm	num_bank	Non-life insurance deposit	o/s account
Constant	**-0.13781*** (0.02428)**	0.0285 (0.03846)	**-0.15539*** (0.04170)**	**-0.14844*** (0.03071)**
Life_ins(t-1)				
Nonlife_ins(t-1)	**1.07121*** (0.04144)**	**1.11235*** (0.03633)**	**0.97507*** (0.06756)**	**0.94264*** (0.10236)**
Mm_agent (mm)	0.00008 (0.00007)	-0.00008 (0.00009)	**0.00031*** (0.00005)**	**0.00051*** (0.00010)**
ATM(atm)	**0.00347*** (0.00113)**			
mmt X atm	-0.000004 0			
Num_Bank(nb)		-0.00355 (0.00333)		
mm X nb		0.00001 (0.00001)		
deposit(de)			**0.00023*** (0.00003)**	
mm. X de			**-0.0000005*** 0**	
o/s_account (outs)				**0.00381*** (0.00095)**
mm. X outs				**-0.00002*** 0**
Net effect	na	na	**0.000011**	**0.001185**
Year effect	Yes	Yes	Yes	Yes
Autoregressive(1)	(0.0010)	(0.0020)	(0.0020)	(0.0050)
Autoregressive(1)	**(0.3590)**	**(0.4290)**	**(0.4290)**	**(0.4200)**
Sargan Over I R	(0.0020)	(0.0070)	(0.0990)	(0.0070)
Hansen Over IR	**(0.1700)**	**(0.2670)**	**(0.1180)**	**(0.1320)**
	DHT for instruments			
(a) Instruments in levels				
H excluding group	**(0.3240)**	**(0.3840)**	**(0.1300)**	**(0.1910)**
Diff(null, H=exogenous)	**(0.1580)**	**(0.2370)**	**(0.2030)**	**(0.1740)**
(b) IV(years, eq(diff))				
H excluding group	**(0.3660)**	**(0.1810)**	**(0.5200)**	**(0.2280)**
Diff(null, H=exogenous)	**(0.1250)**	**(0.4540)**	**(0.0480)**	**(0.1510)**
Fisher test	6675.20***	2513.94***	888.87***	1529.04***
No. of Instruments	20	20	20	20
No. of Countries	22	22	22	22
No. of Observations	132	132	132	132

Note: **mm_agent:** agent distribution of mobile money. **mm_activity:** activity of mobile money **mm_adoption**: adoption of mobile money. **Life_insu:** life insurance premiums as a percentage of Gross domestic Product. **Nonlife_insu**: non-life insurance premiums as a percentage of Gross domestic Product. **Atm:** count of Automated Teller Machine per 100,000 adults. **num_bank**: count of bank branches. **Deposit:** number of commercial bank deposit accounts. o**/s accounts**: number of deposit accounts with commercial banks **Infl**: inflation and **fin dev:** financial development.

***, ** , * : 1%, 5%, and 10% statistical significance, respectively. Robust standard errors in parenthesis. Diff means Difference. I R: identifying Restrictions Test. The bold significance values is twofold. 1) The significance of estimated coefficients and the Wald statistics. 2) The failure to reject the null hypotheses of: the validity of the instruments in the Sargan and Hansen OIR. DHT represents Difference in Hansen Test for Exogeneity of Instruments Subsets

4.4.5 The Impact of inclusive finance in the link between the activity of mobile money and insurance

The final conclusions about the role of inclusive finance in the rise of insurance and mobile money activity were reached. The net impact of deposit accounts in decreasing the impact of mobile money activity on life insurance premiums is related positively (0.00019). In other words, the number of deposit accounts influences the link between the level of active mobile money accounts per 1,000 adults and life insurance penetration. Furthermore, the number of ATMs has a beneficial effect on the relationship between the number of active mobile money accounts per 1,000 adults and non-life insurance penetration (0.0007). Furthermore, the number of deposit accounts influences the relationship between the number of active mobile money accounts per 1,000 adults and non-life penetration. Finally, the net impact of outstanding accounts in reducing the impact of mobile money activities on non-life premiums is associated positively (0.000055).

These results show some revealing results. The impact of mobile money activities on life insurance is negative but their impact on non-life insurance is positive. Nevertheless, when moderated with non-mobile money-led financial inclusion, the net effect on both life and non-life insurance is positive. This implies that when mobile money activities increase despite the availability of bank branches and ATMs, the insurance industry will also be improved. This is not surprising since several telecommunications have introduced insurance into their mobile money transactions. For instance, few years ago, MTN incorporated insurance packages where their customers can subscribe to without walking into insurance companies. The recent global findex database also shows that customers are also able to not only save, borrow, receive or make payments through mobile money but they are also able to insure their life and property with mobile money which consequently tends to improve the insurance industry.

Table 4. 11 The importance of financial inclusion in the growth of the mobile money activity-life insurance connection

	Life insurance			
Var	**atm**	**Num_bank**	**deposit**	**o/s_account**
Constant	0.06456 (0.04461)	-0.03126 (0.14781)	**0.06508**** **(0.02413)**	**-0.15134***** **(0.04906)**
Life_ins(t-1)	**0.92455***** **(0.03515)**	**1.00124***** **(0.03130)**	**0.93678***** **(0.01253)**	**0.91052***** **(0.02517)**
Nonlife_ins(t-1)				
Mm_activity (mmact)	-0.0001 (0.0001)	-0.00009 (0.0003)	**-0.00028***** **(0.0001)**	**0.00045***** **(0.0001)**
ATM(atm)	0.00131 (0.0042)			
mmact X atm	**0.00001***** **0**			
Num_bank(nb)		0.01226 (0.01225)		
mmact X nb		0.00002 (0.00003)		
deposit(de)			0.00003 (0.00008)	
mmact X de			**0.0000005***** **0**	
o/s_account (outs)				**0.01205***** **(0.00123)**
mmact X outs				**-0.00001***** **0**
Net effect	na	na	**0.000019**	**0.000112**
Year effect	Yes	Yes	Yes	Yes
Autoregressive(1)	(0.0780)	(0.0820)	(0.0830)	(0.0700)
Autoregressive(1)	**(0.8940)**	**(0.8800)**	**(0.8900)**	**(0.5650)**
Sargan Over I R	(0.0900)	**(0.3050)**	**(0.1590)**	**(0.1500)**
Hansen Over IR	**(0.6350)**	**(0.5290)**	**(0.3800)**	**(0.6560)**
	DHT for instruments			
(a) Instruments in levels				
H excluding group	**(0.4810)**	**(0.3720)**	**(0.1650)**	**(0.2880)**
Diff(null, H=exogenous)	**(0.6030)**	**(0.5510)**	**(0.5840)**	**(0.7840)**
(b) IV(years, eq(diff))				
H excluding group	**(0.3930)**	**(0.2470)**	**(0.4810)**	**(0.3070)**
Diff(null, H=exogenous)	**(0.7390)**	**(0.7950)**	**(0.2840)**	**(0.8850)**
Fisher	443342.74***	1.11e+06***	3.71e+06***	646568.11***
Instruments	20	20	20	20
Countries	22	22	22	22
Observations	132	132	132	132

Note: **mm_agent:** agent distribution of mobile money. **mm_activity:** activity of mobile money **mm_adoption**: adoption of mobile money. **Life_insu:** life insurance premiums as a percentage of Gross domestic Product. **Nonlife_insu**: non-life insurance premiums as a percentage of Gross domestic Product. **Atm:** count of Automated Teller Machine per 100,000 adults. **num_bank**: count of bank branches. **Deposit:** number of commercial bank deposit accounts. o/**s accounts**: number of deposit accounts with commercial banks **Infl**: inflation and **fin dev:** financial development.

***, ** , * : 1%, 5%, and 10% statistical significance, respectively. Robust standard errors in parenthesis. Diff means Difference. I R: identifying Restrictions Test. The bold significance values is twofold. 1) The significance of estimated coefficients and the Wald statistics. 2) The failure to reject the null hypotheses of: the validity of the instruments in the Sargan and Hansen OIR. DHT represents Difference in Hansen Test for Exogeneity of Instruments Subsets

Table 4. 12 The importance of financial inclusion in the growth of the mobile money activity-non-insurance connection

	Non-life insurance			
Var	**atm**	**Num_bank**	**deposit**	**o/s_account**
Constant	**-0.07584*** **	-0.0249	**-0.05684***	**-0.44378*** **
	(0.02279)	(0.02642)	**(0.03299)**	**(0.07706)**
Life_ins(t-1)				
Nonlife_ins(t-1)	**0.96942*** **	**0.95463*** **	**0.93753*** **	**0.67466*** **
	(0.02647)	**(0.03297)**	**(0.05150)**	**(0.05451)**
Mm_activity (mmact)	**0.00027****	0.00009	**0.00030****	**0.00073*** **
	(0.00011)	(0.00012)	**(0.00014)**	**(0.00014)**
ATM(atm)	**0.00461*** **			
	(0.00096)			
mmact X atm	**-0.00001*** **			
	0			
Num_bank(nb)		0.00293		
		(0.00265)		
mmact X nb		**-0.00002****		
		(0.00001)		
deposit(de)			**0.00010****	
			(0.00004)	
mmact X de			**-0.0000005*** **	
			0	
o/s_account (outs)				**0.01402*** **
				(0.00127)
mmact X outs				**-0.00002*** **
				0
Net effect	**0.00007**	na	**0.000001**	**0.000055**
Year effect	Yes	Yes	Yes	Yes
Autoregressive(1)	(0.001)	(0.002)	(0.002)	(0.005)
Autoregressive(1)	**(0.363)**	**(0.501)**	**(0.482)**	**(0.603)**
Sargan Over I R	(0.022)	-	(0.001)	(0.020)
Hansen Over IR	**(0.390)**	**(0.141)**	**(0.202)**	**(0.375)**
		DHT for instruments		
(a) Instruments in levels				
H excluding group	**(0.341)**	**(0.476)**	**(0.260)**	**(0.221)**
Diff(null, H=exogenous)	**(0.404)**	**(0.092)**	**(0.225)**	**(0.497)**
(b) IV(years, eq(diff))				
H excluding group	**(0.645)**	**(0.191)**	**(0.514)**	**(0.497)**
Diff(null, H=exogenous)	**(0.204)**	**(0.197)**	**(0.103)**	**(0.269)**
Fisher	49089.58***	12486.42***	9579.89***	91944.15***
Instruments	20	20	20	20
Countries	22	22	22	22
Observations	132	132	132	132

Note: **mm_agent:** agent distribution of mobile money. **mm_activity:** activity of mobile money **mm_adoption**: adoption of mobile money. **Life_insu:** life insurance premiums as a percentage of Gross domestic Product. **Nonlife_insu**: non-life insurance premiums as a percentage of Gross domestic Product. **Atm:** count of Automated Teller Machine per 100,000 adults. **num_bank**: count of bank branches. **Deposit:** number of commercial bank deposit accounts. o/**s accounts**: number of deposit accounts with commercial banks **Infl**: inflation and **fin dev:** financial development.

***, ** , * : 1%, 5%, and 10% statistical significance, respectively. Robust standard errors in parenthesis. Diff means Difference. I R: identifying Restrictions Test. The bold significance values is twofold. 1) The significance of estimated coefficients and the Wald statistics. 2) The failure to reject the null hypotheses of: the validity of the instruments in the Sargan and Hansen OIR. DHT represents Difference in Hansen Test for Exogeneity of Instruments Subsets

4.4.6 The Impact of inclusive finance in the link between the adoption of mobile money and insurance

The link between the development of financial inclusion and the adoption of mobile money is examined. The effect of the number of outstanding accounts on the number of people who are insured is negative. The number of ATMs and the number of mobile money accounts is negatively related to the number of individuals who are insured. The number of deposit accounts also positively affects the link between the adoption of mobile money and non-life insurance premiums. This study revealed that the number of accounts that are registered for mobile money promotes the establishment of non-life insurance policies. Outstanding accounts negatively affects the number of mobile money accounts and non-life insurance policies. These are relevant as the effects of varying specifications can be observed.

Again, even though the impact of mobile money adoption on the insurance industry is positive, it changes to be negative when it's moderated by some financial inclusion indicators. This implies that when the traditional banking system and insuring life and property is effective and available, economic agents in Africa are more likely to reduce the rate at which they use mobile money for insurance purposes. Moreover, in Africa, a part of the population is conservative and takes a lot of time to adopt technology Others also don't have phones or stable internet connections, and therefore, if the traditional systems of insurance are effective, the rate of adopting mobile money for insurance purposes will also reduce. This is because they will prefer the traditional approach as compared to the mobile money approach. It's also likely that mobile money charges may refrain people from using or adopting mobile money to facilitate their insurance transactions.

Table 4. 13 The importance of financial inclusion in the confluence of mobile money adoption and life insurance development

	Life Insurance			
Var	**atm**	**Num_bank**	**deposit**	**o/s_account**
Constant	**-0.20684*** (0.0703)**	**-0.22796* (0.1258)**	0.00067 (0.0967)	**-0.15222** (0.0666)**
Life_ins(t-1)	**0.94103*** (0.0394)**	**1.04228*** (0.0225)**	**0.96848*** (0.0668)**	**0.99913*** (0.0433)**
Nonlife_ins(t-1)				
Mm_adoption (adopt)	0.00007 (0.0001)	**0.00016* (0.0001)**	0.00017 (0.0002)	**0.00028*** (0.0001)**
ATM(atm)	0.00511 (0.00477)			
adopt X atm	0 0			
Num_bank (nb)		**0.02244** (0.0102)**		
adopt X nb		-0.00002 (0.00001)		
deposit(de)			0.00016 (0.00033)	
adopt. X de			0 0	
o/s_account (outs)				**0.00780*** (0.00089)**
adopt X outs				**-0.00001*** 0**
Net effect	na	na	na	**(0.000058)**
Year effect	Yes	Yes	Yes	Yes
Autoregressive(1)	(0.0790)	(0.0890)	(0.0750)	(0.0760)
Autoregressive(1)	**(0.9760)**	**(0.9080)**	**(0.9370)**	**(0.8160)**
Sargan Over I R	**(0.1580)**	**(0.3630)**	**(0.3200)**	**(0.2260)**
Hansen Over IR	**(0.2600)**	**(0.5740)**	**(0.6440)**	**(0.5470)**
	DHT for instruments			
(a) Instruments in levels				
H excluding group	**(0.2250)**	**(0.9420)**	**(0.1730)**	**(0.3840)**
Diff(null, H=exogenous)	**(0.3300)**	**(0.3180)**	**(0.8980)**	**(0.5650)**
(b) IV(years, eq(diff))				
H excluding group	**(0.5540)**	**(0.5150)**	**(0.5150)**	**(0.4880)**
Diff(null, H=exogenous)	**(0.1340)**	**(0.5040)**	**(0.6080)**	**(0.4930)**
Fisher test	331576.77***	27099.01***	37256.84***	45849.37***
No. of Instruments	20	20	20	20
No. of Countries	22	22	22	22
No. of Observations	132	132	132	132

Note: **mm_agent:** agent distribution of mobile money. **mm_activity:** activity of mobile money **mm_adoption**: adoption of mobile money. **Life_insu:** life insurance premiums as a percentage of Gross domestic Product. **Nonlife_insu**: non-life insurance premiums as a percentage of Gross domestic Product. **Atm:** count of Automated Teller Machine per 100,000 adults. **num_bank**: count of bank branches. **Deposit:** number of commercial bank deposit accounts. **o/s accounts**: number of deposit accounts with commercial banks **Infl**: inflation and **fin dev:** financial development.

***, ** , * : 1%, 5%, and 10% statistical significance, respectively. Robust standard errors in parenthesis. Diff means Difference. I R: identifying Restrictions Test. The bold significance values is twofold. 1) The significance of estimated coefficients and the Wald statistics. 2) The failure to reject the null hypotheses of: the validity of the instruments in the Sargan and Hansen OIR. DHT represents Difference in Hansen Test for Exogeneity of Instruments Subsets

Table 4. 14 The importance of financial inclusion in the confluence of mobile money adoption and non-life insurance development

	Non-life insurance			
Var	**atm**	**Num_bank**	**deposit**	**o/s_account**
Constant	**-0.12354****	**-0.13644*****	**-0.15057*****	**-0.33860*****
	(0.04725)	**(0.04286)**	**(0.04422)**	**(0.03612)**
Life_ins(t-1)				
Nonlife_ins(t-1)	**0.96882*****	**1.08242*****	**1.00448*****	**0.76024*****
	(0.04893)	**(0.04558)**	**(0.03255)**	**(0.05690)**
Mm_adoption (adopt)	**0.00012*****	0.00005	**0.00018*****	**0.00041*****
	(0.00004)	(0.00004)	**(0.00005)**	**(0.00004)**
ATM(atm)	**0.00684*****			
	(0.00115)			
adopt X atm	**-0.00001*****			
	0			
Num_bank (nb)		0.00338		
		(0.00277)		
adopt. X nb		0		
		(0.00001)		
deposit(de)			**0.00026*****	
			(0.00004)	
adopt. X de			**-0.0000003*****	
			0	
o/s_account (outs)				**0.01232*****
				(0.0008)
adopt. X outs				**-0.00002*****
				0
Net effect	**-0.00008**	na	**0.000001**	**-0.000265**
Year effect	Yes	Yes	Yes	Yes
Autoregressive(1)	(0.002)	(0.003)	(0.003)	(0.007)
Autoregressive(1)	**(0.399)**	**(0.393)**	**(0.409)**	**(0.585)**
Sargan Over I R	**(0.225)**	(0.004)	**(0.319)**	(0.013)
Hansen Over IR	**(0.173)**	**(0.236)**	**(0.193)**	**(0.225)**
	DHT for instruments			
(a) Instruments in levels				
H excluding group	**(0.100)**	**(0.614)**	**(0.131)**	**(0.251)**
Diff(null, H=exogenous)	**(0.356)**	**(0.139)**	**(0.337)**	**(0.262)**
(b) IV(years, eq(diff))				
H excluding group	**(0.208)**	**(0.192)**	**(0.115)**	(0.082)
Diff(null, H=exogenous)	**(0.234)**	**(0.371)**	**(0.451)**	**(0.670)**
Fisher test	2121.23 ***	3151.94***	14907.45***	20270.18***
No. of Instruments	20	20	20	20
No. of Countries	22	22	22	22
No. of Observations	132	132	132	132

Note: **mm_agent:** agent distribution of mobile money. **mm_activity:** activity of mobile money **mm_adoption**: adoption of mobile money. **Life_insu:** life insurance premiums as a percentage of Gross domestic Product. **Nonlife_insu**: non-life insurance premiums as a percentage of Gross domestic Product. **Atm:** count of Automated Teller Machine per 100,000 adults. **num_bank**: count of bank branches. **Deposit:** number of commercial bank deposit accounts. o/**s accounts**: number of deposit accounts with commercial banks **Infl**: inflation and **fin dev:** financial development.

***, ** , * : 1%, 5%, and 10% statistical significance, respectively. Robust standard errors in parenthesis. Diff means Difference. I R: identifying Restrictions Test. The bold significance values is twofold. 1) The significance of estimated coefficients and the Wald statistics. 2) The failure to reject the null hypotheses of: the validity of the instruments in the Sargan and Hansen OIR. DHT represents Difference in Hansen Test for Exogeneity of Instruments Subsets

4.5 Chapter Summary

A summary of the outcomes across all pre-estimation and post-estimation diagnostics was provided in this chapter. The test results justify the application of GMM as the principal estimation technique. Lastly, the study's objectives were described and discussed with respect to the works of past researches and theories of supporting studies.

CHAPTER FIVE

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

5.1 Introduction

The main research results from the entire study are presented in this chapter. The primary conclusions, policies, and final suggestions for additional research are presented in this chapter.

5.2 Summary

Mobile money has played a vital role in the economies in Africa especially the east African region like Kenya where most transactions are dependent on the telecom companies to ensure the mobile money service remains active on a daily basis without interruption. Most businesses make and receive payments through mobile money services affording convenience and lower cost. This makes it possible to include more people in the formal financial sector. Inclusive finance may increase the participation of people across the world in the economic mainstream, increasing the reach and effectiveness of monetary policy. Insurance being a part of the economic mainstream, has low penetration in the African region with only 3% penetration rate. The rapid emergence and growth of mobile money services in Africa has raised questions about the potential of this technology to improve the penetration of insurance in the continent. This paper aims to explore the various interactive factors that influence the development of insurance and financial inclusion in the continent.

The literature section of this study explores the different theoretical models that are used to explain the relationship between insurance, financial inclusion, and mobile money in Africa. The main theories include the hypothesis of asymmetry information, the endogenous growth model, the technology acceptance model, and the prospect theory. An empirical review of the

study revealed that the results of the multiple techniques used to research the association between insurance, inclusive finance, and mobile money showed some results.

The quantitative research method was utilized to set up the different models. The study was conducted in 22 African economies. The study's objectives were to analyze the relationship between financial inclusion and mobile money in the continent. It found that mobile money has an effect on financial inclusion, while the effect of it on insurance development was not significant.

5.3 Summary of findings

The study found that mobile money has a significant positive effect on financial inclusion in Africa. The emergence of mobile money in Africa has made it easy for a lot more people to be included in the formal financial space making this study agree with numerous types of research done on the importance of mobile money as a financially inclusive tool in Africa.

It also found that the development of mobile money technology has no significant influence on the insurance industry in Sub-Saharan Africa.

The study also found that financial inclusion positively affects the development of insurance in Africa. In addition, it shows that the link between insurance premiums and mobile money activity is moderated by financial inclusion.

5.4 Conclusion

The findings of this study shed light on the intricate relationship between mobile money, financial inclusion, and the insurance industry in Africa. This comprehensive analysis has yielded important insights that contribute to our understanding of how these factors intersect and influence each other within the African context.

The study unequivocally establishes that mobile money has a significant positive effect on financial inclusion in Africa. The emergence and widespread adoption of mobile money services have democratized access to the formal financial space, aligning with the broader consensus in the existing body of research. These findings affirm that mobile money is not merely a technological innovation but a potent tool for fostering financial inclusion, enabling previously marginalized populations to participate in formal financial systems.

Surprisingly, the study indicates that the development of mobile money technology has no significant influence on the insurance industry in Sub-Saharan Africa. While this may appear counterintuitive, it suggests that the expansion of mobile money services, despite its transformative power in financial inclusion, has not led to a corresponding surge in the insurance sector's growth. This underscores the complexity of the relationship between financial technologies and insurance, warranting further investigation into the specific factors limiting their synergy.

In line with previous research, this study reaffirms that financial inclusion positively affects the development of the insurance sector in Africa. As individuals gain access to formal financial services, including savings and payment platforms like mobile money, their capacity and willingness to engage with insurance products increase. This finding underscores the role of financial inclusion as a catalyst for broader economic resilience and protection against risks, aligning with the objectives of sustainable development.

An intriguing aspect of this study's findings is the moderation effect of financial inclusion on the relationship between insurance premiums and mobile money activity. This suggests that financial inclusion acts as a vital intermediary, shaping the nature and strength of the

connection between insurance and mobile money. Further research is warranted to delve deeper into this moderating role and explore the underlying mechanisms.

5.5 Recommendations

Regarding the results of the study, it is recommended that insurance companies should pay more attention to the implementation of ICT related innovations that could assist boost the growth of the industry.

Various stakeholders, including the government, must also step up their efforts to reduce financial exclusion. They should create job opportunities and improve the environment in order to bridge the inequality gap.

5.6 Suggestions for Further Research

Further studies are needed to investigate the role that mobile money plays in the development of the insurance and financial inclusion sectors in Africa. These studies can also be extended to include country-specific analysis. This will give a deeper understanding of how the various financial systems in different countries affect the link between insurance and mobile money.

Future studies can improve the existing literature by using alternative measurements of financial inclusion and methodologies, to assess whether the established linkages withstand further empirical scrutiny. To expand the scope of financial inclusion in insurance, it is import to examine the reasons why other measures of financial inclusion does not impart Insurance in Africa. It is also useful to examine why mobile money does not impact insurance in Africa. Another area of interest will be to look at other determinants of Insurance and how financial inclusion could moderate mobile money and insurance.

References:

Abiona, O., & Foureaux Koppensteiner, M. (2020). Financial inclusion, shocks and welfare: Evidence from the expansion of the mobile money agent network in Tanzania. *Journal of Human Resources*. *57*(2), 435-464.

Abor, J. Y., Amidu, M., & Issahaku, H. (2018). Mobile telephony, financial inclusion and inclusive growth. *Journal of African Business*, *19*(3), 430-453.

Aduda, J., & Kalunda, E. (2012). Financial inclusion and financial sector stability with reference to Kenya: A review of literature. *Journal of Applied Finance and Banking*, *2*(6), 95-120.

Ahmad, A. H., Green, C., & Jiang, F. (2020). Mobile money, financial inclusion and development: A review with reference to African experience. *Journal of Economic Surveys*, *34*(4), 753-792.

Ahmed, H., & Cowan, B. (2021). Mobile money and healthcare use: Evidence from East Africa. *World Development*, *141*, pp. 105392.

Ahmed, O., & Wamugo, L. (2018). Financial innovation and the performance of commercial banks in Kenya. *Int. J. Curr. Aspect. Finance* (IJCAF), *4*(2), 133-147.

Ajide, K. B. (2017). Determinants of financial inclusion in Sub-Saharan Africa countries: Does institutional infrastructure matter? *CBN Journal of Applied Statistics*, *8*(2), 69-89.

Aker, J. C., Boumnijel, R., McClelland, A., & Tierney, N. (2016). Payment mechanisms and ant-ipoverty programs: Evidence from a mobile money cash transfer experiment in Niger. *Economic Development and Cultural Change*, *65*(1), 1-37.

Aker, J., & Mbiti, I. (2010). Mobile phones and economic development in Africa. *Journal of Economic Perspectives, 24*(3), 207–232.

Akinlo, T. (2023). Information technology and insurance development in Sub-Saharan Africa. *Information Development*, *39*(1), 169-183.

Akudugu, M. A. (2013). The determinants of financial inclusion in Western Africa: Insights from Ghana. *Research Journal of Finance and Accounting, 4*(8), 1-9.

Al Amareen, S.a., (2022). The role of financial technology in enhancing financial inclusion: Evidence from Jordanian Banks, *Accounting*. Yarmouk University: Irbid – Jordan.

Alhassan, A.L., and N. Biekpe (2016). Determinants of life insurance consumption in Africa. *Research in International Business and Finance, 37*, 17–27.

Allen, F., Demirgüç-Kunt, A., Klapper, L. F., & Martinez Peria, M. S. (2012). The foundations of financial inclusion: Understanding ownership and use of formal accounts. *World Bank Policy Research Working Paper* (6290).

Alrabei, A. M., Al-Othman, L. N., Al-Dalabih, F. A., Taber, T. A., & Ali, B. J. (2022). The impact of mobile payment on the financial inclusion rates. *Information Science Letters, 4*, 1033-1044.

Alshubiri, F., Jamil, S. A., & Elheddad, M. (2019). The impact of ICT on financial development: Empirical evidence from the Gulf Cooperation Council countries. *International Journal of Engineering Business Management*, *11*.

Amoah, A., Korle, K., & Asiama, R. K. (2020). Mobile money as a financial inclusion instrument: what are the determinants? *International journal of social economic, 47*(10), 1280-1297.

Andersson-Manjang, S., & Naghavi, N. (2021). State of the industry report on mobile money (GSMA). Retrieved April, 5, 2022. Available at: https://www.gsma.com/mobilefordevelopment/wp-content/uploads/2021/03/GSMA_State-of-the-Industry-Report-on-MobileMoney-2021_Full-report.pdf.

Anjanappa, J., & Bhattacharya, A. (2023). Climate change and the insurance industry in India: Challenges and opportunities. *Available at SSRN 4451120*.

Arellano, M., and O. Bover. (1995). Another look at the instrumental variable estimation of error-components models. *Journal of Econometrics, 68* (1), 29–51.

Aron, J. (2018). Mobile money and the economy: A review of the evidence. *The World Bank Research Observer, 33*(2), 135-188.

Aron, J., & Muellbauer, J. (2019). The Economics of mobile money: Harnessing the transformative power of technology to benefit the global poor. *Centre for the Study of African Economies*. Oxford martin school policy paper.

Arora, R. U. (2020). Digital financial services to women: Access and constraints. *In gender bias and digital financial services in South Asia*. *Emerald Publishing Limited, Bingley, pp. 51-72*

Ashley, W. J. (1891). The rehabilitation of Ricardo. *The Economic Journal, 1*(3), 474-489.

Asongu, S. A., & Le Roux, S. (2017). Enhancing ICT for inclusive human development in Sub-Saharan Africa. *Technological Forecasting and Social Change*, *118*, 44-54.

Asongu, S. A., & Nwachukwu, J. C. (2018). Openness, ICT and entrepreneurship in sub-Saharan Africa. *Information Technology & People*, *31*(1), 278-303.

Asongu, S. A., & Odhiambo, N. M. (2020). Foreign direct investment, information technology and economic growth dynamics in Sub-Saharan Africa. *Telecommunications Policy*, *44*(1), p.101838.

Asongu, S. A., Agyemang-Mintah, P., & Nting, R. T. (2021). Law, mobile money drivers and mobile money innovations in developing countries. *Technological Forecasting and Social Change*, *168*, p.120776.

Asongu, S., & Odhiambo, N. M. (2020). Financial access, governance and insurance sector development in Sub-Saharan Africa. *Journal of Economic Studies*, *47*(4), 849-875.

Asongu, S., Nnanna, J., & Acha-Anyi, P. (2019). Information technology, governance and insurance in Sub-Saharan Africa. *Social Responsibility Journal. 16*(8),1253-1273.

Asongu, S.A., and J.C. Nwachukwu. (2016). The role of governance in mobile phones for inclusive human development in Sub-Saharan Africa. *Technovation* 55, 1–13.

Avram, K., Y. Nguyen, and M. Skully. (2010). Insurance and economic growth: A cross country examination. Australian centre for financial studies—*Finsia banking and finance conference*, 1–45.

Baganzi, R., & Lau, A. K. (2017). Examining trust and risk in mobile money acceptance in Uganda. *Sustainability*, *9*(12), pp. 2233.

Bah, M., & Abila, N. (2022). Institutional determinants of insurance penetration in Africa. *The Geneva Papers on Risk and Insurance-Issues and Practice*, 1-42.

Banerjee, A., & Newman, A. (2003). Inequality, growth and trade policy. *MIT Working Paper*, Cambridge, MA.

Banerjee, A., Duflo, E., Imbert, C., Mathew, S., & Pande, R. (2020). E-governance, accountability, and leakage in public programs: Experimental evidence from a financial management reform in india. *American Economic Journal: Applied Economics*, *12*(4), 39-72.

Bank of Ghana. (2017). Impact of mobile money on the payment system in Ghana: An econometric analysis. retrieved from https://www.bog.gov.gh/privatecontent/Public_Notices/Impact of Mobile Money on the Payment Systems in Ghana.pdf

Batista, Catia and Vicente, Pedro C., (2013) Introducing mobile money in rural Mozambique: Evidence from a field experiment. *NOVAFRICA Working Paper* Series No. 1301.

Beck, T. & Webb, I., (2003). Economic, demographic and institutional determinants of life insurance consumption across countries. *World Bank Economic Review*, *17*(1), pp. 51-88.

Beck, T., Demirgüç-Kunt, A., & Levine, R. (2007). Finance, inequality and the poor. *Journal of economic growth, 12*, 27-49.

Beck, T., Demirguc-Kunt., A., & Martinez Peria, M. S. (2008). Banking services for everyone? Barriers to bank access and use around the world. *World Bank Economic Review*, *22*(3), 397– 430.

Benami, E., & Carter, M. R. (2021). Can digital technologies reshape rural microfinance? Implications for savings, credit, & insurance. *Applied Economic Perspectives and Policy*, *43*(4), 1196-1220.

Bird, J. (2018). Smart'insurance helps poor farmers to cut risk. *Financial Times, 4*.

Blundell, R., and S. Bond. (1998). Initial conditions and moment restrictions in dynamic panel data models. *Journal of Econometrics, 87* (1), 115–143.

Bold, C., Porteous, D., & Rotman, S. (2012). Social cash transfers and financial inclusion: Evidence from four countries. *Population (in millions), 193*(46), 109.

Browne, M.J. & Kim, K., (1993). An international analysis of life insurance demand. *Journal of Risk and Insurance, 60*(4), 616-634.

Camner, G., C. Pulver, and E. Sjoblom. (2010). "What makes a successful mobile money implementation? Learnings from MPESA in Kenya and Tanzania." GSMA – MobileMoney for the Unbanked.

Chakrabarty, K. C. (2011). Financial inclusion and banks: Issues and perspectives. *RBI Bulletin*, November 2011.

Chakravarty, S. R., & Pal, R. (2013). Financial inclusion in India: An axiomatic approach. *Journal of Policy modeling, 35*(5), 813-837.

Chang, C.H., and C.C. Lee. (2012). Non-linearity between life insurance and economic development: A revisited approach. *Geneva Risk and Insurance Review 37* (2): 223–257.

Chen, S. S., Cheng, S. C., Pan, G., & Wu, T. P. (2013). The relationship between globalization and insurance activities: a panel data analysis. *Japan and the World Economy*, *28*, 151-157.

Chithra, N., & Selvam, M. (2013). Determinants of financial inclusion: An empirical study on the inter-state variations in India. Available at SSRN: https://ssrn.com/abstract=2296096

Chukwu, E., Garg, L., & Eze, G. (2016). Mobile health insurance system and associated costs: a cross-sectional survey of primary health centers in Abuja, Nigeria. *JMIR mHealth and uHealth*, *4*(2), e4342.

Chummun, B. Z. (2019). Mobile Security in Low-Income Households' Businesses: A Measure of Financial Inclusion. In *Cyber Law, Privacy, and Security: Concepts, Methodologies, Tools, and Applications*. IGI Global. pp. 576-595

Churchill, C. (Ed.). (2006). Protecting the poor: A microinsurance compendium. *International Labour Organization*, *2*, 12-24.

Čihák, M., Demirgüç-Kunt, A., Erik, F., & Levine, R. (2012). Benchmarking Financial Systems around the World. *The World Bank Policy Research Working Paper 6175*. Washington, DC: The World Bank.

Claessens, S. (2006). Access to financial services: A review of the issues and public policy objectives. *Oxford Journals, 21*, 207–240.

Conroy, J. (2005). APEC and Financial Exclusion: Missed Opportunities for Collective Action? *Asia-Pacific Development Journal, 12*(1), June 2005.

Cull, R., Demirgüç-Kunt, A., & Morduch, J. (2009). Microfinance meets the market. *Journal of Economic perspectives, 23*(1), 167-192.

David LEE Kuo Chuen and Robert H. Deng. (2017). Handbook of Blockchain, Digital Finance, and Inclusion, Volume 1: Cryptocurrency, FinTech, InsurTech, and Regulation (1st. ed.). *Academic Press, Inc*., USA.

Davidson, N. and McCarty, M.Y. (2012) Driving customer usage of mobile money for the unbanked. London: *GSMA*.

Davis, F. D. (1989). Perceived usefulness, perceived ease of use, and user acceptance of information technology. *MIS quarterly*, 319-340.

De Koker, L., & Jentzsch, N. (2012). Assessing and Mitigating Mobile Money Integrity Risks within the New Framework. *Washington Journal of Law, Technology & Arts, 8*(3), 165-196.

De Koker, L., and N. Jentzsch. (2013). "Financial Inclusion and Financial Integrity: Aligned Incentives?" *World Development, 44*, 267–280.

De Weerdt, J., & Dercon, S. (2006). Risk-sharing networks and insurance against illness. *Journal of development Economics, 81*(2), 337-356.

Demirgüç-Kunt, A., & Klapper, L. F. (2012). Measuring financial inclusion: The global findex database. *World bank policy research working paper*, (6025).

Demirgüç-Kunt, A., & Singer, D. (2017). Financial inclusion and inclusive growth: A review of recent empirical evidence. *World Bank Policy Research Working Paper*, (8040).

Demirgüç-Kunt, A., Klapper, L., Singer, D., Ansar, S., & Hess, J. (2020). The global Findex database 2017: measuring financial inclusion and opportunities to expand access to and use of financial services. *The World Bank Economic Review, 34*(Supplement_1), S2-S8.

Demirgüç-Kunt, A., Thorsten, B., & Honohan, P. (2008). Finance for All? Policies and Pitfalls in Expanding Access. *World Bank Policy Research Report*. Washington: World Bank.

Dev, S. M. (2006). Financial inclusion: Issues and challenges. *Economic and political weekly*, 4310-4313.

Dittus, P., Klein, M. (2011), On Harnessing the Potential of Financial Inclusion," *BIS Working Papers* No. 347.

Donovan, K. (2012). Mobile money for financial inclusion. *Information and Communications for development*, *61*(1), 61-73.

Dorfleitner, G., & Nguyen, Q. A. (2022). Mobile money for women's economic empowerment: the mediating role of financial management practices. *Review of Managerial Science*, 1-30.

Duncombe, R. (2009). Assessing the potential for mobile payments in Africa: Approaches and evidence from Uganda. *Development Informatics Working Paper Series* Paper No. 41.Centre for Development Informatics, Institute for Development Policy and Management, University of Manchester.

Duncombe, R., Boateng, R. (2009), Mobile phones and financial services in developing countries: A review of concepts, methods, issues, evidence and future research directions. *Third World Quarterly Journal, 30*(7), 1237-1258.

Dupas, P., & Robinson, J. (2013). Savings constraints and microenterprise development: Evidence from a field experiment in Kenya. American Economic Journal: *Applied Economics, 5*(1), 163-192.

Durai, T., & Stella, G. (2019). Digital finance and its impact on financial inclusion. *Journal of Emerging Technologies and Innovative Research, 6*(1), 122-127.

Ehrbeck, T., Pickens, M., & Tarazi, M. (2012). Financially Inclusive Ecosystems: The roles of government today. *CGAP*, February. 1-11.

Elango, B., & Jones, J. (2011). Drivers of insurance demand in emerging markets. *Journal of Service Science Research, 3*(2), 185-204.

Enz, R. (2000). The S-curve relation between per-capita income and insurance penetration. *The Geneva Papers on Risk and Insurance-Issues and Practice, 25*(3), 396-406.

Ernst & Young (EY) (2015),"Tomorrow's investment rules 2.0", Ernst & Young (EY), available at: www.ey. com/Publication/vwLUAssets/EY-tomorrows-investment-rules-2/$FILE/EY-tomorrows-investmentrules-2.0.pdf

Evans, D. S., and A. Pirchio. (2015). "An Empirical Examination of Why Mobile Money SchemesIgnite in Some Developing Countries but Flounder in Most." *Review of Network Economics, 3* (4), 397–451.

Evans, O. (2016). The effectiveness of monetary policy in Africa: Modeling the impact of financial inclusion. *Iranian Economic Review*, *20*(3), 327-337.

Evans, O. (2018). Connecting the poor: the internet, mobile phones and financial inclusion in Africa. *Digital Policy, Regulation and Governance. 20*(6), 568-581.

Fadun, S. O. (2014). Financial inclusion, tool for poverty alleviation and income redistribution in developing countries: Evidences from Nigeria. *Academic Research International, 5*(3), 137.

Feyen, E., R. Lester, and R. Rocha. (2013). What drives the development of the insurance sector? An empirical analysis based on a panel of developed and developing countries. *Journal of Financial Perspectives 1* (1): 117–139.

Foster, C. & Heeks, R. (2013a) Analyzing Policy for Inclusive Innovation: The Mobile Sector and Base-of-the-pyramid Markets in Kenya. *Innovation and Development, 3*(1), 103-119.

Foster, C., & Heeks, R. (2013). Innovation and scaling of ICT for the bottom-of-the-pyramid. *Journal of Information Technology*, 28, 296-315.

Friedman, M., & Savage, L. J. (1948). The utility analysis of choices involving risk. *Journal of Political Economy, 56*(4), 279-304.

Garg, S., & Agarwal, P. (2014). Financial inclusion in India–a Review of initiatives and achievements. *IOSR journal of business and Management, 16*(6), 52-61.

Ggombe, K. M. (2015). The role of mobile money in facilitating rural access to financial services and the resultant effect on household welfare: Evidence from Uganda. Unpublished PhD Thesis, National Graduate Institute for Policy Studies (GRIPS) Global Financial Report.

Global System for Mobile Association (GSMA). (2010). Mobile Money Definitions. Retrieved 09 November 2015 from http://www.gsma.com/mobilefordevelopment/wpcontent/uploads/2012/06/mobilemoneydefinitionsnomarks56.pdf

Goland, T., Bays, J., & Chaia, J. (2010). From millions to billions: Achieving full financial inclusion. *McKinsey & Company*.

Gosavi, A. (2017). Can mobile money help firms mitigate the problem of access to finance in Eastern sub-Saharan Africa? *Journal of African Business, 19*(1), 1–18.

Grossman, J., & Tarazi, M. (2014). Serving smallholder farmers: Recent developments in digital finance. CGAP (Consultative Group to Assist the Poorest), Washington, DC, 94.

GSM Association. (2020). The state of mobile internet connectivity 2020. URL: https://www. gsma. com/r/wp-content/uploads/2020/09/GSMA-State-of-Mobile-Internet-Connectivity-Report-2020.pdf

GSMA (2016). The State of Mobile Money in Sub-Saharan Africa. GSMA Intelligence.

GSMA (2017). State of the Industry Report on Mobile Money. GSMA Intelligence.

GSMA (2018a). The Mobile Economy: West Africa 2018. GSMA Intelligence, 36. Retrieved fromhttps://www.gsmaintelligence.com/research/?file=e568fe9e710ec776d82c04e9f 6760adb&download

GSMA. (2018b). The Mobile Economy. *GSMA Intelligence*, (35), 53.

Guerineau, S., and R. Sawadogo. (2015). On the determinants of life insurance development in Sub-Saharan Africa: The role of the institutions quality in the effect of economic development. Etudes et Documents N°19. CERDI 19, 1–34.

Gürbüz, A. (2019). The economics of rural populations in Sub-Saharan Africa: Financial inclusion and agriculture (Doctoral dissertation, Doctoral Dissertation), *Georgetown University*. http://hdl. handle. net/10822/1054923.

Haiss, P., & Sümegi, K. (2008). The relationship between insurance and economic growth in Europe: a theoretical and empirical analysis. *Empirica*, *35*(4), 405-431.

Han, L., Li, D., Moshirian, F., & Tian, Y. (2010). Insurance development and economic growth. *The Geneva Papers on Risk and Insurance-Issues and Practice*, *35*(2), 183-199.

Hannig, A., & Jansen, S. (2011). Financial Inclusion and Financial Stability: Current Policy Issues. Asian Development Bank Institute Working Paper, No. 259, pp. 1–29. Phillipines: Asian Development Bank

Hariharan, G., & Marktanner, M. (2012). The growth potential from financial inclusion. *ICA Institute and Kennesaw State University, 2*(5), 1-12.

Hughes, N., & Lonie, S. (2007). M-PESA: mobile money for the ―unbanked‖ turning cellphones into 24-hour tellers in Kenya. *Innovations: Technology, Governance, Globalization, 2*(1-2), 63-81.

Ilhan, E. G. E., & Bahadir, T. (2011). The relationship between insurance sector and economic growth: An econometric analysis. *International Journal of Economic Research, 2*(2), 1-9.

InterMedia (2012). Mobile money in Uganda: Use, barriers and opportunities. Washington, D.C.

Islam, A. H., Basher, S. A., & Enamul Haque, A. K. (2022). The impact of mobile money on long-term poverty: evidence from Bangladesh. *Journal of Social and Economic Development, 24*(2), 436-455.

Iyawe, O. O., & Osamwonyi, I. O. (2017). Financial development and life insurance demand in Sub-Sahara Africa. *International Journal of Financial Research*, *8*(2), 163-175.

Jack, W., and T. Suri. (2014). "Risk Sharing and Transactions Costs: Evidence from Kenya's Mobile Money Revolution." *American Economic Review, 104* (1), 183–223.

Jack, W., Suri, T., 2011. Mobile Money: The Economics of M-PESA NBER Working Paper 16721. *National Bureau of Economic Research*, Cambridge, MA.

Jensen, R. (2007). The digital provide: Information (technology), market performance, and welfare in the South Indian fisheries sector. *The quarterly journal of economics*, *122*(3), 879-924.

Johnson, S. and Krijtenburg, F. (2015) Upliftment, friends and finance: everyday concepts and practices of resource exchange underpinning mobile money adaption in Kenya. *Bath Papers in International Development and Wellbeing*, No. 41.

Jonathan, D., & Camilo, T. (2008). Mobile banking and economic development: Linking adoption, impact and use. *Asian Journal of Communication, 18*(4), 318–322.

Karlan, D., Kendall, J., Mann, R., Pande, R., Suri, T., & Zinman, J. (2016). Research and impacts of digital financial services.*National Bureau of Economic Research.* NBER Working Paper No. 22633.

Kasekende, L. (2013), "Improving rural access to finance in Uganda: Opening remarks at the official launch of the Uganda rural challenge fund", NBER Working Paper No. 20135, Kampala, 19 April.

Kaushal, S., & Ghosh, A. (2018). Banking, insurance and economic growth in India: An empirical analysis of relationship from regulated to liberalized era. *Journal of Financial Economic Policy*, *10*(1), 17-37.

Kempson, E. (2006). Policy level response to financial exclusion in developed economies: Lessons for developing countries. paper presented at the conference, access to finance: Building inclusive financial systems, World Bank, Washington, DC.

Kennedy, P. (2008). A guide to econometrics. 6th edition. *John Wiley & Sons*.

Kiconco, R. I., Rooks, G., & Snijders, C. (2020). Learning mobile money in social networks: Comparing a rural and urban region in Uganda. *Computers in Human Behavior*, *103*, 214-225.

Kiconco, R., Rooks, G., Solano, G., & Matzat, U. (2019). A skills perspective on the adoption and use of mobile money services in Uganda. *Information Development, 35*(5), 724–738.

Kikulwe, E. M., Fischer, E., & Qaim, M. (2014). Mobile money, smallholder farmers, and household welfare in Kenya. *PLoS ONE, 9*(10), 1–13.

Kjosevski, J. (2012). The determinants of life insurance demand in central and southeastern Europe. *International Journal of Economics and Finance*, *4*(3), 237-247.

Kugler, M., & Ofoghi, R. (2005). Does insurance promote economic growth? Evidence from the UK. In *Money Macro and Finance (MMF) Research Group Conference* , *8*.

Kumar, D., Martin, D., & O'Neill, J. (2011), "The times they are changing': Mobile payments in India", Proceedings of the SIGCHI Conference on Human Factors in Computing Systems, pp. 1413–1422, ACM, Vancouver, BC.

Kumar, V., Thrikawala, S., & Acharya, S. (2022). Financial inclusion and bank profitability: Evidence from a developed market. *Global Finance Journal*, *53*, 100609.

Kwenda, F., & Chinoda, T. (2019). The impact of institutional quality and governance on financial inclusion in Africa: A two-step system generalised method of moments approach. *Journal of Economic and Financial Sciences*, *12*(1), 1-9.

Ky, S., Rugemintwari, C., & Sauviat, A. (2018). Does mobile money affect saving behaviour? Evidence from a developing country. *Journal of African Economies*, *27*(3), 285-320.

l-Dwairi, R. (2017) 'Social commerce adoption among Jordanian youth: empirical study',Int. J. *Business Information Systems*, *26*(3), 277–296.

Lal, R., & Sachdev, I. (2015). Mobile money services: Design and development for financial inclusion. Boston, MA: Harvard Business School. *Working paper,* pp. 15-083.

Lawack, V. (2013). "Mobile money, financial Inclusion and financial Integrity: The South African case." *Washington Journal of Law, Technology and Arts, 8* (3), 317.

Lee, C. C. (2011). Does insurance matter for growth: Empirical evidence from OECD countries. *The BE Journal of Macroeconomics, 11*(1).

Lee, C. C., Chang, C. H., Arouri, M., & Lee, C. C. (2016). Economic growth and insurance development: The role of institutional environments. *Economic Modelling, 59*, 361-369.

Lee, C. C., Chiu, Y. B., & Chang, C. H. (2013). Insurance demand and country risks: A nonlinear panel data analysis. *Journal of International Money and Finance*, *36*, 68-85.

Lee, H. (2019). Insurance development and economic growth. *Financial Statistical Journal, 1*(4).

Lenka, S.K., Barik, R.(2018). Has expansion of mobile phone and internet use spurred financial inclusion in the SAARC countries? *Financial Innovation, 4* (5).

Lester, R. R. (2011). The insurance sector in the Middle East and North Africa: Challenges and development agenda. *World Bank Policy Research Working Paper*, (5608).

Li, T., & Li, M. (2020). An empirical analysis of the factors influencing the development of insurance industry in China. *SAGE Open*, *10*(4),

Li, X., X. Zhao, and W. Pu, (2020). Measuring ease of use of mobile applications in e-commerce retailing from the perspective of consumer online shopping behaviour patterns. *Journal of Retailing and Consumer Services*, 55, p. 102093.

Liberto, D. (2019). What is endogenous growth theory. Retrieved from Investopedia website: https://www.investopedia.com/terms/e/endogenousgrowththeory.asp on December, 3, 2020.

Liu, J., Li, B., Lin, B., & Nguyen, V. (2007). Key issues and challenges of risk management and insurance in China's construction industry: An empirical study. Industrial Management & Data Systems, 107(3), 382-396.

Luciano, E., Rossi, M., & Sansone, D. (2016). Financial inclusion and life insurance demand; Evidence from Italian households. *Netspar Discussion, 11*, 2015-039.

Della Peruta, M. (2018). Adoption of mobile money and financial inclusion: a macroeconomic approach through cluster analysis. *Economics of Innovation and New Technology*, *27*(2), 154-173.

Mago, S. and Chitokwindo, S. (2014), "The impact of mobile banking on financial inclusion in Zimbabwe: A case for Masvingo province", *Mediterranean Journal of Social Sciences*, *5*(9), 221.

Martín. H. San, and Herrero. Á (2012). Influence of the user's psychological factors on the online purchase intention in rural tourism: Integrating innovativeness to the UTAUT framework. *Tourism Management, 33* (2012), 341-350.

Mas, I., and D. Radcliffe. (2010). "Scaling Mobile Money." *Journal of Payments Strategy and Systems, 5* (3), 298–315.

Maurer, B. (2012). "Mobile Money: Communication, consumption and change in the payments space." *Journal of Development Studies, 48* (5), 589–604.

Mbiti, I. and Weil, D. (2011). Mobile banking: the impact of M-Pesa in Kenya. *NBER Working Paper*, No. 17129.

Mbiti, I., & Weil, D. N. (2015). Mobile banking: The impact of M-Pesa in Kenya. *African successes: Modernization and development* . *University of Chicago Press, 3,* 247-293.

McKay, C., and M. Pickens. (2010). Branchless banking 2010: Who's served? At what price? What's next? CGAP focus note 66. Washington, DC: World Bank Group.

Meera, M. R., Kaleeswaran, P., & Siddique, R. M. A. (2016). Financial inclusion through insurance. *Intercontinental Journal of Banking, Insurance and Finance, 3*(12), 9-15.

Michael, O. (2012). Insurance sector development and economic growth in Nigeria. *African Journal of Business Management, 6*(23), 7016-7023.

Mileva, Y., Bruhn, A., & Weickert, J. (2007). Illumination-robust variational optical flow with photometric invariants. *Pattern Recognition: 29th DAGM Symposium, Heidelberg, Germany*. Springer Berlin Heidelberg. *29*,152-162

Morgan, P. J. (2022). Fintech and financial inclusion in Southeast Asia and India. *Asian Economic Policy Review, 17*(2), 183-208.

Mpofu, F. Y., & Mhlanga, D. (2022). Digital financial inclusion, digital financial services tax and financial inclusion in the fourth industrial revolution era in Africa. *Economies*, *10*(8), 184.

Mtenzi, F. J., Oreku, G. S., Lupiana, D. M., & Yonazi, J. J. (Eds.). (2018). Mobile technologies and socio-economic development in emerging nations. *IGI Global*.

Munyegera, G. K., & Matsumoto, T. (2016). Mobile money, remittances, and household welfare:Panel evidence from rural Uganda. *World Development, 79*, 127–137.

Murendo, C., Wollni, M., De Brauw, A., & Mugabi, N. (2018). Social network effects on mobile money adoption in Uganda. The Journal of Development Studies, 54(2), 327–342.

Mutegi, F. K. (2018). Role of Innovation Strategy on Insurance Penetration in Kenya (Doctoral dissertation, COHRED-JKUAT).

Muthiora, B. (2015). Enabling mobile money policies in Kenya: Fostering a digital financial revolution. *GSMA Mobile Money for the Unbanked*, 1-28.

Ndiwalana, A., Morawczynski, O., & Popov, O. (2010). Mobile money use in Uganda: A preliminary study. *M4D* 2010, 121.

Ndubuisi, P., Okere, K. I., & Iheanacho, E. (2022). Financial sector development and energy consumption in Sub-Saharan Africa: Does institutional governance matter? Dynamic panel data analysis. *Journal of International Commerce, Economics and Policy*, 2350003.

Neaime, S., & Gaysset, I. (2018). Financial inclusion and stability in MENA: Evidence from poverty and inequality. *Finance Research Letters, 24*, 230-237.

Nektarios, M. (2010). A growth theory for the insurance industry. *Risk Management and Insurance Review*, *13*(1), 45-60.

Nyman, J. A. (2001). The demand for insurance: Expected utility theory from a gain perspective. *Discussion Paper* No. 313.

Obadha, M., Colbourn, T., & Seal, A. (2020). Mobile money use and social health insurance enrolment among rural dwellers outside the formal employment sector: Evidence from Kenya. *The International Journal of Health Planning and Management*, *35*(1), e66-e80.

Okello Candiya Bongomin, G., Ntayi, J. M., Munene, J. C., & Malinga, C. A. (2018). Mobile money and financial inclusion in sub-Saharan Africa: The moderating role of social networks. *Journal of African Business*, *19*(3), 361-384.

Okocha, F. O., & Awele Adibi, V. (2020). Mobile banking adoption by business executives in Nigeria. *African Journal of Science, Technology, Innovation and Development*, *12*(7), 847-854.

Olaniyi, E., Adeoye, B. (2016), Determinants of financial inclusion in Africa: A dynamic panel data approach. *University of Mauritius Research Journal, 22*, 310-336.

Osabuohien, E. S., & Efobi, U. R. (2013). Africa's money in Africa. *South African Journal of Economics*, *81*(2), 292-306.

Otchere, I., Soumaré, I., & Yourougou, P. (2016). FDI and financial market development in Africa. *The World Economy, 39*(5), 651-678.

Ouma, S.A., Odongo, T.M. and Were, M. (2017), "Mobile financial services and financial inclusion: is it a boon for savings mobilization?" *Review of Development Finance*, 7(1), 29-35.

Outreville, J. F. (1990). The economic significance of insurance markets in developing countries. *Journal of Risk and Insurance*, *18*(3), 487-498.

Outreville, J. F. (1996). Life insurance markets in developing countries. *Journal of risk and insurance*, *63*(2): 263-278.

Pagano, M. (1993). Financial markets and growth: an overview. *European economic review*, *37*(2-3), 613-622.

Pradhan, R. P., Bahmani, S., & Kiran, M. U. (2014). The dynamics of insurance sector development, banking sector development and economic growth: Evidence from G-20 countries. *Global Economics and Management Review, 19*(1-2), 16-25.

Rangarajan, C. (2008). Report of the committee on financial inclusion. Ministry of Finance, Government of India.

Rasool, Ishrat. (2018). Financial Inclusion through Health Insurance. Rerived from https://www.researchgate.net/publication/325528759_Financial_Inclusion_through_Health_Insurance accessed on December 29, 2022

Rewilak, J. (2017). The role of financial development in poverty reduction. *Review of development finance, 7*(2), 169-176.

Ritzén, I., & Hussein, J. (2021). Mobile money and economic growth in Sub-Saharan Africa.

Roodman, D. (2009). A note on the theme of too many instruments. *Oxford Bulletin of Economics and statistics, 71*(1), 135-158.

Roodman, D. (2009b). How to Do xtabond2: An introduction to difference and system GMM in Stata. *Stata Journal, 9* (1), 86–136.

Rosenberg, A. (1988). Philosophy of social science (Vol. 2). Boulder, CO: Westview Press.

Rothschild, M., & Stiglitz, J. E. (1976). Increasing Risk: A definition." *Journal of Economic Theory*, *2*(1970) , 225-243.

Sadorsky, P. (2012), "Information communication technology and electricity consumption in emerging economies*", Energy Policy, 48*,130-136.

Sanderson, A., Mutandwa, L., & Le Roux, P. (2018). A review of determinants of financial inclusion. *International Journal of Economics and Financial Issues, 8*(3), 1.

Sapa, S. G., Phunde, S. B., & Godbole, M. R. (2014). Impacts of ICT Application on the Insurance Sector (e-Insurance). *IBMRD's Journal of Management & Research, 3*(1), 311-320.

Sarma, M. (2012). Index of financial inclusion–A measure of financial sector inclusiveness. *Centre for International Trade and Development*, *School of International Studies Working Paper Jawaharlal Nehru University*. Delhi, India.

Sarma, M., & Pais, J. (2011). Financial inclusion and development. *Journal of international development, 23*(5), 613-628.

Sawadogo, R. (2021). The relationship between insurance and banking sectors in Sub-Saharan African: Does globalization matter?. *Economic Change and Restructuring*, *54*(1), 101-119.

Scharwatt, C., & Williamson, C. (2015). Mobile money crosses borders: New remittance models in West Africa. *GSMA*, London.

Sharma, D. (2016). Nexus between financial inclusion and economic growth: Evidence from the emerging Indian economy. *Journal of financial economic policy*, *8*(1), 13-36.

Shekar, M., & Veeramani, S. (2017). Financial inclusion through insurance and pension schemes. *European Business and Management, 3*(6), 105-112.

Smith, A. (1776). An inquiry into the nature and causes of the wealth of nations: *London: printed for W. Strahan; and T. Cadell*, 1,1776.

Soumare, I., Tchana Tchana, F., & Kengne, T. M. (2016). Analysis of the determinants of financial inclusion in Central and West Africa. *Transnational Corporations Review, 8*(4), 231-249.

Sriram Taranikanti (2017), "Insurance Sector and its role in financial inclusion", Andhra Pradesh HRD Institute Journal, Data retrieved from - https://www.aphrdi.ap.gov.in/Trainings/workshops2017.php

Suri, T., & Jack, W. (2016). The long-run poverty and gender impacts of mobile money. *Science, 354*(6317), 1288-1292.

Tchamyou, V. S., & Asongu, S. A. (2017). Information sharing and financial sector development in Africa. *Journal of African Business*, *18*(1), 24-49.

Thulani, M., Chitakunye, P., & Chummun, B. Z. (2014). Mobile money as a strategy for financial inclusion in rural communities. *Mediterranean Journal of Social Sciences*, *5*(25), 216.

Treasury, H. M. (2007). Budget 2007. Building Britain's long-term future, prosperity and fairness for families, economic and fiscal strategy report and financial statement and budget report, 342.

Tversky, A., & Kahneman, D. (1992). Advances in prospect theory: Cumulative representation of uncertainty. *Journal of Risk and uncertainty*, *5*(4), 297-323.

Ullah, S., Akhtar, P., & Zaefarian, G. (2018). Dealing with endogeneity bias: The generalized method of moments (GMM) for panel data. *Industrial Marketing Management*, *71*, 69-78.

Upadhyay, P., & Jahanyan, S. (2015). Analyzing user perspective on the factors affecting use intention of mobile based transfer payment. *Internet Research, 26*(1), 38–56.

Urhie, E., Amonu, O. C., Mbah, C., Ewetan, O. O., Matthew, O. A., Adediran, O., ... & Adekeye, A. (2021). Banking technology and cashless economy in selected Sub-Saharan African countries: does education matter? *Journal of Money Laundering Control*. *24*(3), 584-595.

USAID. (2012). Mission critical: Enabling digital payment for development. *A USAID Opportunity Brief*. Washington DC: USAID

Venkatesh, V., & Davis, F. D. (2000). A theoretical extension of the technology acceptance model: Four longitudinal field studies. *Management science*, *46*(2), 186-204.

Venkatesh, V., Brown, S. A., Maruping, L. M., & Bala, H. (2008). Predicting different conceptualizations of system use: The competing roles of behavioral intention, facilitating conditions, and behavioral expectation. *MIS quarterly*, 483-502

Venkatesh, V., Morris, M. G., Davis, G. B., & Davis, F. D. (2003). User acceptance of information technology: Toward a unified view. *MIS quarterly*, 425-478.

Venkatesh, V., Morris, M., Davis, G., & Davis, F. (2002). User acceptance of information technology: Toward a unified view. *MIS Quarterly*, *27*(3), 425.

Ward, D. and Zurburegg, R. (2000). Does insurance promote economic growth? Evidence from OECD Countries. *Journal of Risk and Insurance*, *67*(4), 489-506.

Ward, D., & Zurbruegg, R. (2002). Law, politics and life insurance consumption in Asia. *The Geneva Papers on Risk and Insurance-Issues and Practice*, *27*(3), 395-412.

Wasow, B., & Hill, R. D. (1986). Determinants of insurance penetration: a cross-country analysis. In *Insurance industry in economic development*. New York: New York University Press. pp. 160-176.

Webb, I. P., Grace, M.F. & Skipper, H. D. (2002). The effects of banking and insurance on the growth of capital and output. *Center for Risk Management and Insurance working paper, 2*(1).

WEF (World Economic Forum). (2011). Mobile financial services development report. Retrieved from http://www.weforum.org/issues/mobilefinancial-services-development.

Wen, J., and C. Zhang. (1993). Investment under risk in property rights. *China Economic Review, 4* (1), 49–53.

World Bank. (2014). 'A survey on access to and use of financial services in 152 Countries around the world'. *The global findex database*. Washington DC: World Bank.

World Bank. (2017). Mobile money in Somalia: Household Survey and Market Analysis. https://www.mfw4a.org/sites/default/files/resources/Mobile_Money_in_Somalia_b_WBank.pdbbf.

Yenkey, C., Doering, L., & Aceves, P. (2015). The financialization of everyday life: Mobile money and (in) formal activity in a developing context. *Rotman School of Management Working Paper*, (2562518).

Yokossi, T. (2017). Mobile money and economic activity: Evidence from Kenya. *Working Paper*. Retrieved from https://www. researchgate.

Zhang, Y., N. Lin, and T. Li. (2012). "Markets or Networks: Households' choice of financial intermediary in Western China." *Social Networks, 34*(4), 670–681.

Zins, A., & Weill, L. (2016). The determinants of financial inclusion in Africa. *Review of development finance*, *6*(1), 46-57.