FINANCIAL INCLUSION AND WELFARE: EVIDENCE FROM THE GLOBAL FINDEX AND FINANCIAL ACCESS SURVEYS

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DECLARATION

This thesis is my original work and has not been presented for a degree in any other university

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DEDICATION

To my mentors and my God

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ABSTRACT

This thesis focuses on financial inclusion and its potential to ensuring that the key segments of the population derive benefits arising from accessing and using a wide array of financial services. A cross-country analysis is carried out to investigate the extent to which determinants and constraints to financial inclusion vary across different countries within the sub-Saharan Africa region. The thesis further isolates savings mobilization and credit access as key aspects of financial inclusion and performs a seemingly unrelated regression analysis to derive the most critical factors that jointly drive policy in Kenya and Tanzania. The conceptual and theoretical frameworks underpinning the empirical modelling are presented. Finally, the thesis examines the potential effect of financial innovation on household welfare. To bring out these differences, the thesis utilized the user-side data taking into account hierarchies within data and potential heterogeneity in the sub-populations. The datasets utilized were obtained from the Global Findex wave of 2014 survey, FinAccess and FinScope waves of 2013 surveys. The use of a multilevel approach was motivated by the stratification of the data into clearly delineated sub-populations constituting levels: individual household level and country level. Estimation results showed that country differences explain more than 10 percent of the observed aspects of account ownership. The results further showed that at lower levels of income there is less association between earnings and account ownership. However, compared to owning an account with a mobile phone service provider, the results showed greater association between account ownership and earnings. The majority of those who transact through the mobile account platform are less endowed with resources. Similarly, the study established that age was negatively associated with ownership of account. Older households were less likely to own an account implying that aging is negatively associated with households desire to hold an account. Countries exhibited marked differences in financial inclusion. The differences were explained by individual household differences as well as country differences. The main financial inclusion barriers identified included households' lack of money income, the cost of financial

services and the distance to the nearest point of service. These barriers were found to be associated with lower income levels and lower education attainment. The thesis concludes that compared to other forms of account ownership, the mobile phone account appeared to serve the lower end individuals who largely exhibit lower levels of education and are likely to be found at the lower end of the income spectrum. Aging was found to have the effect of switching households from one financial service to another. The findings suggest that both demographic and socioeconomic factors are critical determinants of access to savings and credit services in Kenya and Tanzania. More emphasis has been laid on the importance of socioeconomic factors such as age, gender, education, marital status, social capital, and income. The implication of having more people access formal savings and credit is to prevent unnecessary risks associated with informal and/or exclusion. Economic theory lends credence to these findings by affirming the role of savings in the investment model. The findings further revealed the role played by agency banking services on household welfare. Agency banking was found to have a positive significant effect on the welfare if it targeted individuals within the upper class in the wealth quintile. On the other hand, the mobile banking services would be more relevant if it focused on the middle class in the wealth quintile. Therefore, promotion of branchless banking is an important innovation that holds great potential to transforming the welfare of households.

JEL Classification Codes: **D6; G2**

Key Words: Financial Inclusion, Financial Innovation, Welfare

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LIST OF ABBREVIATIONS

ASCAs	Accumulating Savings and Credit Association
ATMs	Automated Teller Machines
BRICS	Brazil Russia India China and South Africa
CAK	Communications Authority of Kenya
CBK	Central Bank of Kenya
EAC	East Africa Community
FA	Factor Analysis
FAS	Financial Access Surveys
FSA	Financial Services Association
FSD	Financial Sector Deepening
GDP	Gross Domestic Product
ICC	Intra-Class Correlation
KE	Kenya
LCH	Life Cycle Hypothesis
Max	Maximum
MFI	Micro Finance Institutions
Min	Minimum
MNOs	Mobile Network Operators
NASSEP	National Sample Survey and Evaluation Programme
NIE	New Institutional Economics
OECD	Organisation for Economic Co-operation and Development
OLS	Ordinary Least Squares
PCA	Principal Component Analysis
ROSCAs	Rotating Savings and Credit Associations
SACCO	Savings and Credit Cooperative Society

SADC	Southern African Development Community
SD	Standard Deviation
SDP	State Domestic Product
SSA	sub-Saharan Africa
TAM	Technology Adoption Model
TV	Television
TZ	Tanzania
VIF	Variance Inflation Factor

CHAPTER ONE
INTRODUCTION

1.1 Background

Financial inclusion is considered a key enabler to economic growth and therefore placed on the agenda of most developing countries as a policy priority. However, this concept has attracted varied definitions. For instance, Sarma (2008) emphasizes on the ease with which financial services could be accessed, their availability and affordability. In addition, the author also finds usage as an important aspect of financial inclusion. On the other hand, Fungacova and Weill (2014) view the concept within the context of usage rather than quality of services provided whereas Claessens (2006) views it from the perspective of variety and affordability of financial services. Demirguc-Kunt and Levine (2008) define financial inclusion as removal of obstacles in form of price and non-price constraints from financial services. However, the basic understanding across these definitions places greater emphasis on access, usage and less on quality of financial services[1]. The challenge of addressing the quality of financial services lies in the lack of systematic data on financial inclusion. In this thesis, we adopt access[2] and usage as the working definition for financial inclusion. Majority of the adult population are locked out of the formal financial system that would guarantee better standards of living. The main focus of this thesis includes services such as payments or transactions which constitute the most commonly used financial service. Savings, credit and insurance are other important financial services in use although insurance service accounts for the least number of users in most developing nations.

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[1] We recommend that the focus of future research should be on affordability (price) and quality of financial services provided when appropriate data becomes available.

[2] The thesis uses the terms access and usage interchangeably but in reality, access means the possibility of using a service while usage refers to the actual use of the service.

The world over, about 48 percent of households surveyed in the Global Findex initiative lack a formal account[3] either with a bank or any other financial institution (Demirguc-Kunt et al., 2015). This situation is mostly prevalent in developing countries. Fewer individuals have access to and use formal financial services (Lee et al., 2015; Rupeiga-Apoga 2014; Peachey and Roe 2004) although there is emerging evidence of increased access to finance in the recent past. Financial innovations appear to be the key to unlocking access to a wide ranging financial services. Expanding frontiers of financial services continues to be a major challenge to countries in the developing world. Inaccessibility to financial services derails economic growth and slows down development (Levine et al., 2000). Available evidence shows that financial depth and indeed financial inclusion plays a key role in promoting growth and poverty alleviation (Anaslswanto et al., 2016; Gottschalk 2015; Ajide 2015; Park and Mercado 2016; Galor 2011; Galor and Zeira 1993). In sub-Saharan Africa, financial services are not equitably distributed. Major milestones in quantitative access have been achieved although most deserving individuals remain excluded.

Available empirical evidence shows that use of a wide variety of formal financial services can potentially generate substantial improvements in the welfare of the poor (Oya et al., 2011). The challenge however has been the scarcity of systematic data with consistent indicators that would permit a detailed investigation into the patterns and trends in financial inclusion and provide a diagnostic analysis across and within individual countries. Available data shows that increase in financial inclusion has been contributed largely by mobile money revolution (Ouma et al., 2017; Beck et al., 2014). Despite the mobile money revolution, Africa has not realised the full potential inherent in financial services utilisation. This situation is driven by a huge number of people and enterprises that are still excluded from accessing transactions, savings, credit and insurance services (Beck et al., 2016). For

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[3] Formal account means owning an account with a recognized formal financial institution. It could also refer to a mobile money account.

instance, according to Beck et al., (2016), less than 25 percent of adult population have access to and use financial services to transact while over 90 percent of consumers still transact on cash basis. Although the number of adult population that is banked remains low, there exists variations in the ownership of accounts across countries. For instance, several developing countries including sub-Saharan Africa, a large proportion of the households lack an account in a formal financial institution (Allen et al., 2016). Southern Africa has the highest proportion of account ownership at 51 percent followed by North Africa at 20 percent (Demirguc-Kunt and Klapper 2012). Africa lags behind in bank account penetration mainly because of infrastructural challenges and geographical inaccessibility (Triki and Faye 2013).

Technological innovations in the financial sector are increasingly playing an important role towards providing financial services with reduced cost and limited risk. One aspect of financial innovation is branchless banking. Branchless[4] banking is increasingly being used to refer to the shift from using the traditional banking halls while accessing financial services to using any of the outlets or virtual platforms for the same services offered by banks. This concept has shaped the financial sector landscape in a significant way over the last decade. Branchless banking is used to refer to services such as mobile banking, credit cards, debit cards, real time gross transfer service (RTGS), internet banking, automated teller machines (ATMs) among others. These services form a large component of technological innovations prevalent in the financial sector in most economies. However, due to limitations in available data, branchless banking is used in this thesis to refer to mobile banking transactions and agency banking. Improvement in communication channels within and between institutions has enabled a huge proportion of the population to conveniently access the most important

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[4] "Branchless Banking" is defined here as availing financial services outside the traditional banking halls. The use of mobile technology and agency banking become the main instruments of fulfilling these services. The world over, the concept of branchless banking include but not limited to agency banking, mobile banking among others. In this thesis, we adopt use of mobile banking to collectively refer to a mechanism of using both the mobile handset jointly with agency services.

financial services with a broad range of options. The use of mobile phones to transact, save, invest and manage risk has become an important part of the daily lives for many people. Although branchless banking encompasses a wide range of technological innovations, the most commonly used services are the mobile banking and agency banking. This is mainly because of the widespread network coverage in many parts of developing countries.

The reality in Africa is that more and more people have embraced use of mobile phone technology to transact (Muto and Yamano 2009; Porter et al., 2016). This technology has largely been aided by the presence of agents across all regions in the country and more especially in Kenya. Kenya is seen as the most progressive country among developing nations where the mobile money technology has penetrated to the rural set ups. The Kenyan market is concentrated with Mobile money platforms which comprise of Airtel Money, M-Pesa and Equitel, Pesa point and Kenswitch. These mobile platforms are provided by Mobile Network Operators (MNOs) and other authorized institutions that are connected to the formal financial service institutions meant to transmit financial service transactions to the end user (CBK Act Chapter 491 2014)

Agency banking and mobile money accounts are increasingly facilitating access to the financial services sector. These services are available at relatively low cost with a prudent level of risk. Based on the reduced risk exposure from the available financial services, more people are able to access different utilities such as education, health care, water, electricity at a lower cost which directly translates into improved economic welfare. The platform allows people to access formal savings and credit which could enable them to invest. Reduced cost and risk have the potential to enhance peoples' welfare. Credit rationing and low saving rates among the poor households are major bottlenecks towards growth and development of the financial services sector in developing nations (Kimutai and Jagongo 2013). A large

proportion of adults living in rural areas are underserved with the financial products and services offered mainly by mainstream financial institutions. According to Demirguc-Kunt et al., (2015), about 73 percent of adults live in rural areas in Kenya majority of whom live below 2 dollars per day. The proportion of households who do not have a bank account in a formal financial institution account for 43.8 percent of adult population 15 years and above (Demirguc-Kunt et al., 2015). However, 40 percent of those who have access to mobile money services do have no access to account in a formal financial institution. Constrained access to Credit has been brought about by information asymmetry between the supply side and the demand side of the financial services market and the need by lending entities to hedge themselves against inconceivable risks of default by potential borrowers. Subsequently, even meriting borrowers are excluded from the credit market in effect restricting potential investment (Dobbie and Skiba 2013; World Bank 2000). Savings mobilisation plays a critical role of channelling funds to productive investments. This requires stability in the financial institutions with the capability of mobilizing resources and ensuring appropriate allocation to highly efficient sectors of the economy. Conventionally, mainstream banks and non-bank financial institutions often ignore the relevance of micro-savers who constitute majority of the people in many developing nations (Diop et al., 2003). The effects of financial sector deepening on demand for various financial services have been widely analysed from the macroeconomic perspective (Beck et al., 2000, Beck and Demirguc-Kunt 2008). This thesis however, adopts a microeconomic approach which has received scant attention in literature largely because of lack of precise and consistent data comparable at the household level as well as across and within countries.

1.2 Statement of the problem

Despite the financial and technical resources devoted to bringing more people to the formal financial system, a significant proportion remains excluded. Worldwide, about 2 billion people have no access to formal financial services (Demirguc-Kunt et al., 2015). A huge proportion of these people are found in the developing countries particularly the rural areas (Mujeri 2015). Consensus built around financial inclusion imperatives show that access to basic financial services by majority of the people can potentially improve household livelihoods[5]. However, the existing financial infrastructure underpinning access to financial services in a developing country context remains under-developed, inefficient and provides people with fewer options to choose from. For instance, while developed countries are awash with debit and credit cards, savings accounts, internet banking services, a well-functioning payment system and other sophisticated financial services infrastructure, the same cannot be said of most developing countries particularly in the sub-Saharan Africa region. The SSA region is faced with numerous hurdles in its quest to achieve meaningful financial inclusion. Recently, there have been numerous attempts to establish a regular pattern of data collection initiatives in the region to help understand certain aspects of financial inclusion. Critical aspects that have not received adequate attention include: the extent to which financial inclusion vary across countries and within countries, welfare effects of financial inclusion and financial innovations, savings mobilization and credit access. The main drawback to investigating these issues has been unavailability of regular and consistent data in this region. Until 2011 when the Global Findex dataset became available, little had been known about the global depth of financial inclusion and the degree to which different groups of individuals were excluded from the financial system. Most economies lacked the precise indicators of use

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[5] Livelihood issues may be read in the context of welfare. Broadly, welfare issues relate to improving livelihoods of individual households.

of a wide range of financial services. However, many of these economies have begun collecting data on a regular basis. Key datasets available in sub-Saharan Africa include the FinAccess, FinScope and the Global Findex datasets. These databases provide consistent measures of the demand side constraints to access and use of financial services across the economies and over time, filling an important gap in the financial inclusion literature.

Although the financial sector in the sub-Saharan Africa region has expanded significantly in the recent past, the proportion of people who are financially excluded has remained high. In Kenya, about 55.2 percent of the adult population has access to formal account in a financial institution while 43.8 do not have an account majority of whom reside in rural areas (Demirguc-Kunt et al., (2015). The proportion of those who actively use these services could even be lower although actual data on voluntary exclusion is not available. Financially excluded individuals experience financial services access constraints such as credit and savings access and are not able to participate adequately towards the growth and development of their economies. This situation deprives them the opportunity to effectively contribute to poverty reduction and welfare improvement.

This thesis therefore examines the extent of financial inclusion in the sub-Saharan Africa region and its welfare effects on individual households. A few studies have investigated the variations in financial inclusion in different regions of the world using the Global Findex datasets (Zins and Weill 2016; Demirguc-Kunt et al., 2015; Fungacova and Weill 2014). However, this thesis deviates from these studies in three major ways: First, in light of the new datasets available across most economies in sub-Saharan Africa, the thesis benchmarks financial inclusion in the region and provides an in-depth analysis of the various determinants of financial inclusion. Secondly, the thesis isolates the key financial services notably access to credit and savings mobilisation and applies a consistent framework amenable to cross-

country analysis. Finally, this thesis takes cognisance of the innovations taking place in the financial sector in Africa and their impact on household welfare.

1.4 Research Questions

Consistent with the research problem, this study seeks to investigate the following research questions:

1. What are the determinants of financial inclusion in sub-Saharan Africa?

2. What factors affect credit access and savings mobilisation in Tanzania and Kenya?

3. To what extent does mobile banking enhance household welfare in Kenya?

1.5 Objectives of the thesis

This thesis broadly sought to examine the extent to which financial inclusion has penetrated sub-Saharan Africa and its welfare effects on households. The thesis used three different datasets to achieve each of the specific objectives. The three datasets were cross-sectional in nature. Specifically, the thesis sought to:

1. Estimate and explain the financial inclusion gaps in sub-Saharan Africa.

2. Examine credit access and savings mobilisation in Tanzania and Kenya

3. Investigate the role of mobile banking in enhancing welfare in Kenya

1.6 Contribution of the Thesis

This thesis makes several contributions to the empirical literature on financial inclusion and welfare in several ways. First, the thesis provides empirical evidence of heterogeneity in financial inclusion in sub-Saharan Africa taking into account the hierarchical nature of relationships across different population sub-groups. Previous studies on the variations of financial inclusion across and within countries assumed homogeneity across all population sub-groups (Demirgüç-Kunt and Klapper 2013; Akudugu 2013). Evidently, different countries exhibit different characteristics that make them unique. In addition, country

differences have been shown to have an effect on financial inclusion (Fungacova and Weill 2014). This thesis applies the multilevel analysis to take into account the group (country) effects. This approach recognizes the existence of hierarchies in Global Findex dataset by allowing residual components at the sub-group level.

Secondly, the thesis makes use of the most recent data on financial inclusion from the demand side perspective (Global Findex 2014; FinScope, 2013; FinAccess 2013). The financial inclusion landscape has undergone tremendous transformation over the last decade owing to the faster growth in financial innovations such that the demand side has become critical in explaining the scope of financial inclusion. Previous studies on financial inclusion can be classified on the basis of the definition adopted and on how the concept is measured. Two major approaches have been identified in literature namely the macroeconomic approach based on aggregated variables (Peach and Van der Werff 2013; Levine 2005) and microeconomic approach whose focus is on household level variables (Collins et al., 2009; Atkinson et al., 2013). In addition, the depth of detail matter in a multidimensional conceptual framework of which financial inclusion is part. The thesis adopts the micro-econometric modelling approach to measure the extent to which financial inclusion across and within countries can be differentiated. It provides the benchmark upon which future studies in financial inclusion in Africa may be anchored.

Thirdly, arising from the scant data from the demand side on financial inclusion across countries, comparability of critical aspects of financial inclusion is limited. This situation is made worse by surveys conducted using multiple methodologies such as the Global Findex, FinScope and FinAccess). Until today, there has been no consistency in the indicators of financial inclusion across all the data collection initiatives. This arises because there are no international classification standards for financial inclusion. Therefore, this thesis attempts to

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standardize aspects of financial inclusion specifically the understanding of financial access strands notably formal, formal other, informal and excluded. By comparing savings mobilisation and access to credit in Kenya and Tanzania, we note that there is need to establish a core set of financial inclusion indicators that adhere to an established standard. For instance, FinScope survey dataset collected in Tanzania contains variables similar to those captured in the FinAccess survey from Kenya. However, the categorisation of these variables is different. Categorisation of education variable in FinScope is somewhat different from FinAccess. Similarly, income categories between the two countries including the value of the currencies are also different. In order to jointly estimate the model containing these variables, it was necessary to standardize them for uniformity such that if income has 4 levels from the FinScope data, the same can be said of income in FinAccess Kenya.

Finally, Kenya's Vision 2030 economic blueprint aims at creating a globally competitive and prosperous country capable of providing a high quality of life to its people. The economic pillar has set ambitious target of achieving an average annual growth rate in GDP of 10 percent. Financial services sector is one of the key priority sectors under the economic pillar critical to achieving this target. The role of financial services is to drive a significant increase in savings and investment and mobilise both domestic and external resources. The government of Kenya has invested a lot of resources towards promoting expansion of financial system across the country. However, we note that financial innovation is an evolutionary process with great dynamism over time. In Kenya, financial innovation in form of mobile money services has greatly influenced every aspect of peoples' lives and consolidated all market segments. Previous studies that looked at financial innovation in Kenya focused exclusively on M-pesa mobile money services (Jack et al., 2014; Mbiti, et al., 2011; Morawczynski and Pickens 2009). However, we observe that not all users of M-pesa mobile money service have been linked to their commercial bank accounts. This thesis

focuses on individual households who use mobile money account directly linked to their commercial bank accounts. This aspect of analysis is completely lacking in previous studies conducted in Kenya. The thesis also provides the critical linkage between mobile banking and agency banking which is an important component that aids the money transfer service.

1.7 Data and Methodology

The data used in this thesis was assembled from three different sources namely: The Global Findex, FinAccess and FinScope. Relevant sections of this thesis have provided detailed description of the data sources. FinAccess and FinScope are demand side country level datasets. FinAccess Kenya is a demand side data that has been collected on a three-year basis since 2006. It measures access to financial services for adults' aged 16 years and above based on Kenya National Bureau of Statistics' National Sample Survey and Evaluation (NASSEP V). In subsequent rounds, the data collection tools have undergone improvements to capture the emerging issues in demand for financial services. The data is gathered by Financial Sector Deepening Trust in Kenya in collaboration with Central Bank of Kenya and Kenya National Bureau of Statistics (KNBS). FinScope Tanzania data is collected by Fin Mark Trust based in South Africa. The FinScope survey was launched in 2002 by Fin Mark Trust and collects data in 12 Southern Africa Development Community (SADC), 5 Non-SADC states in Africa and 4 Asian countries. The aim of the FinScope survey is to determine the access levels to financial services across income brackets and across different demographics. Most of this data is not configured to allow for cross-country comparisons because of the discrepancies in the way the questions were framed. The Global Findex dataset[6] though collected over the period 2011 and 2014 calendar years allow for cross-country comparison on different aspects of financial services access at household level. This is a Global survey that covers 148

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[6] The Global Findex dataset was collected by World Bank in 2011 and 2014. This is a demand side data amenable to cross-country comparisons. The FinScope Surveys and FinAccess are other demand side datasets but do not easily allow comparisons of indicators.

economies. All these surveys produce cross sectional data giving a global picture at a given point in time.

The challenge experienced in using these datasets especially the FinAccess and FinScope is to standardize the indicators across the countries before estimations. This standardization included definitional aspects of the term financial inclusion and the different aspects of financial services that were investigated. Since each survey round in both Kenya and Tanzania had enhanced indicators of financial inclusion in the subsequent periods, it was difficult to use earlier rounds to generate a real panel data for analysis. In view of the drawbacks of these datasets, we believe that our data compilation and analysis have the potential to contribute to establishing consistent indicators of financial inclusion.

This thesis presents varied methodological approaches to address the specific objectives. The aim of each methodology is to present the relationships between the theoretical and empirical frameworks. Since the three data sources are cross-sectional, the thesis adopted the micro-econometric approach to explain the relationships and associations among the relevant variables. In the first objective, we used the multilevel regression approach after testing for its suitability using the intra-class correlation measure. Using this approach, we assessed the differentials in financial inclusion under (1) Account ownership in general, (2) Account ownership in a financial institution, and (3) account ownership with a mobile phone service provider.

In order to address the second objective, we adopted the seemingly unrelated regression model to jointly estimate and isolate the factors associated with access to savings and credit in Kenya and Tanzania. This approach was preferred and based on the assumption that although the separate equations are seemingly unrelated, they have more or less similar characteristics amenable to joint estimation. In the third objective, we preferred use of

multidimensional approach to capture the dependent variable as well as measure the household welfare.

Welfare issues therefore bring on board the question of who should the government policy target. In this thesis, we rely on FinAccess data collected over the 2013 calendar year in which households across the country were selected in a representative sample. Available evidence shows that the welfare effects of financial innovation takes a top down approach in which more wealthy individuals benefit first before a trickle down is felt by the poor segments of the population.

1.8 Structure of the Thesis

This thesis is organized into five chapters. Chapter 2 undertakes a cross-country analysis of financial inclusion in sub-Saharan Africa. This is the initial empirical chapter within the broader context of financial inclusion. Chapter 3 compares determinants of access to savings mobilisation and credit access in Tanzania and Kenya, hence addressing the demand side of financial access. Chapter 4 presents an assessment of the role of cellular banking technology as a welfare improving innovation in Kenya. A strong relationship exists among the empirical chapters. After understanding financial inclusion across the sub-Saharan Africa, chapter three focuses on Kenya and Tanzania in order to understand in details some aspects of financial inclusion. Contextually, financial inclusion involves assessing country-based dimensional aspects which provide a clear understanding of the depth of penetration or the extent of inclusion. In view of this, we considered that different aspects of financial inclusion receive varied emphasis in different countries. Hence, the chapter delves into Kenya's most renowned innovation of using mobile money to access commercial bank account: the mobile banking service. In this empirical chapter, we present the role of mobile banking as welfare improving. The chapter looks critically at a narrow sub-group of individuals whose mobile money service is linked to their commercial bank accounts. Chapter 5 concludes this thesis

by providing a summary of the key findings, policy implications and some ideas for extending this work for future research.

CHAPTER TWO
A CROSS-COUNTRY ANALYSIS OF FINANCIAL INCLUSION
IN SUB-SAHARAN AFRICA

2.1 Background

The global agenda has recently focused on financial inclusion imperatives following increased availability of data. The realization that the financial sector plays a critical role that can spur growth and reduce prevalence of poverty has led to renewed enthusiasm in financial innovations aimed at bringing more people to the system of formal finance. The global attention has been aimed at ensuring equitable participation in economic growth through financial inclusivity. Available empirical evidence provides proof that access and usage of financial services[7] in their variety is welfare improving (Oya et al., 2011). Conversely, inadequacy of regular and methodical data has been a major hindrance to detailed examination of financial inclusion. The core focus of this chapter is to examine the involuntary exclusion from financial services propagated by diverse circumstances beyond an individual's control. This chapter takes cognisance of the challenges of availability of user-side data and therefore restricts the scope of financial inclusion to demand-side dynamics. Recently, there have been concerted efforts to gather regular data on financial inclusion in developing countries. The major drawback of these data is that it is mostly demand side yet of critical importance to understanding the dynamics of both the demand-side as well as the supply-side dynamics. In addition, the data lacks the ability of comparability across different entities. The Global Financial inclusion Dataset[8] (The Global Findex) is the initiative of the

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[7] In this thesis, financial services refer to the following unless otherwise explicitly specified: credit services and products, savings services and products, payments or transactions services, insurance and risk management services available to all.

[8] The Global Financial Inclusion datasets capture demand side dynamics but have an advantage of allowing for comparability across different entities. Other user-side datasets include The FinScope data collected by Fin Mark and FinAccess data collected collaboratively between Central Bank of Kenya (CBK) and Financial Sector Deepening (FSD). However, these datasets are not amenable to cross-country comparisons.

World Bank of gathering financial inclusion data globally. This initiative collects demand side data that can be compared across countries. The first round of the survey was undertaken in 2011 while the most recent survey was carried out in 2014. Other demand-side data collected in developing countries include the financial access (FinAccess and FinScope) surveys.

Although there has been a remarkable progress in quantitative access to financial services in most developing nations, this progress is yet to translate into economic inclusivity. The main emphasis has been to promote numeric increase in the proportion of individuals accessing financial services with little or no regard to both qualitative access and the distribution of such services. Financial systems that are inclusive allow for a wide variety of financial services to be accessed by most people majority of whom are poor. Historically, financial exclusion has removed certain segments of the population from engaging within the context of mainstream financial sector. Some of the key factors identified as contributing to the exclusion include income volatility, gender, age, location, financial literacy and economic activity undertaken by households. Financial exclusion limits participation of households in economic growth and development. The potential inherent in these segments of the population is likely to provide a positive and significant input into the economy. This is because to achieve inclusive growth, financial inclusion is considered a critical building block.

Although the uptake of financial services has been on the rise in most developing countries, informal financial arrangements remain a major challenge. These arrangements do not provide the broad risk-pooling effect and low-cost services (Honohan 2005). Consequently, exposing individuals to unlimited risks and higher costs associated with non-standardized services. The most common forms of informal financial services include: Rotating savings

and credit associations (ROSCAs) and Accumulating savings and credit associations (ASCAs). The informal financial services have continued to co-exist with formal financial services owing largely to the inability to accommodate poor people who are low income earners.

2.1.1 Trends and Patterns of financial inclusion in sub-Saharan Africa(SSA)

SSA region has witnessed a significant improvement in financial inclusion in the inter-temporal period ranging between 2011 and 2014. The Global Findex surveys carried out in 2011 and 2014 reveal that although there is a decline in financial exclusion, there exist significant differences across the region. In order to understand the extent of financial inclusion in SSA region, we present a brief economic development record and demographic patterns in the region. SSA has gone through a period of sustained growth over the last decade mainly driven by investment in infrastructural programmes, exports and foreign investments (Kappel 2014). SSA enjoys a huge population of about 900 million and estimated to hit 1.3 billion by 2030 (Population Reference Bureau 2016). The great potential inherent in the huge market should be harnessed to spur growth through increased access and usage of a broad range of financial services. This potential is hampered by poor infrastructural development, less diversification of the economies and poor governance structures. These challenges expose the economies to internal as well as external shocks. Since the year 2000, there has been improvement in the macroeconomic situation in most SSA countries owing in part to industrial boom and improved balance of payments. Despite the positive developments, most of the SSA countries' economic performance remains low. This hampers the quest for deepening of financial services access and promotes informal services that are not only risky but also costly. The role of the financial sector is to provide a transmission mechanism through which it impacts macroeconomic activities. Table 2.1 shows trends in financial inclusion across the SSA. Although SSA witnessed a significant decline in financial exclusion, variations across economies are large.

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Table 2.1: Account ownership across sub-Saharan Africa, between 2011 and 2014

Country	Account ownership 2011(% of adult population)	Account ownership 2014(% of adult population)	Change (%)
Angola	39.2	29.3	-9.9
Benin	10.5	16.6	6.1
Botswana	30.3	51.9	21.6
Burkina Faso	13.4	14.4	1.0
Burundi	7.2	7.1	-0.1
Cameroon	14.8	12.2	-2.6
Chad	8.9	12.4	3.5
Congo	10.1	17.1	7.0
Republic of the Congo	3.7	17.5	13.8
Gabon	18.9	33.0	14.1
Ghana	29.4	40.5	11.1
Guinea	3.7	6.9	3.2
Kenya	42.3	74.7	32.4
Madagascar	5.5	8.6	3.1
Malawi	16.5	18.1	1.6
Mali	8.2	20.1	11.9
Mauritania	17.5	22.9	5.4
Mauritius	80.1	82.2	2.1
Niger	1.5	6.7	5.2
Nigeria	29.7	44.4	14.7
Rwanda	32.8	42.1	9.3
Senegal	5.8	15.4	9.6
Sierra Leone	15.3	15.6	0.3
South Africa	53.7	70.3	16.6
Sudan	6.9	15.3	8.4
Tanzania	17.3	39.8	22.5
Togo	10.2	18.3	8.1
Uganda	20.5	44.5	24
Zambia	21.4	35.6	14.2
Zimbabwe	39.7	32.4	-7.3

Source: Author's computation from The Global Findex datasets.

SSA region shows greater disparity in financial inclusion despite the progress seen in many countries within the region. Between 2011 and 2014, all countries in the region recorded a positive change in financial inclusion with the exception of Angola, Burundi, Cameroon and Zimbabwe.

Figure 2.1 shows the spread in account ownership between 2011 and 2014. Similar trends are shown depicting progress in most of the countries in the region. Countries with poor governance record registered low progress in financial inclusion.

Figure 2.1: Percentage change in mobile account ownership in SSA between 2011 and 2014.

The penetration of financial services in SSA remains low to impact macroeconomic environment. Therefore, it is imperative to understand the challenges and the factors that are responsible for the current situation with financial inclusion in sub-Saharan Africa region.

2.1.2 Implications of Financial Inclusion

Financial inclusion therefore provides the mechanisms that facilitate engagement of poor people in productive ventures such as investment activities, education, health care and insurance. However, where such mechanisms are deficient individuals are not capable of accessing a full range of financial services. The vacuum created is filled by limited and informal financial services that are potentially risky. This situation is not good for countries that aim to reduce persistent income inequalities and slower economic growth. This may lead to reduced economic development leading to increased incidences of poverty. According to Levine (2005), financial development is presented as the most critical factor to economic growth that is linked to poverty alleviation. Financial development hereafter relates broadly to policy and institutional framework, and factors that lead to efficient financial markets (Malkiel and Fama 1970) and effective intermediation (Lenka 2015). Consequently, financial growth is concerned with financial services augmentation and the working of capital markets

in the allocation of resources and risks (Hussain and Chakraborty 2012). Therefore, financial development encompasses financial inclusion supported by financial development policies, factors and institutions. From the foregoing, the importance of financial inclusion has been underscored in achieving enhanced growth and efficiency of resource allocation while reducing poverty prevalence (Galor and Zeira 1993). The transformative power of financial inclusion has led to improved financial services access by the poor households and small-scale business enterprises thereby increasing earning opportunities for the majority. Additionally, economies have witnessed an upsurge in improved technologies (King et al., 1993); expansion of precautionary savings that have led to smoothening of household consumption functions and created a risk-pooling mechanism that cushions households from unnecessary risks (Honohan 2005); and acts as an entity within which other basic necessities and utilities can be reached (Peachey and Roe 2004). In view of the foregoing, the concept of financial inclusion can be viewed as being complex and multidimensional whose channels of influence impact multiple entities.

2.1.3 Statement of the Problem

The depth of financial inclusion in SSA region has greatly increased between 2011 and 2014 based on the Global Findex data. This increase has not been uniform across all countries. Huge amounts of resources and technical support have been dedicated to ensuring a greater penetration of financial inclusion with little success in most of the countries. Among the countries that have achieved milestones in account penetration between 2011 and 2014, Kenya registered the highest increase at 32.4 percent, followed by Uganda at 24 percent, Tanzania at 22.5 percent and Botswana at 21.6 percent respectively. Despite this progress, financial inclusion gaps remain in most economies within the region. For instance, Angola, Burundi, Cameroon and Zimbabwe are on the path of decline in financial inclusion. Available anecdotal evidence shows that the change in account penetration between 2011 and

2014 in these economies has been negative rewinding progress that had been made in earlier years. Therefore, in order to fully understand the extent of variations in financial inclusion in the SSA region, we require systematic data containing consistent indicators amenable to cross-country comparisons. Until 2011, little was known about the extent of financial inclusion in most developing countries around the globe. This was because there was no systematic data that could support cross-country analysis. With the Global Findex data waves of surveys of 2011 and 2014, different aspects of financial inclusion have been subjected to empirical investigations. However, the number of studies in this area are growing but the focus varies from one region to the other. For instance, Demirguc-Kunt et al., (2015) looks at financial inclusion from the global perspective by providing a cross-section of issues in general. Zins and Weill (2016) focus on some aspects of financial inclusion in Africa by concentrating on what influences financial inclusion. Zins and Weill (2016) definition of financial inclusion relate to banking services. Beck and Cull (2015) show that most banks in Africa do not promote inclusive finance like their counterparts in other parts of the world. On their part, Mlachila et al., (2013) view distributional skewness as being the main reason for slow penetration of financial inclusion in most economies. This empirical chapter therefore differs from these studies by focusing on account ownership at three different levels: Account at a financial institution, account in general and account with a mobile service provider. The study concentrates on economies within the SSA region and makes use of the Global Findex dataset, a demand side data.

Although the global policy agenda has focused on financial inclusion, the concept has not fully been integrated with other policy parameters. This has been made worse by the lack of internationally acceptable standard definition of financial inclusion. Some of the available literature has only sought to provide key policy insights emanating from the concept. The research questions to be addressed comprises of:

1) How does the level of financial inclusion compare across the SSA region?

2) What are the obstacles to financial inclusion in the SSA region?

3) What are the determinants of financial inclusion in the SSA region?

2.1.4 Research Objectives

This chapter aimed at investigating the extent of financial inclusion differentials across the SSA region. More exclusively, the chapter aimed at:

1) Comparing the level of financial inclusion across the sub-Saharan countries,

2) Analyze barriers to financial inclusion in the sub-Saharan region,

3) Investigate the determinants of the financial inclusion in the sub-Saharan region.

2.1.5 Significance of the Study

Social life has been transformed by the changes taking place in the financial sector. Every aspect of life is increasingly being controlled and supported by the developments in the sector. Digital finance has led to a paradigm shift from the old business model to a new and more convenient one. Major innovations in the financial sector have occurred in the last decade in SSA region. It is now possible to find formal transactions taking place through mobile phone technology or through financial institutions' agents. However, these platforms have come with some level of stringency in regulations aimed at lessening the potential risk exposure (Anderloni et al., 2007). Financial inclusion is expected to bring on board all segments of the population so that their contribution can result in inclusive growth. By understanding the extent to which financial inclusion is differentiated across the SSA countries, the relevant policies can be formulated to target specific areas of concern. This is supported by the view that SSA countries have a myriad of bottlenecks that vary from one country to the other. This chapter presents a pioneering work whose aim is to unravel the factors that have led to differences in financial inclusion across the SSA region. In addition,

we examine the possible barriers and the extent to which these barriers affect financial inclusion in SSA.

2.1.6 Scope and Limitations

Although there are 48 countries in the sub-Saharan Africa region, data was available for 34 countries. Most countries in Africa and especially the SSA region experience erratic growth characterized by high volatility and low investment potential. This chapter utilized the second wave of the Global Financial inclusion dataset collected by World Bank in 148 economies around the world. This dataset is a global survey on the use of certain financial services. The key areas of focus include: savings, credit, insurance and payments. This chapter also examined the possible bottlenecks to financial inclusion across the SSA region. The chapter focused on different account ownership namely: Account ownership in general, account ownership in financial institution and account ownership with mobile service provider. The definition of financial inclusion adopted in this thesis relates to financial services consumed by households.

2.2 Literature Review

2.2.1 Introduction

The financial sector today facilitates broad access to and usage of a variety of financial services across different segments of the population. This sector has greatly benefitted from innovations that have opened up vast areas that were hitherto excluded. Therefore, the aim of promoting financial inclusion is to ensure equitable contribution to economic activity and accrual of attendant benefits. Financial inclusion agenda is popular with many developing countries and has been viewed as the panacea to most of the problems affecting the rural poor. However, for efficient execution of financial inclusion agenda, it is essential to have proper institutional and regulatory framework that will govern the implementation process.

This literature review is divided into three sections: Theoretical literature forms the first section followed by empirical literature and finally, overview of literature.

2.2.2 Theoretical Literature

The relevance of financial sector development is not only being experienced in most advanced economies but in emerging economies as well (Anderloni and Carluccio 2007). This is mainly because of its role in facilitating access to credit through widening sources of borrowing, savings mobilisation and cushioning consumers against risk exposure. Legal and institutional strength play a critical role towards creating an enabling environment where financial sector institutions are stable and trusted. Although most developing economies are characterized by unstable and disjointed financial sector, it is imperative to create and empower institutions that will drive the reform agenda. The neoclassical economics views institutional theory in the context of price mechanism and production efficiency but ignores other pertinent parameters such as social norms, behaviour and rules (North 2000; Joskow 2008). Focusing on positive economic theory is not likely to yield the desired results because it fails to incorporate the morality aspect. It is against this rational thinking that New Institutional Economics (NIE) has set new benchmarks for determining public reform and policy agenda that will promote efficacy sectors.

Financial inclusion perception falls within the broader concept of social inclusion whose aim is to ensure social inclusivity and equal treatment for all. Social inclusion therefore promotes positive values of equal opportunities for all while reducing the ever widening gap between the rich and the poor. Therefore, financial inclusion brings about the total transformation of socioeconomic and financial realities surrounding individuals. Therefore, social inclusion encompasses financial inclusion which affects the daily lives of the people in a positive way. For instance, access to and use of a wide variety of financial products has been shown to

promote smoothing of consumption (Honohan and King 2012), savings mobilisation and reduce exposure to risks.

Literature on development economics has shown that financial progress is key to economic development (Levine 2005). Consequently, it leads to poverty reduction through provision of financial services (Banerjee and Newman 1993). Affordable and trusted financial system is vital to facilitating efficient financial market operations. It is more likely to reduce information costs as well as transaction costs, influence savings mobilisation and promote better investment decisions (Beck et al., 2009). Further, the financial system characterised by trust is more likely to promote financial long-run growth and innovations prospects while facilitating expenditure smoothening purposes as well as risk-pooling effect (Honohan 2005) that will cushion consumers against unprecedented and unforeseen shocks. It is also a means for accessing other basic utilities such as quality education and health as well as clean and safe water (Peachey and Roe 2004). Thus, a stable and trusted financial scheme will control positive strategy decisions while creating a multiplier effect in other areas via its communication mechanisms. Financial inclusion imperative is known in academic and policy circles. It has been recognised that for the growth benefits to trickle down to the common person, it is vital to make sure financial inclusion reaches more of the people who are under-served by the available financial services. Financial services access is likely to ease poverty growth if it reaches majority of consumers (Galor and Zeira 1993). While informal financial arrangements play a key role in closing the demand gap for financial services in developing nations, they nevertheless fail to provide affordable and broad risk pooling effect (Honohan 2005). Further, constrained access to and utilization of financial services exposes individuals to risks, decelerates savings rate and leads households to saving with informal network alternatives and access to credit (Kimenyi and Ndung'u 2009). According to Love and Bruhn

(2009), more financial services access has the potential to improve the macroeconomic environment and in turn financial inclusion.

There is overwhelming literature suggesting the means of achieving high financial inclusivity in developing countries. According to Demirguc-Kunt and Klapper (2012), investments have drawn individuals closer to services provided by commercial banks while expanding individuals' financial literacy. At all income levels, it is generally acceptable that not all households are sufficiently serviced given the available formal financial institutions (Shankar 2013). Consequently, utilization of financial services is still limited primarily due to the supply side constraint. Although access to credit is progressively informing key policy aspects to poverty alleviation in developing countries, its theoretical underpinning is not apparent. Theoretical literature holds that the association between access to credit and growth depends largely on the nature of credit in question. It has also been shown that household investment that results in improved productivity may be driven by access to credit according to the most popular hypothesized view. Access to savings and credit could potentially reduce the effects of negative shocks arising from volatilities in income (Eswaran and Kotwal 1990). They contend that access to credit undermines vulnerabilities to negative shocks thereby enhancing household capability to smooth consumption during periods of low income by providing an opportunity to take part in riskier investments since they are cushioned against negative outcomes.

Financial services use across most developing countries is subject to supply- and demand-side factors. This chapter, however, looks at how demand-side factors and how they are impacted by the supply-side dynamics. According to Ayenew and Zewdie (2010) availability and accessibility to financial services provides ingredients to nurturing economic growth and ensuring a decline in income inequalities among households.

Multi-level theories can be used to address multi-level problems which are commonly found in our societies. Although the multi-level techniques are a recent phenomenon (Huttner and van den Eeden, 1993), they have nevertheless occupied an important space that was initially void. In a multi-level approach, specification of the boundaries of variables is necessary so that a clear criterion of assigning measures to sub-groups suffice. Multi-level theory in effect postulates situations where there are direct effects between individuals and cross-level effects through relational variables. The advantage of this approach is that no group telepathy is assumed but more focus is on the organisational structure and its attendant communication channels and processes inherent in group formations. The multi-level approach is still evolving since the times of Durkheim's sociological concepts. Overall, this approach is more suitable where the subject of investigation involves different levels in-build with individual households influencing the group and in turn the group influencing the individual. In most multi-level modelling, the outcome variable is to be found at the lowest level (level 1) of the hierarchy. However, fewer studies applying this approach have investigated how individual variables may influence group outcomes (DiPrete and Forristal 1994).

2.2.3 Empirical Literature

A growing body of knowledge has laid more emphasis on how financial inclusion should be measured. Consequently, more definitions have emerged with each one taking a narrow perspective depending on the stage of development of the country. With this view, financial inclusion becomes a supply side problem. However, this perspective fails to recognise individual limitations of households and therefore ignores the role played by the demand side. More recently, several initiatives have been made by most developing countries to collect consistent and systematic data on financial inclusion indicators. For instance, The World Bank's Global Findex data is a demand side data covering many economies of the world. The Global Findex is so far the most recent data that is comparable across different economies.

In the SSA region, a few data collection activities have been spearheaded by Central Banks, Fin Mark Trust Fund and Financial Sector Deepening (FSD) Trust. While these initiatives are key to understanding the extent of financial inclusion, many of the indicators remain un-standardized and inconsistent.

The concept of financial inclusion is increasing gaining worldwide recognition in many policy debates not just because it brings people to using the financial services but also to choosing among the available options such as payments, credit and insurance (Burgess and Pande 2005) who investigated the relationships among financial inclusion, poverty and income inequalities found out that expansion in rural bank branches was more likely to lead to reduction in poverty incidences. Similarly, empirical evidence from household surveys indicated that availability and affordability of financial services is likely to lead to greater utilization which in turn would lead to improving poor people's well-being (Dupas and Robinson 2012; Caskey et al., 2006). However, the demand on the poor people's side would be to have a good understanding of the financial concepts to be able to enjoy the full benefits.

Globally, the variation in financial services access between male and female adults is explained by among other factors gender-based discriminations that limit women's participation in economic activities. In their study of financial inclusion and discrimination against women in 98 countries, Demirguc-Kunt et al., (2013) identified major gender-based differences in access to credit, savings, and ownership of bank accounts. The researchers attributed cross-country differences in financial inclusion to gender norms and legal discriminations against women. In particular, female adults were less likely to save, access credit, and own a bank account than their male counterparts in countries where women faced legal restrictions in their attempt to work, decide on residence location, inherit wealth, and head their households. In addition, an increase in violence against women and the incidence of early marriage reduced access to financial services among women.

According to Arun and Kamath (2015), financial inclusion is a process that occurs in stages, with payments being the first stage. This means that adopting a payment platform of financial product is the entry point to financial inclusion. In this case, adopting the product is driven by a payment need such as receiving a salary. The implication of this argument is that measures geared towards promoting financial inclusion should promote economic activities that encourage the use of payment and other financial products. Adoption of a payment product has promoted access to other financial services like insurance, savings, and credit. Use of electronic payment systems enables financial institutions to collect vital transaction information about a customer to assess credit worthiness. This promotes access to credit services. The product adopted after payment products, however, varies from state to state depending on the needs of customers. For instance, in Brazil customers often adopt savings/ investment services, whereas in Italy they adopt credit services after payment products.

Creating awareness about availability and benefits of financial services is expected to improve inclusion, especially in low income countries where the levels of education/ financial literacy is still low. Indeed Bayero (2015) in his study of cashless policy in Nigeria found that awareness of electronic channels of accessing financial services had a positive effect on financial inclusion. Further, payment infrastructure was found to have a positive effect on financial inclusion. An efficient and secure payment infrastructure reduces transaction costs, which in turn motivates adoption of electronic payment products. Bayero (2015) also found that improving customer value proposition enhanced financial access. This is consistent with Terpstra and Verbeeten (2014) who concluded that customer satisfaction improved access to financial services. The results means that product development initiatives should focus on satisfying the felt financial needs of the target population so as to increase inclusion. The business model adopted by financial institutions did not have any statistically significant effect on financial inclusion.

In India, Gwalani and Parkhi (2014) found that expansion of bank branch network had little contribution to financial inclusion. This was attributed to the fact that the rural poor still faced several social and economic barriers to financial inclusion despite expansion of bank branch network. The barriers identified by the researchers included high cost of financial services, inefficiencies at the bank level that prevented delivery of relevant and affordable financial services, and inadequate incentive structure to promote use of financial products such as savings bank accounts. Inadequate staff and lack of appropriate technology to deliver appropriate services were also major barriers to financial inclusion. Although Arun and Kamath (2015) argue that adopting a payment system should be the first step in promoting financial inclusion, Gwalani and Parkhi (2014) opine that creating awareness about existing products should be the first step. Specifically, the focus should be on financial literacy and eradicating poverty to increase financial inclusion. Banks being the main beneficiaries of inclusion should invest upfront in financial literacy in order to create a large market for their products in the long term. According to Gwalani and Parkhi (2014) providing adequate income opportunities to the poor will improve inclusion by enhancing the use of products such as electronic payment systems. This means that the use of technology to deliver financial services must also improve to enhance inclusion.

In their study of the effect of access to financial services in India's manufacturing sector, Beck and Hoseini (2014) concluded that financial deepening and bank outreach reduce informality. This means that financial deepening proxied by credit to private firms and bank outreach proxied by branch penetration reduced the entry barriers to the formal sector, while increasing the productivity of formal manufacturing firms. Financial depth also increased production efficiency, especially among firms that relied heavily on external funds to finance their operations. Bank outreach, on the other hand, had no effect on production efficiency.

Ayyagari and Hoseini (2013) supported the premise that financial deepening alleviates poverty, especially in rural areas by promoting inclusive growth in India. Their household data analysis revealed that financial depth proxied by commercial bank credit to state domestic product (SDP) had a negative effect on poverty. This implies that an improvement in financial deepening reduced poverty in rural areas. By contrast, financial deepening had no statistically significant effect on poverty in urban areas. Overall, financial depth had a greater impact on rural poverty than financial outreach. Entrepreneurship was the main channel through which financial deepening reduced poverty. This finding is attributed in part to the fact that credit supply in rural areas mainly benefits the self-employed who use it to expand their businesses, thereby reducing poverty.

Firm characteristics such as size are likely to determine the extent to which they respond to financial obstacles. Firms with a large capital/ asset base are likely to have greater access to internal funds to finance their operations than small firms. This suggests that small firms are more vulnerable to financial obstacles than medium growth firms. This discourse is supported by Beck et al., (2016) who found that the degree to which legal and financial underdevelopment and corruption hinder firm growth mainly depended on size of the firm. They revealed that the growth of small firms is consistently affected negatively by legal, financial and corruption related bottlenecks. The effect of financial and legal obstacles was higher in countries where corruption was rampant. The financial obstacles that adversely affect firm growth included bank paper work, bureaucracies, and the need to have special relationship with a bank. This obstacles limit access to financial services, which in turn constrains firm growth.

In their study of private credit in 129 countries, Djankov et al., (2005) found that creditor protection rights and availability of information sharing institutions promoted inclusive

financial growth in terms of access to credit. Private and public credit bureaus were found to promote private credit development in poorer rather than rich/ developed countries. Credit bureaus provide vital information that lenders use to assess the credit worthiness of prospective customers. An increase in credit reference bureaus, thus, is expected to improve access to relevant customer information, thereby increase access to credit, especially in poor countries where transaction information is difficult to obtain through alternative means such as credit cards.

Financial intermediation plays an important role in promoting financial inclusion by channelling funds from savers to borrowers. However, intermediation is associated with costs that if not controlled can impede rather than enhance financial inclusion. Poghosyan (2013) provided evidence in support of a negative effect of intermediation costs proxied by interest rate margin on credit supply. At the firm level, intermediation costs increased with higher riskiness of credit portfolio, low bank capitalization, and small bank size. In addition, lack of competition measured by concentration in the banking industry increased intermediation costs. This suggests that measures geared towards promoting competition can reduce intermediation costs in terms of low interest margins. As a result, financial inclusion is likely to increase in terms of access to loans and ownership of bank accounts.

Adamo (2013) distinguishes two noteworthy classifications of individuals who are included in financial inclusion: Those who assume a dynamic part and those that are uninvolved. The dynamic part of financial inclusion is played by strategy creators, sentiment shapers, specialists in financial sector while the inactive part is played by individuals in low income and social orientation. Peach and Van de Werff (2013) contend that changes in the approach are critical to macroeconomic dependability and mitigates the unfavourable outcomes of financial exclusion. Policy fortifies the connections among growth, democracy and integrated

society. This perspective is supported by a number of studies that view advancement in financial sector as more likely to promote growth in economy (Rajan and Zingales 2003; Aghion et al., 2003). Utilizing information from 109 countries both from developing and developed nations, Calderon and Liu (2003), observed that the direction of causality is from financial development to economic growth. Yet other studies have established economic development to be the cause of financial development (Luintel and Khan 1999; Demetriades and Hussein 1996). The direction of causality notwithstanding, economic development has greater benefits to the poor and the lower segments of the society (Beck et al., 2007).

Available evidence shows that a large proportion of the rural population's interest is captured in the informal financial market (Rutherford 2000). This is mainly because the activities in these markets within economies of developing countries outweigh those in developed economies (Khandker and Faruqee 2003). The recent evidence reveals that with availability of a variety of financial services, less rural population are using informal channels (FinAccess 2013, FinScope 2013).

In terms of the determinants of financial inclusion, a few studies have found out that robust explanatory variables of access to formal financial services are varied by income level and its distribution stand out. According to Honohan (2007), distributional efficiency of income affects social inequality such that a lower income inequality improves financial inclusion. Using Honohan (2008) access indicators, Park and Mercado (2016) conclude that a higher per capita income increases financial inclusion. In this study an indicator of financial inclusion is constructed for 37 Asian countries using macro data from the World Development Indicators. These findings are corroborated by a similar study by Demirguc-Kunt and Klapper (2013), which investigated the financial inclusion in multiple countries. They established that a higher-income quintile was associated with deeper penetration of financial services. Therefore, empirical findings predict a positive relationship between income and financial

inclusion, although studies on the distributional aspects of income show a completely different scenario. Education for households has remained a big challenge despite the existence of a clear relationship between educational achievement and financial inclusivity (Atkinson and Messy 2013). Education accomplishment has been shown to rise linearly in relation to consumption of financial services. This view is supported by Camara and Tuesta (2015) who analysed a nationally representative sample in Peru using the probit models and found out that education plays a significant role in financial inclusion.

In this chapter, the dependent variable used included use of formal financial services which was dichotomous taking the value 1 or 0 for use and not use respectively. This analysis had one fundamental flaw in that the data in use was not amenable to cross-country comparisons. Numerous family units who are burdened by training restriction will probably endure absence of job and in this manner prevented from securing access to financial services. The education variable is predicted in many empirical findings to be positively related to financial inclusion although a variation on the levels of education has shown quite different results. Numerous countries classified as developing nations are affected by ethnicity bias and social exclusion although there is limited data to conduct full analysis (Khan 2008). Empirical findings show that black and minority groups (Goodwin et al., 1999) are more likely to be excluded from financial services not because of their ethnicity per se or gender but largely because of their low incomes. We note that some studies have paid attention to the location of the banks measured in terms of residence. Accordingly, Burgess and Pande (2005) observed that expansion policy on bank branches to diverse rural settings had a welfare improving effect on the households in India.

Honohan and King (2012) carried out a cross-country analysis of causes and effects of financial access. In this study, a survey on several African countries was done using a nationally representative sample which showed that location measured by urban and rural

was a key factor for financial access. The analysis employed the probit and Ordinary Least Squares (OLS) regression approaches with location variable being highly significant. Different studies have considered; work status, financial knowledge, numeracy and risk aversion metric being the essential factors affecting financial services access. In another study, cross country gender analysis showed less likelihood of women utilizing formal financial services compared to their male counterparts. The gender crevice is more conspicuous in developing countries where poverty is rife (Demirguc-Kunt et al., 2012). This gender gap has tended to persist relative to different income sub-groups. However, Honohan and King (2012) find gender not a significant determinant of financial services access.

Focusing on the Mexican economy, Ambrosius and Cuecuecha (2013) provided strong evidence in support of the premise that foreign remittance has a positive effect on financial deepening in the domestic economy. Their analysis of Mexican household level data revealed that remittances had a positive effect on access to credit, savings, and ownership of savings bank account. However, remittance was found to promote access to credit from the informal rather than the formal banking industry. This implies that remittances create demand for financial services such as lending and savings. However, the formal financial sector does not fully cater for the demand, thereby forcing the recipients of remittances to rely on the informal financial sector.

In their study of household welfare in Uganda, Munyegera and Matsumoto (2016) concluded that access to mobile phone financial services had a positive effect on remittances. Specifically, households that had access to mobile phone based money transfer services were more likely to receive remittances than those who did not have access to the services. In addition, the frequency and value of remittance increased with access to mobile phone based financial services. The increase in remittance was attributed to the reduction in transaction

costs associated with mobile phone money services, especially in the rural areas where financial institutions such as banks are not easily accessible. An increase in remittances improved welfare in terms of increased real per capita consumption.

Financial inclusion proxied by the percentage of individuals in a population with formal bank account and savings promotes economic growth and development by enhancing access to education and promoting entrepreneurship. However, the level of financial inclusion varies from one country to the other mainly due to socio-economic and demographic factors such as the level of income and age of an individual. Indeed Fungacova and Weill (2014) in their financial inclusion study in China found out that financial inclusion was deeper in China than in other BRICs. A key factor explaining the difference in the level of financial inclusion was that voluntary exclusion was higher in China than in other BRICs where barriers such as high bank charges and lack of trust in the banking system prevented access to financial services. Overall, Fungacova and Weill (2014) concluded that education, income, age, and being a man had a positive effect on financial inclusion.

Financial services have to meet the expectations of the target population in terms of cost, quality, and availability for their uptake to increase. Thus, financial institutions often focus on improving customer satisfaction in a bid to attract more customers, thereby increasing financial inclusion. According to Terpstra and Verbeeten (2014), improving customer satisfaction is associated with costs that can potentially prevent access to financial services, especially among the low-income earners. The authors found a positive relationship between the cost of service to customers and the satisfaction of customers. Additionally, they found out that the satisfaction of customers creates higher returns in the most profitable customer segment. This means that financial institutions are more likely to ignore the low income earners who often constitute the least profitable segment of the customer base in their effort

to improve profits. The resulting reduction in customer satisfaction is attributable to barriers to financial inclusion. Moreover, financial services will remain inaccessible to the low income earners due to their inability to pay a premium to access high quality services. In this chapter however, we have not used customer satisfaction as a variable mainly because it was not considered in the survey instrument.

According to Allen et al., (2013), account ownership, frequent account use, and using a bank account to save provide an enabling environment for accessing financial services through the cost channel. Allen et al., (2013) concur with Fungacova and Weill (2014) that individuals who are poor, young and unemployed are likely to be financially excluded due to their inability to access financial services. Additionally, financial inclusion increases with education and urbanization. This is based on the fact that people who are highly educated are likely to have high income, which enable them to afford financial services. Urbanization has led to increased financial inclusion due to availability of financial institutions that provide those financial services.

2.2.4 Summary and Gaps in Knowledge

Despite the growing literature on financial inclusion in emerging economies, a great deal should be done to improve the comprehension of why selectivity exists in the use of different types of services. This behaviour is likely to affect the pattern of distribution of financial services. There are many variables recognized in literature that would offer a possible explanation to the variation in financial inclusion. Some of these variables have not been analysed due to scarcity of data. However, many countries have been able to collect data offering an opportunity for more analysis to be carried out. Data on financial inclusion in the SSA region is becoming increasingly available.

While various studies have examined financial inclusion at various levels across the world, the essential distinction is the primary source of data. The vast majority of the studies have used primary data sources in view of the insufficient data sources. The methodological approaches followed by these studies are as varied as the number of studies themselves. In essence, the indicators derived from these datasets may not be consistent with other regions and therefore not subject to cross-country examination. There are few datasets that are regularly generated within the context of SSA region namely; the Global Findex, FinScope and FinAccess surveys. The review of literature shows mixed results for both macro and micro data. This chapter examines demand side data with attributes comparable across countries. It is against this background that this chapter investigated financial inclusion in the SSA area and carried out contrasts of chosen indicators.

Table 2.2 shows a summary of selected empirical literature reviewed. From the results summarised in Table 2.2, we noted five general findings. First, the level of financial inclusion varies across countries and regions (Adamo 2013; Dermiguc-Kunt and Klapper 2013). Second, according to available evidence, the main determinants of financial inclusion include: individual income, education or financial literacy, proximity of location in relation to financial service points, as well as psychometric factors (Honohan and King 2012; Atkinson and Messy 2013); the income level of the country of residence (Adamo 2013); cost and documentation requirements (Dermiguc-Kunt and Klapper 2013; Dupas and Robinson 2012); urbanisation (Sarma and Pais 2011); rule of law (Park and Mercado 2016); and ethnicity (Khan 2008). It is useful to note that although important determinants have been identified, some of the key factors that are consistent with theory are not captured. For example, theory suggests that financial regulation (such as the setting of capital requirements and the supervision of financial institutions) provides a level playing field and reduces information asymmetry, moral hazard and adverse selection. Clearly, this is one important factor that

future research should investigate. The third observation is the need to take a closer look at financial inclusion by firms; the only key study here is Ardic et al., (2012). The role of small firms such as *Jua Kali* in generating value-added and employment cannot be ignored and the financing of these firms is consistent with both financial inclusion and inclusive growth. The fourth observation is the need to reconcile the demand side as well as the supply side of financial inclusion, in order to address the supply constraints. The fifth observation is that there is no clear causality channel between financial development and economics growth (Murinde 2012).

Table 2.2: Summary of Selected Empirical Literature

Year and author	Topic	Tool	Findings
Honohan (2009)	Cause and Effect of Financial Access: Cross-Country Evidence From The Finscope Surveys	Multivariate Probit Model	Evidence shows the significance of a person's education, income, psychometric perception and location of financial services. Cross country differences are also observed.
Ardic et al., (2012)	Small and Medium Enterprises A Cross-Country Analysis with a New Data Set	Logarithmic drop framework[9]	Lending is affected by factors such as: legal and business environment, private credit, efficiency of banking system, per capita income and private credit to GDP ratio.
Adamo 2013	Financial Inclusion	Cluster Analysis	Average to high income nations have adult population 15 years and above with more formal accounts compared to those in Less developed countries (LDCs) or developing nations.
Atkinson and Messy (2013)	Promoting Financial Inclusion through Financial Education: OECD/INFE Evidence, Policies and Practice	Policy Evaluation	Low penetration of financial services is positively associated with lower levels of financial literacy.
Beck et al., (2007)	Finance, Inequality, and the Poor	OLS/dynamic panel instrumental variables regressions	Find that a decline in income inequality has a positive impact on growth of income via financial development.
Demirguc-Kunt and Klapper (2013)	Measuring Financial Inclusion: Explaining Variation in Use of Financial Services across and within Countries	OLS regression/Probit regression	Find distance, cost and documentation to be the key barriers causing cross-country and regional differences to financial inclusion.
Demirguc-Kunt et al., (2012)	Measuring Financial Inclusion: The Global Findex Database	Descriptive analysis	Account ownership and account penetration was found to vary significantly across different regions of the world among adults 15 years and above.
Dupas and Robinson (2009)	Savings Constraints and Microenterprise Development: Evidence from a Field Experiment in Kenya	Instrumental variables regression	Finds that although interest rates influence financial service choice, savings will still take place even when the deposit rate is negative.
Honohan (2007)	Cross-country variation in household access to financial services	OLS regression analysis	Better access to finances by individual family units is associated with reduced inequality, in spite of the fact that there is insufficient proof demonstrate that there is causality between increased access to finance and lower poverty levels.
Calderon and Liu (2003)	The direction of causality between financial development and economic growth	Geweke Decomposition Test	The empirical findings concluded that financial development is more likely to determine economic growth
Murinde (2012)	Financial development and economic growth: Global and African evidence	Survey of the literature on developing and developed countries	Financial development leads to economic growth but the causality

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[9] Duan (1983) method for correcting the bias.

			channels are not clear.
Claessens (2006)	Access to Financial Services: A Review of the Issues and Public Policy Objectives	Descriptive statistics	Most jurisdictions are yet to prioritise policy on universal access to financial services and therefore, the benefits are yet to trickle down to the citizenry.
Burgess and Pande (2005)	Can rural banks reduce poverty? Evidence from the Indian social experiment	OLS regression	The findings demonstrate that expansion in bank branches to rural neighbourhoods had the potential to reduce poverty.
Aghion et al., (2003)	The effect of financial development on convergence: theory and evidence	GMM estimator	Found out that growth is positively affected by financial development.
Sarma and Pais (2011)	Financial Inclusion and Development: A Cross Country Analysis	Logit regression	The findings demonstrate that the most essential variables affecting financial inclusion are: literacy, income, inequality and urbanisation.
Van de Werff 2013	A Cross-Country Analysis of Financial Inclusion within the OECD	OLS regressions	The findings demonstrate that social factors are key determinants of highly banked population segments.
Park and Mercado (2016)	Financial Inclusion, Poverty and Income Inequality in developing Asia	OLS regression	Provide evidence that show per capita income, demographic characteristics and rule of law significantly affecting financial inclusion in developing Asia.
Khan (2008)	Financial inclusion and Ethnicity	Cluster Analysis	Findings show that minority ethnic groups are disadvantaged on the basis of access to financial services
Goodwin et al ., (1999)	Debt, money management and access to financial services: Evidence from the 1999 PSE survey of Britain	Logistic Regression	The findings show that almost half of the households in Britain are excluded on at least one of the selected indicators of financial inclusion: access to bank account, paying bills, formal credit, formal saving, insurance, utilities.

In all the studies reviewed, none of them considered applying a multilevel modelling approach that is suitable given the structure of the data. Data structure in most studies contains in-build relationships between levels of interactions. For instance, citizens are found in a specific country and in turn a country is found in a specific region. This approach takes the nested structure across multiple levels of interactions reflecting different social contexts within which influences are created. In this chapter, individual households are nested within countries and countries are nested within the region. The basic level constitutes the level 1 variable which in most cases defines the individuals. This is however not the standard scheme of classification under multilevel modelling. According to Galtung (1969), roles may be reversed depending on the nature and purpose of the study. Galtung (1969) for instance looked at roles within individuals as constituting level 1 as opposed to the individuals themselves. Similarly, Goldstein and Johnson (2003) working on a longitudinal research design evaluated repeated measures within individuals at level 1. Therefore, the type of hierarchy created relies heavily on the researchers' needs and nature of research. Multilevel

techniques have variables at different levels in the hierarchy. The variables include: Global, Relational, and Analytical and structural. The global variables only apply at the specific level where they are defined and do not necessarily refer to other levels. For instance, gender may be classified as a global variable. Relational variables also apply to a specific level but their description portrays their influence on other units at the same level. On the other hand, measurement of analytical and structural variables is done at lower level. For instance, obtaining government consumption constitutes aggregating individual households' consumption. It is customary to obtain higher level measurements using the lower level variables. The importance of multi-level modelling lies in the fact that no one level can be considered adequate enough to provide all the answers required as one level may be associated with the other levels through the variables. This approach is relevant when examining cross-level hypothesis. Higher level variables may be constructed from the lower level variables hence relationally linked. The question that multilevel analysis is likely to address is one that looks at how variables at different levels influence a certain outcome. This chapter deals with a problem that requires hierarchical configuration of data to address it.

2.3 Methodology

2.3.1 Research Design
The demand-side Global Findex dataset collected over the 2014 calendar year is used to assess the determinants of financial inclusion in SSA. This is a cross-sectional dataset that covers access and use indicators of more than 140 economies of the world. This dataset consists of a nationally representative sample randomly selected among adults of 15 years or above. The data contains a record of data collected in 2014 calendar year. An aggregate of 34 nations from sub-Saharan Africa were analysed. Averagely, about 1,000 individuals 15 years or above were considered. The data collection procedures were standardized across all the countries. The margin of error considered in this survey was not significantly different.

The database is the first one that provides insights into households' use of financial services across different economies. Additionally, the database contains information on financial exclusion. However, there is no evidence showing that exclusion is driven by restrictions from participation in the formal financial system. Although financial exclusion separates people from benefiting from the usage of financial services, individual characteristics do hinder households from using such services.

Efforts towards gathering standard data on regular basis at all levels of usage have been made in most emerging economies although the scope has remained limited (Claessens, 2006). Qualitative surveys on usage of financial services have been undertaken within the context of SSA since 2002. Data collected from the surveys remains inadequate as it does not place focus on other critical variables such as savings, credit and risk management.

This chapter classifies people on the basis of available financial services. It utilizes the variables in the dataset. The individual level variables included: age, age squared, education, gender, while the country level variables included: income quintiles, saving, borrowing, debit card ownership, received government transfers through account and received domestic remittances through mobile phone. These factors are important for examining the extent of financial inclusion in SSA region.

2.3.2 Conceptual Framework

This section discusses the conceptual framework underpinning financial inclusion in sub-Saharan Africa. Specifically, the framework covers factors affecting account ownership. While we consider different forms of account ownership, we observe that even in the least of developed countries, our focus will be on factors that influence individuals to open accounts at various institutions. In this framework, the key variables used include age, education, income, marital status and gender to explain financial inclusion. The conceptual framework

used in this chapter considers additional factors believed to influence financial inclusion in sub-Saharan Africa. These factors include debit card ownership, domestic remittances received through mobile phone, government transfers through account, having borrowed and /or saved in the last year. The conceptual framework (See figure 2.2) adopted in this chapter provides a modified framework based on World Bank (2014). It assumes that financial inclusion is affected by not only economic factors but non-economic factors as well. This chapter makes use of the Global Findex dataset (2014) which is a demand side data. In the modified framework we include economic, financial as well as demographic factors that affect financial inclusion. The empirical model used in this chapter therefore takes this approach into account.

Figure 2.2: Conceptual framework for financial inclusion

Independent variables   Proximate determinants   Dependent variable

Demographic factors

-Age

-Gender

Socioeconomic factors

-**Education**

-**Income**

-**Government transfer** -**Remittance**

-**Borrowing**   -**Saving**

Cultural factors

-Religion

-Cultural practices(**Marital status**)

Technological factors

-Technological capacity (**Debit card ownership**)

-Network coverage

Cognition

-Perceived usefulness

-Perceived ease of use

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1) Account ownership (General)

2) Account with financial institution

3) Account ownership with MSP

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2.3.3 Empirical Model

This section evaluates how individuals' descriptions in the Global Findex database are linked with economic inclusion in the SSA region. The chapter recognises that individual households are nested within countries and therefore the data used is treated as consisting of two levels: households within countries. The natural grouping of households in countries tends to differentiate individuals, implying that countries and their citizens influence each other. This explains the observed behavioural differences of individuals in different countries. If this relationship is not taken into account, the country (group) effects may render the results invalid. This calls for use of the multilevel approach.

Multilevel analysis has been widely used in sociological, demographic, education fields to depict an approach that permits concurrent study of the effects of level one and level two variables on individual-level results. Overtime, there has been greater need to use this approach to explain similar situations in other fields of study. Additionally, the developments of statistical methods and softwares that incorporate multilevel structures have led to greater demand to use the approach. The fact that individuals and groups may interact to cause an outcome has been the subject of intense debate in empirical literature (DiPrete and Forristal, 1994). The rationale for multilevel models has also been prompted by unavailability of individual level variables that explain the effect at that level. In this case, group level variables are only used as proxy variables. For a long time, studies have continued to use the assumption of homogeneity which is not appropriate for addressing multi-level problems. Single-level models are anchored on the assumption of independence of different population sub-groups yet it is obvious that this assumption is more likely to be violated due to the existence of the nested data structure (Goldstein 2003). The assumption of homogeneity is relaxed by the multi-level model essentially rendering single-level model inadequate in handling hierarchical data structure. The key advantage of using multi-level framework is in

its ability to examine the extent of heterogeneity among different sub-groups (Srholec 2010). Heterogeneity arises from differences between entities (firms; countries; schools) in terms of size, population, technological advancement, firm-specific processes.

This chapter considered variables at two levels, individual level and country level. Individual level variables were separated from country level variables. Models that focus on individual households ignoring group membership may be represented as follows:

$$y_i = \alpha + \beta x_i + \mu_i \dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots 2.1$$

where y_i is the dependent variable, i is the categories of the response variable, x_i is a vector of explanatory variables, α is the intercept, β is the slope and μ_i is the error term. This model cannot be used to describe simultaneous relationships involving complex survey data. For instance, to describe the relationship between individual households and group membership requires a two-level model. The model is thus stated in 2.2 as:

$$y_{ij} = \alpha_j + \beta_j x_{ij} + \gamma_{ij} \dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots 2.2$$

where j is a subscript that refers to level 2 units (different countries) and i is a subscript that refers to level 1 units (individual households). y_{ij} is the response variable and x_{ij} is a vector of independent variables. For consistency, we adopt Goldstein (2003) notation standard. Hence, we let $\alpha_j = \beta_{0j}$ and $\beta_j = \beta_{1j}$. We also note that β_0 and β_{1j} are level 2 specifications. The group j intercept can be estimated by $\beta_{0j} = \beta_0 + \mu_{0j}$ where β_0 is the population intercept estimate and μ_{0j} is the variation around the individual groups. On the other hand, $\beta_{1j} = \beta_1 + \mu_{1j}[10]$ represents the slopes of groups which is assumed to be identical only when the subscript j is omitted. μ_{1j} is random variables that is normally distributed.

Combining level 1 and level 2 units yield the two-level model of the form:

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[10] μ_{0j} and μ_{1j} are random variables. Their corresponding parameters are $E(\mu_{0j}) = E(\mu_{1j}) = 0$; $var(\mu_{0j}) = \sigma^2$, $var(\mu_{1j}) = \sigma^2$, $cov(\mu_{0j}, \mu_{1j}) = \sigma$

$$y_{ij} = \beta_0 + \beta_1 x_{ij} + (\mu_{0j} + \mu_{1j} x_{ij} + \gamma_{0ij}) \quad\text{...............}2.3$$

where var(γ_{0ij})=$\sigma_{\gamma 0}{}^2$

Equation 2.3 expresses the response variable y_{ij} into two parts: fixed and random. In general, equation 2.3 can be expressed as follows:

$$y_{ij} = \beta_0 + \beta_1 x_{1ij} + \sum_{h=2}^{p} \beta_h x_{hij} + (\mu_{0j} + \mu_{1j} x_{1ij} + \gamma_{0ij}) \quad\text{...............}2.4$$

Based on equation 2.3, the empirical model is stated in equation 2.5:

$$finInc_{ij} = \beta_{00} + \beta_{10} Edu_{ij} + \beta_{20} Gender_{ij} + \beta_{30} Age_{ij} + \beta_{01} Income_{ij} + \beta_{11} debitcard_{ij}$$
$$+ \beta_{21} saved_{ij} + \beta_{31} Borrowed_{ij} + \beta_{41} Govttransfer_{ij} + \beta_{51} Domremit \tan ce_{ij} + ... + (\mu_{ij} + \gamma_{ij}) \,...2.5$$

where *finInc* denotes categorical indicators of financial inclusion, *i* represents the index for individuals and *j* is the index denoting the country. The predictor variables belong to individuals' characteristics found in the survey dataset. Equation 2.5 assumes that the variables do not interact. It has both the fixed part and the random part. Level 1 variables include age, education and gender while level 2 units are income, saved, borrowed, government transfers, domestic remittances and debit card ownership as depicted by the notation in equation 2.5. Although technological and cultural factors are not explicitly stated, we note that some of the socioeconomic and demographic factors are in-build within those factors. In addition, the dataset did not capture cultural and technological aspects within the data.

Equation 2.6 estimates the determinants of barriers to financial inclusion. The estimation is based on the probit regression.

$$finIncBarrier_i = \beta_0 + \beta_1 Edu_i + \beta_2 Gender_i + \beta_3 Age + \beta_4 debitcard_i + \beta_5 Domremit \tan ce_i$$
$$+ \beta_6 Income_i + \beta_7 Govettransfer_i + \beta_8 saved_i + \beta_9 borrowed_i + \gamma_i \quad\text{...............}2.6$$

where *i* represents the various barriers to financial inclusion identified in the Global Findex data.

Equation 2.7 estimates the intra-group correlation. This model takes into account variations arising from group membership. Intra-group correlation is thus measured as follows:

$$\rho = \frac{\sigma_{\mu 0}^{2}}{\sigma_{\mu 0}^{2} + \sigma_{e}^{2}} \dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots 2.7$$

The intra-group correlation is indicative of the proportion of variation explained by the organisational structure of the population.

2.3.4 Definition and Measurement of Variables

2.3.4.1 Dependent Variable[11]

This chapter highlights financial inclusion indicators considered most imperative in comprehending the behaviour of the households. The dependent variables used in this chapter include: A*ccount Ownership (in general), Account Ownership (Mobile phone) and Account ownership (other financial institution).* The dependent variables take the value of 0 if the individual does not own an account and 1 if the individual owns an account. Each dependent variable is analysed separately against the determinants.

2.3.4.2. Independent Variables

The explanatory variables used in this chapter have also been used in other studies that sought to understand the dynamics of financial inclusion (Fungacova and Weill 2014; Beck et al., 2009). This chapter considers *Education, Income, Gender*, *debit card possession, government transfer received through account, domestic remittances received through mobile phone, saving and borrowing behaviour, and Age* as relevant explanatory variables.

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[11] See Demirguc-Kunt and Klapper 2012 for more details.

Education variable is identified by categorical variables ranging from completed primary or less to completed tertiary or more. They range from *completed primary or less, secondary to completed tertiary or more*. Income is given by income quintiles namely; (poorest 20 percent), (second 20 percent), (Middle 20 percent), (fourth 20 percent) to the fifth (wealthiest 20 percent). Gender represents either male or female. Age denotes the number of years lived.

Table 2.3: Definition, measurement and predicted sign for each explanatory variable

Variable	Notation	Measure	Predicted Effect	Source of data
LEVEL 1 VARIABLES				
Age	AGE	Years lived (Continuous)	-	Global Findex
Education	EDU	0=completed primary or less 1=secondary 2=completed tertiary or more	+	Global Findex
Gender	GENDER	0=female 1= male	+/-	Global Findex
LEVEL 2 VARIABLES				
Income quintiles	INCQUIN	0=poorest 20% 1=second 20% 2=middle 20% 3=fourth 20% 4=richest 20%	+	Global Findex
Saved in the last year		0-No 1-Yes	+	Global Findex
Borrowed in the last year		0-No 1-Yes	+	Global Findex
Debit card possession		0-No 1-Yes	+	Global Findex
Domestic remittances received through phone		0-No 1-Yes	+	Global Findex
Government transfers received through account		0-No 1-Yes	+	Global Findex

2.4 Empirical Findings

2.4.1 Introduction

This section presents analysis results of this chapter. The analysis takes two forms namely: non-parametric and parametric. Non-parametric method consists of descriptive aspects of the data while the parametric method deals with regression analysis.

2.4.2 Intra-class Correlation (ICC)

This section is based on a variance components model which addresses the question of whether or not there is sufficient variance represented at the individual level that warrants adoption of the mixed approach. The rule of the thumb states that more than 10 percent of the total variance needs to be represented at a given level. Applying the multilevel modelling with individual households at level 1 and country being level 2, the approach was justified. Using the null model with nothing but constant term gives the variance estimates at level 2 (country level) and level 1 residuals. Approximately 17 percent of the total variance in mobile phone account ownership is represented at the country level being way above the minimum of 10 percent expected for further multilevel modelling. Similarly, total variances explaining differences in account ownership at financial institution and account ownership in general are above the minimum threshold of 10 percent.

2.4.3 Descriptive Statistics

Table 2.4 presents the summary statistics for the variables used in the chapter. The dependent variables are measured as 0 if the individual has no access to an account and 1 if the individual has access to an account. Age is measured in single years. For age as a variable the respondent with the highest age is at 99 while the lowest is 15. This study considered the lowest age to be 18 years and the highest 70 years. The rest of the variables are indicated with minimum and maximum categories. The table also shows the mean values and standard deviations of the variables used in this chapter. The total observations sum up to 33,930

respondents each country contributing on average 1000 respondents. Intuitively, the statistics show that the variables are fairly spread around the mean an indication that there is no clustering.

Table 2.4: Descriptive Statistics

Variable	Obs	Mean	Median	Std. Dev.	Min	Max
Account Ownership	33,930	0.35	0.00	0.48	0	1
Account financial institution	33,930	0.29	0.00	0.46	0	1
Mobile account	31,937	0.14	0.00	0.34	0	1
Income quintile	33,930	2.24	2.00	1.43	0	4
Education	33,930	0.51	0.00	0.59	0	2
Age	30,074	35.30	32.00	13.13	18	70
Gender	33,930	0.51	1.00	0.50	0	1
Debit card ownership	33,489	0.18	0.00	0.38	0	1
Domestic remittances received through mobile phone	12,313	0.29	0.00	0.45	0	1
Government transfers through account or card	2,384	0.46	0.00	0.50	0	1
Saved in the last one year	33,930	0.58	1.00	0.49	0	1
Borrowed in the last one year	33,930	0.53	1.00	0.50	0	1

Table 2.5 presents the correlation matrix of all the variables used in this chapter. We note that income quintile and education variables as shown to be negatively correlated with account ownership. This relationship helped us focus our analysis on the magnitude of the coefficient as we move from the lowest income quintile to the highest. Ordinarily, if the magnitude declines towards the wealthiest (Richest 20 percent), then the relationship is actually positive. This analysis is consistent with (Fungacova and Weill 2014).

From Table 2.5, debit card ownership has an intermediate positive correlation with account ownership in general and account ownership with a financial institution but not with mobile phone account. This is expected given that debit card is mostly used in accounts from commercial banks. Similarly, government transfer to account or card shows positive correlation with account ownership in general and account with a financial institution.

Table 2.5: Correlation Matrix

	Account Ownership	Account financial institution	Account mobile	Income quintile	Education	Age	Gender	Debit card ownership	Domestic remittances received through mobile phone	Government transfers through account or card	saved	borrowed
Account Ownership	1.000											
Account financial institution	0.5107**	1.000										
Account mobile	0.432**	0.2912**	1.000									
Income quintile	-0.204**	-0.1917**	-0.2189**	1.000								
Education	-0.379**	-0.3885**	-0.2796**	0.2526**	1.000							
Age	0.0186**	-0.0032**	0.2022**	-0.0273**	-0.297**	1.000						
Gender	0.0935**	0.0957**	0.0969**	-0.122**	-0.1176**	0.0106**	1.000					
Debit card ownership	0.5396**	0.5888**	0.2405**	-0.2011**	-0.3734**	0.0217**	0.0425**	1.000				
Domestic remittances received through mobile phone	0.2988**	0.2134**	0.5849**	-0.1821**	-0.2178**	0.1913**	0.099**	0.1858**	1.000			
Government transfers through account or card	0.6653**	0.7306**	0.2723**	-0.124**	-0.3466**	0.0211*	0.0217**	0.5125**	0.1772**	1.000		
Saved	0.2261**	0.2257**	0.1473**	-0.1542**	-0.108**	0.0065**	0.0516**	0.2197**	0.14**	0.1574**	1.000	
Borrowed	0.0639**	0.0703**	0.1582**	-0.0486**	-0.0302	0.04**	0.0265**	0.1000**	0.1743**	0.1096**	0.224**	1.000

***p<0.01,**p<0.05,*p<0.10

Figure 2.3 reveals that there exists a wide spread disparity in account ownership with more advanced economies registering higher ownership than their relatively poor counterparts. According to World Development Indicators 2015, Mauritius, South Africa and Kenya have remained ahead of other sub-Saharan countries in providing access to financial services. In these countries, financial innovation in the financial sector is increasingly offering a wide variety of services that were hitherto unavailable to majority of the people (Ikhide, 2015). In addition, the governments have not put much restriction in terms of regulating the financial sector especially the mobile money which accounts for the majority of the people. The model used by the three leading lights is the ideal although inherently risky. Where mobile money has succeeded, to a large extent the mainstream banking services have also improved. Therefore, the three leading countries in SSA also have a well-functioning financial sector capable of interfacing with the mobile money technology and indeed any other financial innovation.

Figure 2.3: Random intercepts by Country
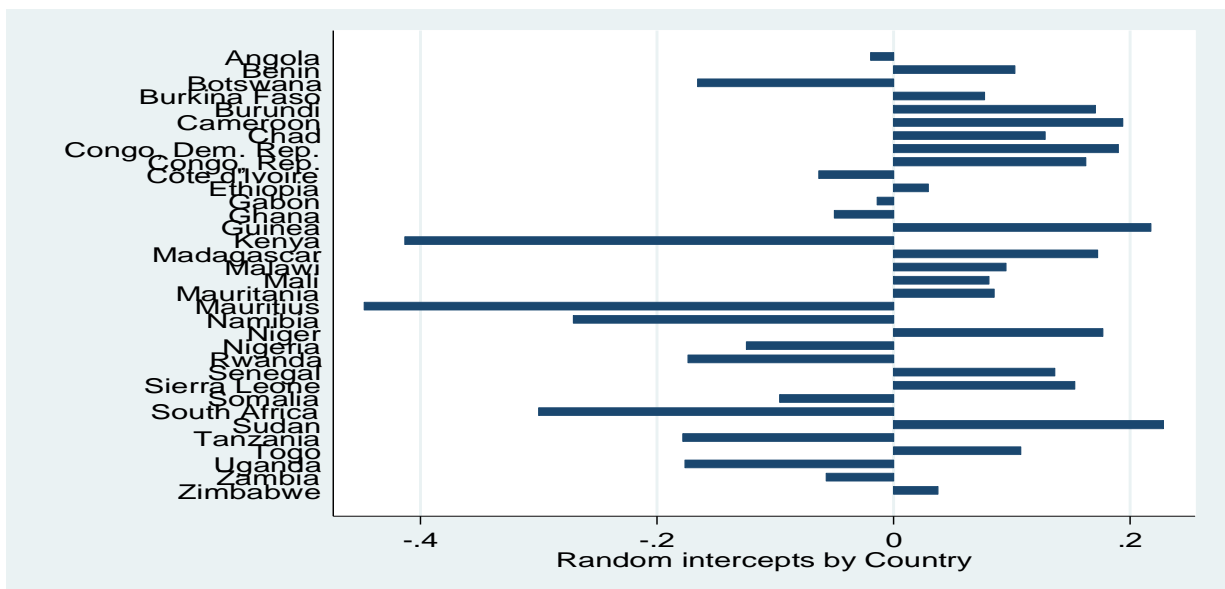
Table 2.6 depicts a null and the fuller model for mobile phone account ownership as shown in equation 2.5. Although the focus was on account ownership in general, a diagnostic analysis of the survey data revealed that more people had mobile phone accounts compared to owning

an account with a financial institutions. Table 2.6 assumes that the first category is the reference category and therefore omitted since it forms the basis for comparisons.

Table 2.6: Results for the multilevel linear regression model with Account Ownership

VARIABLES	Account Ownership		Account in financial institution		Mobile account	
	Null Model	Fuller Model	Null Model	Fuller Model	Null Model	Fuller Model
Fourth20%		-0.0240***		-0.0140**		-0.0128**
		(0.00665)		(0.00591)		(0.00582)
Middle 20%		-0.0575***		-0.0391***		-0.0303***
		(0.00655)		(0.00583)		(0.00573)
Second20%		-0.0905***		-0.0666***		-0.0445***
		(0.00641)		(0.00570)		(0.00560)
Poorest 20%		-0.150***		-0.123***		-0.0879***
		(0.00631)		(0.00562)		(0.00552)
Secondary		-0.121***		-0.107***		-0.0519***
		(0.00467)		(0.00416)		(0.00409)
Completed primary or less		-0.188***		-0.178***		-0.131***
		(0.0102)		(0.00905)		(0.00929)
Age		-0.0115***		-0.0101***		-0.00366***
		(0.000586)		(0.000521)		(0.000512)
Female		0.0327		0.0195		0.0202
		(0.00392)		(0.00349)		(0.00343)
Debit card ownership		0.518***		0.591***		0.108***
		(0.00556)		(0.00495)		(0.00491)
Constant	1.649***	0.405***	1.706***	0.376***	1.862***	1.780***
	(0.0344)	(0.0923)	(0.0333)	(0.0855)	(0.0260)	(0.0295)
lns1_1_1	-1.608***	-1.674***	-1.641***	-4.191	-1.921***	-0.868***
	(0.122)	(0.205)	(0.122)	(5.955)	(0.126)	(0.147)
lns1_1_2		-0.900***		-0.716***		-1.763***
		(0.138)		(0.132)		(0.218)
lns1_1_3		-1.923***		-1.950***		-2.699***
		(0.301)		(0.302)		(0.640)
lns1_1_4		-2.607***		-2.739***		-19.60***
		(0.597)		(0.708)		(4.660)
lns1_1_5		-2.171***		-2.106***		-1.428***
		(0.625)		(0.446)		(0.356)
lnsig_e	-0.837***	-1.242***	-0.886***	-1.277***	-1.166***	-1.072***
	(0.00384)	(0.0226)	(0.00384)	(0.0227)	(0.00396)	(0.0215)
Observations	33,930	1,221	33,930	1,221	31,937	1,201
Number of groups	34	34	34	34	32	32

Standard errors in parenthesis

*** p<0.01, ** p<0.05, * p<0.1

The likelihood ratio test was conducted to compare the null model and the complete/fuller model. The null hypothesis was that the two models were not significantly different. Since Prob > chi2 = 0.0000 is less than 0.05, the null hypothesis was rejected and we concluded that the two models possess statistically significant differences. We may conclude that the random coefficients model has the lowest log likelihood and therefore provides a better fit. Extending the likelihood ratio test to examining country effects, we compare the empty multilevel model with an empty single-level model. We calculate the likelihood ratio test statistic by multiplying twice the differences in log likelihood values. LR= 2(-19842.546--23037.635) = 6390.18. Taking into account the 5 percent chi square value at 1 degree of freedom, there is evidence that country effects overwhelmingly affect account ownership at all levels.

The random effects correlation matrix for the country level shows the relationship between income quintiles and account ownership. Although the overall relationship shows the poorest 20 percent category weighing down the matrix, there is a close relationship between account ownership and income. This is to be expected in many countries within the context of sub-Saharan Africa region.

The variance components model which addresses the question of whether or not there is sufficient variance represented at the individual level that warrants adoption of the mixed approach is computed using the intra-class correlation test or the partitioning variance approach. The rule of thumb states that at least 10 percent of the total variance needs to be represented at a given level. Approximately 17.6 percent of the total variance in account ownership can be used to explain the differences at country level. This test therefore justifies use of the multilevel modelling for the three test indicators (predictor variables).

The variance inflation factor revealed that age and age squared were correlated and therefore likely to overestimate the effect of age on account ownership. The study therefore excluded age squared in the final estimation thereby solving the potential problem of multi-collinearity.

The Farrar-Glauber Multicollinearity t-Test shows that the problem of multicollinearity brought about by the presence of age and age squared has been removed. The Chi2 Test = 1172.3562 and the P-Value > Chi2 (36) 0.0000 at 5 percent level indicates failure to reject the hypothesis that there is no presence of multicollinearity in the model.

Most of the multilevel algorithms have in build mechanism of dealing with heteroscedasticity problem which refers to problems associated with non-constant variance of the random effects model.

Table 2.6 shows the multilevel regression results in which our main dependent variables are account ownership in general, account with a financial institution, and account with mobile service provider (MSP). The results show that owning a formal account is related to the level of income of an individual. Based on our income quintile variable, we have established that the lowest income quintiles for the fuller model are all significant and negative. We observe that as you ascend from the lowest quintile (poorest 20 percent) to the highest quintile (Richest 20 percent), the magnitude of the coefficients tend to reduce an indication that lower quintiles are associated with lower account ownership. The findings are corroborated by Demirguc-Kunt and Klapper (2013) and Fungacova and Weill (2014) who established a similar pattern between income and the financial inclusion measure. A similar pattern has been established between education and financial inclusion. The coefficient of education was found to be significant and negative showing that increasing levels of education tend to be associated with increased levels of account ownership. We observe that having primary education or less compared to having tertiary education, an individual would be less likely to own an account across all the different account ownership categories. The coefficient for primary education or less is large and negative compared to the coefficient of secondary education indicating that education variable is positively related to account ownership. As you move from low levels of education to the highest level of education, the magnitude of the

coefficient reduces that is, it tends to move towards positive (smaller negative number). The findings in this chapter are corroborated by (Atkinson et al., 2013) who found out that financial education is key to promoting financial inclusion. In this chapter, we have also established that having tertiary education or more influences individuals to own formal accounts whether with the financial institutions or with mobile service providers. Again, the large negative coefficients at lower levels of education are indicative of the positive relationship between education and account ownership. The findings in this chapter may not be surprising given that in sub-Saharan Africa, majority of the people have low levels of education. Across all the account ownership categories, age was found to be negatively related to account ownership. As individuals advance in age, they tend to be less likely to own an account at any given category. However, observing the coefficients across all the account ownership categories, as individuals advance in age, they are more likely to switch from holding an account in a formal financial institution to having a mobile account with the mobile service providers. The age at which this switch occurs is necessary for policy intervention. Allen et al., (2013) investigated this relationship and established that ownership of formal account and age were non-linearly related.

The chapter also investigated the effect of owning a debit card on account ownership. Individuals with debit cards were more likely to own an account with a financial institution compared to owning a mobile account with a mobile service provider. The coefficient for debit card ownership is larger for account ownership with a formal financial institution than for mobile account ownership. According to Damodaran (2012), with availability of debit or credit cards, more individuals were found to own formal accounts in India in financial institutions. Therefore, debit card ownership is one way of deepening the penetration of financial services in the society.

The overall findings in this chapter point to the relevant policy indicators that explain the key influences of access to and use of formal accounts. However, the observation that comes out strongly is that there exist discrepancies in the magnitude of influence of the characteristics of individual household on financial inclusion.

Although our findings are largely corroborated by other studies across the world, it is imperative to observe that differences with other studies also exist. For instance, in this study, the coefficient of gender appears to be insignificant contrary to other studies, which view gender and financial inclusion to be strongly associated. Such studies include (Fungáčová et al., 2014, Tuesta et al., 2013).

Overall, the findings in this chapter raise important questions. We observe that as individuals grow older, they attain a certain age beyond which they switch from one aspect of financial inclusion to another. It would be interesting to find out the exact age at which this phenomenon happens. Perhaps we may also wish to point out that different income quintiles play different roles in influencing decisions regarding account ownership and therefore participation in financial inclusion matters. The question would be to establish a clear pattern of events across the income quintiles that would lead to certain specific outcomes.

2.4.3 Evidence on Barriers to Financial Inclusion in sub-Saharan Africa

The initial post-estimation test carried out was the test for the presence of multi-collinearity between explanatory variables. The results of the variance inflation factor shows that age and age squared exhibit this phenomenon. Therefore, including both predictor variables into the model would lead to incorrect conclusion about the outcome variable (account ownership). The estimated model therefore omitted the age squared effectively eliminating the problem of multi-collinearity.

Table 2.7: Correlation Matrix

	Distance	Expensive	No documents	No trust	No money	Family account	Can't get	Needless	Income	Education	Age	Gender	Debit card ownership	Domestic remittance	Govt. transfer	Saved	Borrowed
Distance	1.0000																
Expensive	0.4263**	1.0000															
No documentation	0.1142**	0.0949**	1.0000														
No trust	0.2005**	0.1629**	0.0535**	1.0000													
No money	0.0022**	0.1070**	0.0794**	-0.0061**	1.0000												
Family account	0.0628**	0.0037**	0.1076**	0.2168**	-0.0663**	1.0000											
Can't get	0.1473**	0.2099**	0.1770**	0.1082**	0.1528**	-0.0379**	1.0000										
Needless	0.1028**	0.0759**	0.0803**	0.2252**	0.0271**	0.0691**	0.1428**	1.0000									
Income	-0.0059**	0.0265**	0.0139**	-0.0142	0.0655**	-0.0873**	0.1737**	0.0247**	1.0000								
Education	0.1093**	0.0784**	0.0101**	0.0223	0.0786**	-0.0279**	0.1311**	0.1341**	0.0873**	1.0000							
Age	-0.0311**	-0.0680	0.0828**	-0.0771**	0.0814**	0.0044**	-0.0577**	-0.2092**	-0.0080**	-0.4020**	1.0000						
Gender	0.0751**	0.0201**	-0.0877**	0.0520**	-0.0454	0.0341**	0.0046**	-0.0517	-0.0856**	-0.1770**	0.0690**	1.0000					
Debit card	0.0092**	0.0287**	0.0365**	0.1073**	-0.0782**	0.1307**	0.0099**	-0.0115**	0.0001**	-0.0585**	-0.0387**	0.0866**	1.0000				
Domestic remittance	0.0283**	0.0031**	-0.0268**	-0.0315	0.0028**	-0.0141	-0.1261**	-0.0257**	-0.0684**	-0.1453**	0.1659**	0.0681	0.0163**	1.0000			
Government transfer	0.0302**	-0.1245	0.0401**	0.0223**	-0.1194**	0.0528**	-0.0896**	-0.0352**	0.0562**	-0.2434**	0.0690	0.0213**	0.0690**	0.0129**	1.0000		
Saved	0.0950**	0.0765**	-0.0179**	0.0350**	0.0425	0.0294**	-0.0262**	0.0901**	-0.0488**	0.0896**	-0.0021**	0.0047**	-0.0291**	0.0935**	0.0021**	1.0000	
Borrowed	0.1151**	0.1728**	0.0700**	0.0856**	0.0398**	-0.0004**	-0.0197**	0.0523	-0.0373*	0.1024	-0.0329**	-0.0121**	-0.0338**	0.1061**	0.0317**	0.2458**	1.0000

***p<0.01,**p<0.05,*p<0.10

The examination of the correlation matrix also showed that the multi-collinearity problem had been solved. Table 2.7 shows the correlation matrix after omission of age squared.

Similarly, we sought to test for the presence of heteroscedasticity and use the Breusch-Pagan (B_P) test. The null hypothesis in the B-P test was Homoscedasticity while the alternative hypothesis was Heteroscedasticity (see Table 2.8) i.e Ho=Homoscedasticity (Constant variance) while Ha=Heteroscedasticity. The results are shown in the table below:

Table 2.8: Heteroscedasticity test results

Breusch-Pagan/Cook-Weisberg test for heteroscedasticity
Ho: Constant variance
Variables: fitted values of Faraway
Chi2(1)=7.38
Prob>chi2=0.084

In B-P test, we sought to find out whether the error variances are constant or whether they are a multiplicative function of other variables. Based on the chi square test statistic and the F-test statistic, we did not find any of the two test statistics significant rendering the alternative hypothesis irrelevant. Hence, we conclude that there is no evidence of error terms that are a multiplicative function of the other. Similarly, other fitted values were found not to present the heteroscedasticity problem. Table 2.8 shows the results of the heteroscedasticity test.

This chapter also sought to investigate the barriers to financial inclusion in sub-Saharan Africa. Table 2.9 displays the estimations based on the barriers to financial inclusion available in the survey. Table 2.9 is an estimation based on equation 2.6. From the available data, the barriers to account ownership show that income, education, age, government transfers and having saved affect the barriers to financial inclusion and are significant at different levels. Being in the richest 20 percent category income quintile means that *too far away from the financial service provider* is not a major problem to this category. This finding is consistent with other studies because richer individuals have greater mobility and therefore

distance is not a major factor (Brevoort and Wolken 2009). "Lack of money" and "too expensive" explain why individuals cannot own a mobile phone account. These barriers are affected by income, age, government transfers, having saved, and having borrowed and are consistent with the findings from previous studies (Fungacova and Weill 2014). This empirical chapter notes that lack of documentation, lack of trust in financial institutions, a family member having an account and having no need for financial services were affected by most of the variables in the dataset. These findings provide a view that is consistent with the current state of acquiring ownership of a mobile phone account. However, it is surprising that there exist some individuals who perceive mobile phone account as "hard to get" as depicted by "cannot get one" barrier. These findings however are consistent with Allen et al., (2013) study which finds more educated and wealthier individuals being more likely to own a mobile phone account than the reverse.

In general, the most important barriers that should be addressed include lack of money income, distance to the nearest point of service and the cost of the financial service as depicted by the significant coefficients. These barriers are critical to unlocking the problem of financial inclusion especially in rural areas where services are greatly on demand. Longer distances to the service provider could prove a major constraint if the level of income of individuals is low. Similarly, lack of money and too expensive services work to reduce dependence on formal financial services. This perhaps explains why individuals tend to hold onto a portfolio of both formal and informal financial services simultaneously.

Table 2.9: Determinants of barriers to financial inclusion

VARIABLES	Too far away	Too expensive	Lack of documentation	Lack trust	Religious reasons	Lack money	Family member already has	Cannot get one	No need for financial service
Fourth20%	-0.214**	-0.274***	-0.195*	-0.123	-0.222**	-0.181*	-0.166	-0.216**	-0.200*
	(0.106)	(0.103)	(0.107)	(0.106)	(0.107)	(0.107)	(0.107)	(0.106)	(0.107)
Middle 20%	-0.335***	-0.354***	-0.428***	-0.343***	-0.386***	-0.375***	-0.411***	-0.372***	-0.386***
	(0.104)	(0.102)	(0.104)	(0.103)	(0.105)	(0.105)	(0.104)	(0.104)	(0.104)
Second20%	-0.439***	-0.409***	-0.469***	-0.371***	-0.470***	-0.453***	-0.495***	-0.460***	-0.454***
	(0.103)	(0.101)	(0.103)	(0.102)	(0.103)	(0.103)	(0.103)	(0.103)	(0.103)
Poorest 20%	-0.569***	-0.481***	-0.565***	-0.502***	-0.567***	-0.555***	-0.586***	-0.569***	-0.577***
	(0.0994)	(0.0975)	(0.0997)	(0.0986)	(0.0996)	(0.0996)	(0.0997)	(0.0995)	(0.0996)
Secondary	-0.655***	-0.654***	-0.699***	-0.676***	-0.670***	-0.705***	-0.674***	-0.697***	-0.687***
	(0.0736)	(0.0721)	(0.0740)	(0.0736)	(0.0738)	(0.0740)	(0.0740)	(0.0738)	(0.0738)
Completed primary or less	-1.231***	-1.125***	-1.197***	-1.176***	-1.187***	-1.209***	-1.182***	-1.217***	-1.228***
	(0.146)	(0.141)	(0.143)	(0.143)	(0.143)	(0.143)	(0.143)	(0.144)	(0.144)
Age	-0.0407***	-0.0396***	-0.0438***	-0.0414***	-0.0406***	-0.0412***	-0.0447***	-0.0430***	-0.0410***
	(0.00904)	(0.00886)	(0.00909)	(0.00901)	(0.00907)	(0.00907)	(0.00909)	(0.00906)	(0.00906)
Female	-0.0901	-0.0800	-0.111*	-0.0823	-0.112*	-0.0879	-0.0969	-0.0728	-0.106*
	(0.0628)	(0.0616)	(0.0630)	(0.0626)	(0.0630)	(0.0630)	(0.0630)	(0.0628)	(0.0630)
Has debit card	-0.392	-0.400	0.147	0.161	-0.369	-0.150	0.0166	0.314	-0.361
	(0.344)	(0.316)	(0.292)	(0.286)	(0.333)	(0.312)	(0.297)	(0.289)	(0.341)
Domestic remittances	0.00607	-0.0279	0.0112	-0.0122	0.0291	-0.000337	-0.00423	-0.00395	0.0126
	(0.0642)	(0.0629)	(0.0642)	(0.0639)	(0.0644)	(0.0643)	(0.0643)	(0.0641)	(0.0643)
Government transfers	1.319***	1.235***	1.324***	1.324***	1.332***	1.334***	1.333***	1.317***	1.322***
	(0.0644)	(0.0634)	(0.0644)	(0.0641)	(0.0644)	(0.0643)	(0.0645)	(0.0643)	(0.0643)
Saved	0.698***	0.637***	0.692***	0.661***	0.715***	0.665***	0.680***	0.650***	0.667***
	(0.0718)	(0.0699)	(0.0720)	(0.0714)	(0.0721)	(0.0719)	(0.0720)	(0.0716)	(0.0718)
Borrowed	-0.124*	-0.131*	-0.105	-0.126*	-0.114*	-0.127*	-0.124*	-0.0740	-0.0809
	(0.0689)	(0.0675)	(0.0690)	(0.0686)	(0.0691)	(0.0691)	(0.0691)	(0.0688)	(0.0690)
Constant	-0.518	-0.408	-0.951**	-1.041***	-0.576	-0.678	-0.786*	-1.130***	-0.517
	(0.443)	(0.420)	(0.405)	(0.402)	(0.432)	(0.419)	(0.410)	(0.403)	(0.438)
Observations	2,384	2,384	2,384	2,384	2,384	2,384	2,384	2,384	2,384

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

2.4.4 Conclusions and Policy Implications

The chapter utilized data from the Global Findex wave of 2014 survey. The use of a multilevel approach was motivated by the nature of the data which formed a hierarchy at two levels: individual level and country level. The chapter has clearly demonstrated that country differences explain more than 10 percent of the observed aspects of account ownership.

This chapter found the following key results: First, that at lower levels of income there is lesser association with account ownership compared to higher levels of income. The results clearly shows that majority of those who own mobile account platform are likely to be less endowed with resources. Secondly, age was found to be associated with account ownership. Age and account ownership were shown to be negatively associated. Older individuals were found to be negatively associated with account ownership meaning aging diminishes the need for a formal account in financial institutions.

Thirdly, the chapter has endeavoured to show that there exist differences in financial inclusion across countries. The key differences are largely explained by individual differences although country differences also play a critical role. Many barriers to financial inclusion were investigated with the most critical ones being *lack of money income*, the cost of financial service and distance from the nearest service provider . In other words, having scarcity of money and distance to the nearest financial service provider play the most critical role in influencing the barriers to financial inclusion in Africa. Specifically, it was found that the main barriers were associated with lower income levels and lower educational attainment. The chapter concludes that individuals will less income are more likely to be served by mobile phone account than any other form of account. Aging was also found to influence the tendencies to switch from one form of account to the other. The key findings have shown

how income and age vary with account ownership. Distance expressed in terms of proximity to the nearest service provider also affects account ownership pattern.

Overall, the key factors to consider in the promotion of financial inclusion in sub-Saharan Africa include addressing the problem of income and distance to the service provider. Specifically, policy recommendation should focus on the creation of employment especially among the young who are more likely to demand access to formal financial services. Similarly, the policy should address the problem of financial infrastructure and the supply side constraints that hinder availability of a wide variety of formal financial services by encouraging partnerships between the government and the private sector under the public private partnerships arrangement where major infrastructure is required. The distance to the nearest point of service restricts access and limits use of formal financial services and therefore encourages availability of informal financial services which are hitherto risky and unreliable. The private sector should focus their efforts in developing financial instruments that do not require physical interaction with provider by rather through agency outlets. This may be possible if both the government and the private sector invest in research and development. This is because financial innovation requires huge investment that offers a relatively low risk opportunity for consumers.

CHAPTER THREE
CREDIT ACCESS AND SAVINGS MOBILISATION IN KENYA AND TANZANIA

3.1 Background

Constrained access to credit and savings mobilisation among the low-income households are real limitations to the growth and development of the financial sector in emerging economies. A large proportion of the households are underserved with the formal financial services in many developing countries which has been occasioned by asymmetry of information and the need by lenders to protect themselves against inconceivable risks of default by potential borrowers (Biyase and Fisher 2017). Subsequently, even borrowers with a good credit record have been excluded from the credit market severely limiting the potential for increased investment (World Bank 2000). This situation adversely affects both the supply-and-demand-side of the financial inclusion.

Savings mobilisation plays a critical role in securing funds for productive investment but also requires stable financial institutions to mobilize and allocate resources to most productive ventures. The formal financial system has traditionally disregarded the significance of micro-savers who represent a huge proportion of the populace (Diop et al., 2003). Nevertheless, there has been an acknowledgement of the effective demand generated by rural and peri-urban neighbourhoods for financial services (Thorat 2008). In addition, including this segment of the population into the financial markets has the potential to mobilise savings among the poor and micro-savers for investment into productive opportunities. Recently, there has been a massive influx of people to cities and other major towns in search of opportunities thereby exacerbating the situations in the urban areas. Largely majority of the people living in informal settlements have more or less similar experiences with those who

reside in the rural areas. Therefore, tapping these individuals through engaging their resource mobilisation potential is more likely to deepen their involvement in the economy and ensure more financial inclusion takes place. The impact of financial sector deepening on demand for various financial services has been widely analysed. This chapter, however, adopts a microeconomic technique which has received little attention in literature within the economies of developing countries largely because of lack of precise and consistent data comparable across countries.

The main focus of this chapter is to analyse credit access and savings mobilisation in Kenya and Tanzania and recommend policy interventions aimed at promoting financial inclusion. Not only are the economies of Kenya and Tanzania interconnected but also experience more or less similar challenges arising from the supply side and demand side dynamics. This is particularly true because access to regulated financial services in general for the poor people in the two countries is very limited (Johnson and Nino-Zarazua 2011). Therefore, the focus of policy has shifted from a narrow perspective of providing credit to the poor and low-income earners to widening the range of financial services available to them. The importance of the two countries is also entrenched in the similarity of the factors that influence access to credit and savings mobilization. In addition, the availability of comparable data between the two countries is a major decision criterion. From the foregoing, analyzing the factors associated with access to credit and savings mobilization will help identify the underlying discriminatory indicators to broadening access frontier. This chapter, therefore, analyses the factors across formal to informal financial services.

This is motivated by the increasing quest for broadening financial services frontier in many countries and more especially in sub-Saharan Africa.

Kenya and Tanzania share a common border and therefore, the market within which allocation of various financial services is done cuts across the two countries. The focus of policy framework within these two countries has continued to lean on increasing access to financial services through lowering transactions costs (Johnson and Nino-Zarazua 2011; Al-Hussainy et al., 2008). This approach has proved necessary but not sufficient in dealing with the problem. In order to exhaustively deal with the problem, it is imperative to look beyond the expansion while focusing more on policies that address the underlying constraints. In addition, the policy should focus on addressing specific issues rather than considering the solution in the generic sense.

On the savings mobilisation front, the level of domestic savings has remained low despite many efforts aimed at addressing this situation.   Figure 3.1 shows the trend in Gross Savings as a percentage of GDP between 2000 and 2014. Tanzania's saving strategy has yielded better results than Kenya. On the other hand, access to credit derived from adults with credit from formal institutions is at 7 percent for Tanzania and 10 percent in Kenya. These low levels are not desirable if the economy has to experience meaningful growth targets envisaged in the Vision 2030 for Kenya and Vision 2025 for Tanzania.

Figure 3. 1: Gross Savings as percentage of Gross Domestic Product in Kenya and Tanzania
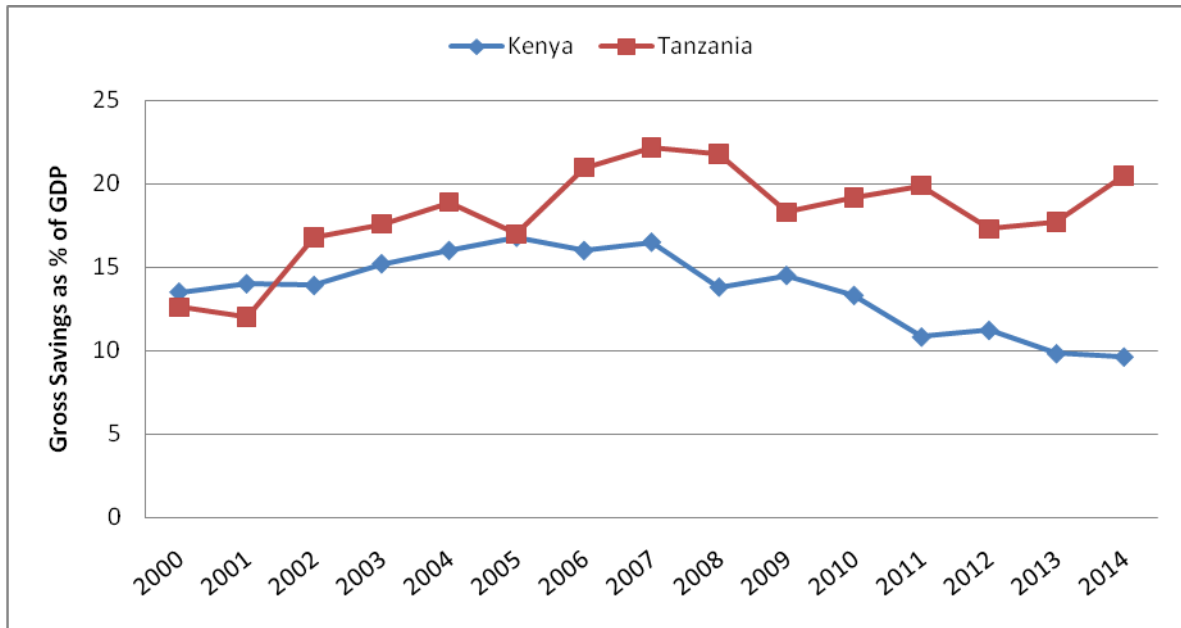
Source: World Bank Statistics, various years

This chapter therefore focused on analyzing the factors that explain access to and use of savings and credit strategies between Kenya and Tanzania. The chapter explored the possible areas of convergence between the strategies employed. The population size of the two countries is fairly similar. The demographic patterns in the two countries are to a large extent the same. The rural population is greater than the urban population. Cross-border trade in services is on the rise between the two countries. The choice of Tanzania and Kenya was therefore informed by strong interconnectedness and similarities in the patterns of financial services available in the two countries. The other motivation is the availability of similar data collected over the same period.

3.1.1 Statement of the Problem

The financial sector has been evolving over time but the majority of the poor people who largely reside in the rural areas remain excluded. Worldwide, about 48 percent of the adult population have no access to formal account making it difficult for them to access other forms of financial services (Demirguc-Kunt et al., 2015, Allen et al., 2016). The proportion of

people accessing formal financial services in developing countries has however been increasing. Kenya and Tanzania have made considerable progress by embracing financial innovations. According to FinAccess data 2016 and FinScope 2013, access to formal financial system stands at 75.3 percent and 57 percent respectively in Kenya and Tanzania. Despite this significant increase in access to financial services, other aspects of financial inclusion still lag behind. Therefore, a huge proportion of the populace remains excluded from accessing these services. For instance, access to credit and savings mobilization in Kenya and Tanzania remains low. Majority of those excluded experience involuntary exclusion either arising from the unavailability of the financial services or some form of inaccessibility beyond the individuals' power. This exclusion has seen informal financial services co-existing with formal financial services despite the obvious risks involved. From the foregoing, financial intermediation is required to ensure financial services reach these people. For instance, availability of credit and savings mobilisation may encourage effective resource allocation to most productive investments. Access to credit and savings influence the welfare of households through multiple channels.

Despite the relevance of credit access and savings mobilisation, a vast majority of small-scale savers continue to be deprived of affordable and secure credit and stable financial system where they can keep their savings. In addition, selective credit policies prevailing in most developing countries have not only hindered savings mobilisation from the domestic economy but also increased inefficient allocation of scarce capital (Donkor and Duah 2013).

From the foregoing, it was imperative to examine how access to credit and savings mobilization between Kenya and Tanzania could be harnessed to create a stable environment where the two economies can be bolstered. Kenya and Tanzania form natural partners in regional economic co-operation and therefore assessing their areas of strength would help

them engage meaningfully in promoting development agenda. Given the recent data collected in both Kenya and Tanzania, scant empirical literature exists comparing the two countries. This chapter is among the first to utilise the demand-side data to compare access to credit and savings mobilisation in Kenya and Tanzania in more detail.

The following are the specific questions under investigation:

1. What are the determinants of access to and use of credit in Tanzania and Kenya?
2. What are the determinants of access to and use of savings mobilization in Tanzania and Kenya?
3. What are the marginal effects of socioeconomic and demographic factors on access to savings and credit mobilisation among households in Tanzania and Kenya?

3.1.3 Research Objectives

This empirical chapter aimed at examining the socioeconomic characteristics of access to and use of credit and savings mobilization in Kenya and Tanzania. More specifically, the chapter aimed at examining the:

1) Determinants of access to and use of credit in Kenya and Tanzania.

2) Determinants of access to and use of savings mobilization in Tanzania and Kenya

3) Marginal effects of socioeconomic and demographic factors on access to credit and savings mobilization among households in Tanzania and Kenya.

3.1.4 Significance of the Study

Access to savings and credit play a significant role towards the realization of the economic potential of a country. Most developing countries are poor and vulnerable yet a large percentage of their population is underserved by the available financial services. To reap

maximum benefits from the financial sector, it is important to ensure all segments of the population operate within the ambits of the financial system. Specifically, if they are offered access to credit and savings from different locations of the country, this opportunity is likely to translate into investment that will, in turn, lead to better living. In this way, service providers will be guided on the design of the relevant credit and savings products for the populace.

This empirical chapter contributes to literature and policy in the following three ways. First, this chapter compares socioeconomic and demographic characteristics of access to savings and credit in a cross-country context and therefore the study is expected to add to the growing work in this area (Ngendakuriyo 2014; Ellis et al., 2010). We also demonstrate how two separate datasets could be enjoined to derive consistent and comparable indicators of financial inclusion at the micro-level as opposed to the common approach of linking financial sector to growth using macro-level variables (Calderon and Liu 2003). Others including Honohan (2005) have sought to establish the relationship between financial sector and welfare improvement. Comparative studies on access to financial services have failed to show why different countries adopt different strategies despite the fact that their economies have more or less similar socioeconomic characteristics. Lastly, gaps have existed in the analysis of access to credit and savings mainly because of scant data amenable to cross country comparisons. The importance of this chapter is thus anchored on the availability of new data that sheds light on the importance of access to specific financial services. Despite the similarities between Kenya and Tanzania, interventional strategies to address the problem of access to credit and savings mobilization are dissimilar. The chapter provides the key focus of policy in both countries. Secondly, this chapter sets the benchmarks for accessing financial services in Kenya and Tanzania by focusing on access to credit and savings mobilization from micro-level data. Finally, this chapter makes a unique contribution by

showing the optimal relativity of access to credit and savings mobilization required to improve household welfare. The chapter aimed at establishing policy convergence between the two countries as a benchmark for regional integration.

3.1.5 Scope and Limitations

This chapter distinguishes key factors perceived to be essential in the two neighbouring countries. The datasets utilized in this chapter were gathered in two distinct settings and the language in the data collection instruments was more or less similar. The datasets include the FinAccess and FinScope for 2013 which are cross-sectional in nature and thus their findings give a broad view of the behaviour of the indicators. Nonetheless, the analysis is restricted to the identified variables in the two cross-country datasets.

3.2 Literature Review

3.2.1 Introduction
This section reviews the existing literature across authors and over time and synthesises them to succinctly bring out the gaps in the literature. Besides the synthesis of the existing literature, this chapter also presents the theoretical literature upon which this chapter is anchored and finally, the overview of the literature is provided to show the gaps that need to be filled.

3.2.2 Theoretical Literature

The traditional theories of savings have yielded divergent views owing to different assumptions made. For instance, Keynesian theory of unemployment, interest and money stated that absolute disposable income is an important factor influencing savings (Keynes 1936). He postulated that since consumption is a function of disposable income, and saving is considered unspent income, therefore saving is also to be seen as a function of income. From the savings-income identity, income is positively related to savings and therefore

unidirectional. Friedman in his Permanent Income Hypothesis (PIH) provides an improvement to the Keynesian theory and according to the Permanent Income Hypothesis (PIH) not only is income an important determinant of savings as stated in Keynesian Economics but also other factors affect the savings function. For instance, PIH showed that both permanent and transitory income, human and non-human wealth plays a role in the savings function. This view is corroborated by Ando and Modigliani's (1963) Life Cycle Hypothesis (LCH) which explains the motives for saving as old age security.

The permanent income hypothesis is based on the assumption that capital markets are perfect. It also assumes that economic and political institutions play a minimal role in the capital markets, despite the fact that they influence the structure and costs of interactions among stakeholders in the markets (Hall 1978). These assumptions, however, hardly hold in developing countries where institutional rigidities in capital markets prevent realization of neo-classical assumptions such as well functioning markets, perfect competition, and perfect mobility of factors of production. Developing countries also face information asymmetry and weak legal systems that limit enforcement of formal contracts (Hall 1978). As a result, individuals opt for financial services in the informal sector as an alternative risk sharing mechanism. In this regard, individuals are likely to borrow funds from people they trust such as close relatives and friends rather than formal financial institutions such as banks. Although the permanent income hypothesis postulates that only permanent changes in income affect consumption, empirical studies show that transitory changes can also affect consumption (Flavin 1981). Thus, savings behaviour is likely to be affected by transitory changes in income. Many empirical studies in developed and developing countries have used these theories to explain household savings behaviour. The findings in developed countries as well as developing countries have been divergent and inconsistent with more recent studies showing that income and savings are positively associated (Kraay 2000; Deaton 1992).

Access to credit and savings play a vital role in developing countries in many ways. In these countries, a large part of their population is financial excluded mainly because of poverty. Access to credit becomes an imperative instrument for smoothing consumption. In addition, unexpected events may create the need to obtain credit. The credit market becomes a meeting point for both lenders and borrowers. In low-income nations, there are substantial proportions of transactions taking place in the informal market despite the obvious risks involved. The informal sector is generally unregulated and displays elements and features uncommon with institutional lending organisations exposing potential borrowers to boundless risks.

Adverse selection theory regarding the functioning of credit markets postulates that lenders do not have the ability to discriminate among borrowers of varying magnitudes of risks (Stiglitz and Weiss 1981). Accordingly, the loan contracts entered are liable to limited risk. Bester (1985) explored the key function played by collateral in establishing a loan contract choice. Conventional financial institutions do not favour micro-savers because they perceive them to be risky and costly. For instance, Chan and Thakor (1987) focused on the effect of collateral on the quality of credit. In this model, consumption of insurance services was found to be a positive function of the quality of credit received. Igawa and Kanatas (1990), noted that the use of collateral is a positive function of the quality of credit. Nwanna (1995) contends that the experience of the poor limited their access to credit and savings mobilisation because of institutional and household level factors. Households presented low levels of income that render them a high-risk profile tag and therefore rated poorly by potential lending institutions (Dallimore and Mgimeti 2003). The high-risk profile households resort to acquiring credit from informal sources to take care of their demand (Montiel et al., 1993). This is mainly because most poor households do not have access to formal risk management tools such as insurance, credit and savings but are also exposed to other aspects of vulnerability and shocks (Ardington et al., 2003).

Literature on access to credit and savings has concentrated on the extent to which the population is excluded from financial services. A lot of energy has been expended to achieve maximum benefits by being financially included. This chapter draws on the extant literature regarding the functioning of the financial markets within the context of resource allocation to different segments of the population. Capital market imperfection within the context of developing countries poses a serious challenge to resource allocation. In essence, this environment breaks the neo-classical assumptions that posit that capital markets efficiently allocate resources to the most productive use. From the foregoing, it has become clear that informal sector plays the role of risk sharing (Cox and Fafchamps 2007). Consequently, a greater part of the poor households lack access to bank accounts that would have ensured easier access to both credit and savings (Banerjee and Duflo 2007).

Numerous households around the globe are known to save for various reasons (Vogel 1984; Zeller et al., 1998) and in different forms (Fernando 2007). The main motives for saving include the precautionary behaviour, life-cycle considerations, the need to exploit investment opportunities, the desire to smooth consumption, and the need to amass financial resources to make large purchases at a future date (Mirach and Hailu 2014). According to the permanent income hypothesis, individuals are less likely to save in the current period if they expect an increase in future income and vice versa. This perspective is supported by empirical studies that have found excess sensitivity of consumption to changes in income (Hall 1978; Flavin 1981). The propensity to save declines as consumption increases due to expected increase in future income. Because the majority of the people live below the poverty line in most developing countries, they therefore lack the capacity to own bank accounts. Empirical evidence shows that the poor would have the capacity to save if appropriate facilities were available and affordable (Kelkar 2009).

According to Schmidt and Kropp (1987), limited access to financial services, including credit and savings account arises due to the lending and savings policies adopted by financial institutions. These include minimum loan amounts, fixed repayment periods, lengthy and complicated application procedures (Atieno 2001). In cases where the repayment period, the banks' lending terms and conditions, and required security do not match the needs of the borrower, the target group will choose not to access credit even if it is available. This leads to the credit-rationing problem, which in turn increases the use of informal sources at the expense of formal banking sector.

3.2.3 Empirical Literature

Studies investigating the factors affecting access to credit and savings mobilization in developing countries have been scanty. However, with increased availability of consistent and systematic data, it has become possible to explore the extent of financial inclusion in these countries from either the demand-side or supply-side perspective.

For instance, using a two-wave round of survey, Mwangi and Sichei (2012) used a multinomial probit model to look into the factors influencing access to credit in Kenya where they indicated that age, gender, household size, education, marital status, distance and income are important determinants of access to credit. They also provided evidence in support of the quadratic relationship between age and access to credit. Access to credit increased among middle-aged individuals but began to decline as one approached retirement age. This study, however, did not make use of other variables we considered critical such as social capital. However, the age-access to credit view has been authenticated by Johnson and Morduch (2007), Le Blanc et al., (2014), Bhuiya et al., (2001) and Diagne (1999). In Le Blanc et al., (2014), age is found to limit access to credit while in Ngendakuriyo (2014), an expanding age raises the likelihood of holding savings product. The current chapter incorporates social

capital to the variables used in the previous studies and found out that it is an important factor that influences access to credit and savings mobilization.

Ngendakuriyo (2014) applied a panel of five countries using different datasets collected at different points in time. The results from this approach may have inconceivable inaccuracies mainly because the assumptions underlying the datasets have not been reconciled across all datasets. The findings showed that age increased the probability of saving up to a level beyond which it began to decline. Middle-aged individuals were more likely to save in banks, whereas the aged were more likely to save in Micro Finance Institutions (MFIs) and informal financial institutions. Similarly, men had a higher probability to save in banks and SACCOs whereas women had a higher access to informal savings and credit mechanisms. Bovenberg and Evans (1990) show that ageing lowered the likelihood to save because such population is in its second period whereas Foley and Pyle (2005) found the young and elderly population to have a higher likelihood to save than the middle-aged population. Old people have often been viewed as less creditworthy; thus, access to credit is likely to reduce as one approaches old age. Foley and Pyle (2005) used panel data collected over five rounds starting from 1995 to 2001 with the aim of examining household savings rate in Russia during the transition period. The transitioning period provided a limit to the applicability and generalizability of the results as the period examined fundamentally deviates from the normal period situation.

In a related study, Mwalughali (2013) used institutional data to assess the impact of membership on household income in Malawi. The institution's mandate was to provide a savings platform for members' surplus resources. The key per capita variables considered included land per capita, income per capita and credit per capita. The study used the binary probit model to assess the impact of savings on household income. This study used the proxy variable of membership to assess the impact of savings on income. The key weakness in this

study was the assumption that in a group membership all members contributed to the scheme. The author, however, used the instrumental variables methodology to deal with the endogeneity problem and established that age of the household head, sex, and distance from the location of the institution were key determinants of household savings. However, this study did not apply the standard sampling approaches since it used the institution as a case study. The findings are consistent with Akudugu (2013) who used the Global Findex dataset of 2011 to assess the determinants of financial inclusion in Western Africa. Akudugu (2013) applied the logit model and found out that only two in five adults were included in the formal financial services in Ghana. Age of household head, financial literacy, wealth class, lack of documentation, distance to the nearest financial service provider, lack of trust in financial institutions, poverty of money and social networks are key determinants of financial inclusion in Ghana. The study assumed that the data could not be subjected to hierarchical modelling unlike Pailwar et al., (2010) who uses the multilevel model to assess the impact of membership of financial institutions on rural savings. Pailwar found out that such membership explained a large proportion of the variation in rural household saving.

The role of gender in access to credit among urban slum residents in the Philippines was investigated by Malapit (2012) using survey data for the period between 2002 and 2006 where it focussed on wealth and non-formal lenders who relied on the reputation and history of borrowers to screen potential borrowers. The study revealed that women were likely to face credit constraints than men and thus concluded that targeting credit interventions to women in urban poor settlements was necessary. Despite the findings the major weakness of the study was in its scope of coverage thereby limiting its applicability. The findings of Malapit (2012) are corroborated by Mwangi and Sichei (2012) who found that men had a higher likelihood of accessing loans from banks and SACCOs, while women from the MFIs and local shops. Credit constraints are likely to be higher for women because of

discrimination tendencies by potential lenders. Additionally, women are involved in social and economic roles such as homemaking, which limit their ability to establish adequate lender networks from whom they can obtain credit. According to Malapit (2012), the consequences of delays in loan repayment are more severe in women than in men however; women are more likely to demand more loans than men and this is partly due to the fact that women bear the greatest responsibility of managing day-to-day consumption patterns in households, which increases their appetite for credit.

Using a Tobit model to analyze major determinants of household savings Mirach and Hailu (2014) found out that the key determinants of household savings included age, sex, marital status and income. In this study, women were more likely to save than men. This is inconsistent with the previous results where men had a higher likelihood to save than women. Women and men were found to have different propensities to save because of the differences in their perception of risks and interest rates, as well as, other gender-related factors that influence savings behaviour. In this regard, women were more likely to save than men because of their conservative behaviour in investment decisions. They prefer to hold their assets in fixed rather than liquid assets (Mirach and Hailu 2014).

Mwangi and Shem (2012) concluded that effective marketing strategies are required to enhance financial inclusion in terms of access to savings accounts and credit facilities. Marketing creates awareness on the benefits and availability of various savings and credit products, thereby facilitating inclusion. This argument is anchored on the fact that access to credit and savings products was found to be influenced by several socio-economic factors that if exploited through appropriate marketing strategies could positively affect the decision to adopt savings and credit services (Mwangi and Shem 2012). The socio-economic factors included age, level of education, ease of reaching a savings facility, availability of M-Pesa

services, wealth, and group affiliation. Ageing increased access to savings and credit services in the formal financial market, but reduced access in the informal market. Large households were found to have high dependency ratios, which negatively affected access to credit and savings. In a related study, Sedirwa (2015) using a probit method to assess what influences saving behaviour in Botswana found out that age, education and income, have a positive and significant influence on household savings behaviour although formal and informal credit and insurance have a negative and significant influence on household saving behaviour.

Family size and family composition have been found to produce uncertain impacts on access to savings and credit. Families with large size and/or many children are less likely to save (Orbeta 2006; Loayza and Shankar 2000) consequently constraining access to credit. This behaviour is partly due to strong intergenerational links existing in most developing countries (Gersovitz 1988) which lessen the need to save. Mwangi and Sichei (2012) found that an increase in household size enhanced access to credit from a buyer of households' harvest, but reduced access to the formal financial system. This is attributed to adequate labour to produce surplus agricultural products, which could be used to access credit services.

Income facilitates access to credit and savings services, especially in developing countries where financial inclusion is still low. Individuals with reliable sources of income are likely to have at least one savings account to accumulate capital since they are likely to have surplus disposable income (Fernando 2007). In addition, they can use their source of income as collateral to access credit from formal financial institutions. Indeed Ike and Umuedafe (2013) in their study of determinants of savings in Nigeria found that the volume of savings among rural farmers was determined by the amount of income obtained from farming and non-farming activities. Thus, low productivity and limited access to credit were the main factors that constrained accumulation of savings among farmers. Farmers generally saved to increase

their productivity (Ike and Umuedafe 2013). These findings suggest that strategies focused on improving access to savings accounts should include measures that are aimed at expanding income opportunities in the target population.

Pailwar et al., (2010) concurs with Ike and Umuedafe (2013) by supporting the argument that improving the incomes of the rural poor is central to expanding access to savings and credit services. The authors used primary data and hierarchical regression to show that income produced a positive effect on mobilization of savings. In addition, location proxied by distance to the nearest financial institution (within 5-kilometre radius) had a positive effect on savings. Membership in financial institutions was also important in the mobilization of savings. However, some institutions such as banks and insurance companies had more influence on savings than others such as SACCOs (Pailwar et al., 2010). Pailwar et al., (2010) corroborates Akudugu (2013) findings who found a negative effect of poverty on access to credit and savings. Pailwar et. al. (2010) established dependency ratio to have a negative effect on savings. This is consistent with Orbeta (2006) who argued that large families are less likely to save due to their high dependency ratio. A large family is likely to spend most of its income on recurrent expenditures/ basic needs, which reduces its marginal propensity to save.

According to Mwangi and Shem (2012), wealth proxied by ownership of assets such as cattle and mobile phones is a key determinant of access since the wealth can be turned into cash and deposited in bank accounts. Having a mobile phone, on the other hand, is important because it facilitates the use of M-Pesa, which provides savings, credit, and money transfer services. Using multinomial probit estimation, Ngendakuriyo (2014) showed that wealthier households and individuals with high levels of education had a high probability of saving in banks, SACCOs, and MFIs than in informal institutions and secret places.

In Indonesia, Gitaharie et al., (2014) found that the probability of a household to access credit for businesses from banks, non-bank, and individuals was influenced by income-related factors such as employment status and poverty level. Banking public education programs also improved access by creating awareness on the availability and benefits of financial services in the country. Ownership of assets such as a house, computer, and a phone also influenced access to credit. This suggests that wealth positively affects access to credit services since it can be used as collateral in the formal and informal sources of credit. However, this is inconsistent with Malapit (2012) who found that lenders in the informal sector depended more on the borrowers' creditworthiness rather than wealth to evaluate loan applications.

Using a probit model, Mwalughali (2013) showed that land per capita had a positive effect on access to credit. This means that having adequate collateral is a key determinant of access to credit. This is based on the fact that financial institutions prefer to provide secured loans to avoid default risks, especially among poor customers with no steady sources of income. A key challenge in providing credit based on collateral is that poor households, especially in rural areas may not have access to collateral. As a result, they will remain locked out of the formal financial system.

Individuals often consider the costs and the benefits associated with various credit and savings products before making a decision to be included or not. High costs are expected to reduce access, whereas benefits are expected to improve access. Ngendakuriyo (2014) analysed the determinants of household savings mobilization in East Africa Community (EAC) and established that transaction costs and deposit interest income influenced individuals' decisions to save in financial institutions and informal mechanisms such as secret places. Additionally, larger households were more likely to save in informal institutions and

secret places due to the convenience of accessing the funds, low costs and lack of adequate funds to maintain regular savings accounts in banks.

According to Mirach and Hailu (2014), a household's propensity to save is determined by income, inflation rate, and the interest paid on bank savings accounts. Inflation discourages savings by eroding the value of money or income over time. Additionally, low-interest rates on deposits can discourage the uptake of savings products, especially during high inflation because savers will not be able to get value for their money. This suggests that efforts geared towards improving the uptake of savings products should also address barriers such as inflation, which make such products unattractive to the target population.

Empirical evidence shows that the higher the interest rate the higher is the likelihood that households will have access to informal financial services (Kochar 1997; Mwangi and Ouma 2012). In the same vein, social capital measured by group membership is positively related to use of formal financial services. In his study of rural households in Nicaragua, Vaessen (2001) evaluated access to credit by the families and demonstrated that the moneylender and the household attributes were essential impacting access to financial services.

In Kenya, Mbuthia (2011) found that resource constrain was the main barrier to access to bank account. This study supports the argument that access to regular income promotes uptake of savings and credit products. Perception of the interest rate paid on deposits and the availability of formal financial institutions were also significant determinants of savings (Mbuthia 2011). High deposit interest rates promote mobilization of savings since it rewards savers for their efforts to save for the future.

A properly functioning credit market has to be established to facilitate access to credit products. This means that the market should be large enough to avoid credit rationing, which

often leads to high-interest rates and exclusion of the most vulnerable households and enterprises. According to Atieno (2001), small enterprises in rural parts of Kenya did not have access to credit due to rationing. In the informal financial sector, credit rationing was attributed to financial resource constraints among lenders. By contrast, rationing in the formal sector was attributed to lending terms and conditions adopted by lenders which acted as barriers to access to credit. Apart from rationing, access to credit was limited by lack of information concerning the available credit facilities and the cost of accessing them. This finding is consistent with Mbuthia (2011) who found that access to credit increased with increase in availability of information concerning available credit products. Atieno (2001) also found out that lack of required security had a negative effect on access to credit. This supports Mwalughali (2013) who found that availability of collateral in terms of land increased access to credit.

Location is another factor considered in the literature although different studies measure it differently. The findings of how location impacts savings and access to credit are mixed. While some studies show that location is a significant determinant of access to savings and credit (Kraay 2000, World Bank 1993), others fail to attach this importance to location in the urban neighbourhoods (Kulikov et al., 2007). World Bank (1993) pointed out that savings and credit schemes with a wide network of branches lower the transaction costs for micro-savers and offers appropriate and affordable credit facilities because of the location of the financial institution. This is consistent with Akudugu (2013) who found out that distance had a negative effect due to the high cost of accessing services in the absence of financial institutions within a 5-kilometre radius. Mwangi and Ouma (2012) also found that distance had a negative effect on access to credit. This further underscores the need to improve the availability of financial institutions to enhance access to credit and other services.

According to King (2012), distance and time to the nearest banking infrastructure such as bank branch or agents are significant barriers to financial inclusion in Kenya. Despite the significant expansion of bank branch network, the negative effect of distance and time to banking infrastructure remains a challenge. This suggests that a large number of Kenyans are still not able to access savings and credit products despite the increase in availability of financial institutions in their areas of residence. However, mobile banking increased access to credit and savings services by eliminating the costs associated with distance and time to the nearest banking institution (King 2012).

Focusing on the Kenyan economy, Mbuthia (2011) found out that a household's decision to save in a formal, informal, or semi-formal institution is mainly informed by among other factors the information they have about existing financial institutions, level of household income, and credit availability in financial institutions. Savings are likely to increase if the target population has adequate information concerning the financial health of the formal financial institution through which they intend to save. Information improves the trust and confidence of potential savers. As a result, individuals will tend to save in institutions that are associated with minimal risks to avoid losing their money.

According to Johnson and Zarazua (2011), financial perception has a significant effect on the decision to adopt and use savings account and other bank services. Specifically, the perception that an individual can survive without a bank account leads to a decline in the likelihood of accessing a general account. The decision to invest and access a savings account was affected more by financial behaviour than financial perception (Johnson and Zarazua, 2011). However, financial behaviour did not have any effect on access to and use of insurance products.

According to Mwangi and Ouma (2012), households are more likely to borrow from the informal sector than the formal banking sector due to their perception of the interest rates charged in the two sectors. Borrowers perceived interest rates in the formal banking system to be very high. Thus, they avoided borrowing from banks and SACCOs. This calls for strategies that improve access to information concerning the interest rates charged by various financial institutions to eliminate perceptions that act as barriers to access.

The business model adopted by financial institutions can significantly influence access to savings account and credit facilities (Allen et al., 2012). An appropriate business model must allow the financial institution to reach the unbanked segments of the population with relevant products to satisfy existing financial needs, while maintaining acceptable levels of profits. In a study of access to banking services in Kenya, Allen et al., (2012) found that Equity Bank had adopted a business model that focused on serving the populations that had been locked out by the traditional banking system. This included individuals with low income, low levels of education, without permanent houses, and without salaried jobs. As a result, the bank contributed to significant increase in access to savings accounts and credit among households. The increase was attributed to the massive branch network expansion program that the bank implemented to reach households in rural and remote locations. The resulting reduction in distance to the nearest financial institution promoted uptake of savings account and credit products.

Recently, MFIs have included in their business models financial education programs to enhance uptake of credit and savings products. Participation in savings and credit institutions' education programs is expected to provide the knowledge and experience that individuals require to make the decision to be included in formal financial system. Mwalughali (2013) supported this argument in his study which found out that participation in community savings

and investments programs in Malawi had a positive effect on access to credit and household income. The study employed a probit model whose results showed that the decision to participate in community savings and investments programs was determined by sex of the household head, land per capita, distance to the nearest program's office and credit per capita.

In their study of mobile phone financial services as a business model for delivering savings and credit products, Mbiti and Weill (2011) concluded that M-Pesa significantly increased access to financial services in Kenya by increasing competition, which in turn reduced transaction fees among competitors. They found that frequent users of M-Pesa services were urban residents, highly educated, banked, and affluent. The use of M-Pesa was associated with a decrease in the use of informal savings mechanisms. Additionally, it increased the probability of being banked. This implies that M-Pesa complements bank services by increasing demand for financial services. Although mobile money account provided opportunities for saving, it was mostly used to transfer funds between individuals rather than to savings account (Mbiti and Weill 2011). This finding was attributed to the fact that holding funds in mobile money savings account had a higher opportunity cost. The implication is that M-Pesa is not likely to promote significant positive savings behaviour even if it paid interest rates on deposits that are as high as those provided by commercial banks.

Access to credit can positively change saving behaviour among individuals and micro-enterprises. Financial institutions prefer to lend to customers who already hold a savings account with them since they are likely to have a better understanding of such customers' financial needs and ability to repay loans. Rogg (2000) found that increased access to credit motivated borrowers to shift their savings from less liquid assets such as livestock and jewellery whose returns are often low or negative into deposit accounts in banks that guarantee positive returns. One of the factors that promoted the shift in savings behaviour

was increased availability of information and improved confidence in existing financial institutions. The positive returns from bank deposits attracted savings from the public, thereby increasing overall access to savings services (Rogg 2000). The increase in access to savings accounts had welfare effects, which included increased income and access to credit facilities. In addition, it promoted the development of the financial market by improving the depth and liquidity, which in turn improved access to various financial services.

3.2.4 Summary and Gaps in Knowledge

Existing studies on the determinants of access to credit and saving mobilisation have adopted both macro and micro techniques . In spite of the many studies done in this field, literature remains inconclusive as to the direction and sign of the relationships. Equally, most of these studies make use of primary data sources that have inconsistent indicators across countries. Other studies have regularly limited the scope of savings and credit sources. In this chapter, keeping money in secret places was seen as a form of saving. Majority of the poor people were classified in this category. Similarly, a few more studies have adopted a narrow definition of access to savings mobilisation and credit on the basis of available data. This chapter defines access to credit and savings mobilisation taking into account the type of data available and the region within which the study is being conducted.

Studies focusing on access to credit and savings mobilisation adopt a functional definition of availability and affordability of financial services (Cracknell 2012; Birkenmaier and Tyuse 2005) to households. This has generally been because of availability of more supply side data in the vast majority of the nations including Kenya thus limiting the evidence from cross-country studies.

In this chapter, we identified indicators common to both countries, that is Kenya and Tanzania so as to enable a cross-country analysis with the unit of analysis being the

household. The literature has overwhelmingly pointed out the most critical factors affecting access to credit and savings mobilisation which includes perceptions, demographic variables as well as socioeconomic variables. A few studies have also highlighted the importance of cognitive role in assessing access to credit and savings. While the focus of literature has been more on unravelling the demand side dynamics, little is known about the supply side. However, with increasing availability of demand side information, there has been a growing need to explore in details the role of social networks and spatial distribution of financial needs which were hitherto given less attention in previous studies.. This chapter thus focused on two key issues: inclusion of additional variables to already existing models and assessing their impact using the latest available demand-side datasets to find out the performance of the variables across the two countries.

Table 3.1 presents a summary of selected empirical literature and from it, we discern key issues about our findings For instance, individual households have a high affinity for non-formal savings channels than formal (Ngendakuriyo 2014). On the other hand, Le Blanc et al., (2014) identify age, gender, marital status as important determinants of access to credit. Similarly, Mwangi and Sichei (2012) conducted a comparative study on access to credit in Kenya between two rounds of survey in which gender, household size, age, education, marital status, income and distance were found to be the key determinants of access to credit. Although intra-country comparative analysis of access to credit has been carried out, we are yet to encounter a study that compares both Kenya and Tanzania in light of access to credit and savings mobilisation. We note that although these two countries are situated side by side, key country differences are likely to have an effect on the aspects of financial inclusion being investigated. Social capital is one of the key variables whose effect on access to credit and savings mobilisation has been the subject of many studies (Mwangi and Ouma 2012; Bhuiya et al., 2001; Vaessen 2001). However, the concept has attracted numerous definitions

depending on the context. This chapter unlike many other studies adopts a multipronged approach of group membership. Instead of the common binary approach to group membership we instead used the number of groups one belongs to rather than just belonging to a group. Although Johnson and Morduch (2007) pointed out the important determinants of access to credit are demographic, socioeconomic and geographical factors, they however do not show the extent to which these factors affect access to credit and savings mobilisation. Fernando (2007) affirmed the importance of providing a wide variety of financial services for a higher savings rate.

Table 3.1 : Summary of Selected Empirical Literature

Author and year	The Title	Methodology	Findings
Ngendakuriyo (2014)	Determinants of household savings mobilisation across EAC countries: An Exploratory Analysis	Multinomial Probit Model	Show that people will probably hold investment funds in non-formal reserve funds channels than formal.
Mwangi and Ouma (2012)	Social capital and access to credit in Kenya	Bivariate Probit Estimation	Social capital was found to increase financial inclusion through enhanced access to informal credit.
Mwangi and Sichei (2012)	Determinants of Access to Credit by Individuals in Kenya: A Comparative Analysis of the Kenya National FinAccess Surveys of 2006 and 2009	Multinomial Probit Estimation	The size of the household, age, education, income, marital status of the household head together with distance from the service provider were found to be important determinants of access to credit
Johnson and Morduch (2007)	The unbanked: Evidence from Indonesia	Binary Probit estimation	Demographic, socioeconomic, and geographic factors found to be important determinants of credit access
Le Blanc et al., (2014)	Household Saving Behaviour and Credit Constraints in the Euro Area	Probit estimation	Sex, age, marital status found to influence access to credit.
Fernando (2007)	Effect of financial access on savings by low-income people	Ordinary Least Squares regression	Enhancement of access channels to a wide variety of financial services had a positive effect on savings rate through income.
Vaessen (2001)	Accessibility of Rural Credit in Northern Nicaragua: The Importance of Networks of Information and Recommendation	Logistic regression	Access to wide network coverage, availability of information and willingness and capacity to take a loans significantly influence the probability of having credit.
Bhuiya et al., (2001)	Micro-credit and emotional wellbeing: Experience of poor rural women from Matlab, Bangladesh	Binary Logit/Logistic regression	Being a member of a micro-credit organisation lessens the emotional strain while increasing economic development.
Diagne (1999)	Determinants of access to and participation in formal and informal credit markets in Malawi	Nested multinomial logit model	The findings pointed out that informal and formal credit were imperfect substitutes after investigating the effect of interest rate, asset composition in the credit market.
Ranjula (2002)	Credit rationing in rural India	• Probit regression with partial observability • Univariate probit regression • Two-sector Model	Affirm a high level of credit rationing in India's Puri district showing the limited nature of rural credit in India.

3.3 Methodology

3.3.1 Research Design
The chapter utilizes the Financial Access (FinAccess) and FinScope survey datasets of 2013 for Tanzania and Kenya which are broadly representative. These are cross-sectional datasets with similar variables. The research design used in this chapter is conclusive research design that is anchored on quantitative relationships among variables. In Kenya, the sample clusters were selected to guarantee representation at all levels. At the individual level, the sample determination was done using KISH technique that randomly selected adult individuals with an aggregate of 6,449 interviews being recorded.

In Tanzania, an aggregate of 800 specification ranges was secured both on the territory and Zanzibar Island. The aggregate meetings directed were 8,000 producing an aggregate sample of 7,987 interviews.

This section highlights the methodological approaches used. We first present a theoretical framework upon which the chapter is anchored. The estimation model and the relevant variables and measurements are presented as well. Finally, we indicate the sources of data and the econometric techniques adopted. Data sources and the econometric techniques are also presented.

3.3.2 Theoretical Framework : The Random Utility Model(RUM)

The random utility theory, a characteristic theory of choice has received proportionate support in the literature (Luce 1959, Marschak 1960, McFadden 1974) and in this chapter we review the theory in the context of households' financial services preferences. This theory first assumes that a variety of financial services are available to consumers and therefore the choice alternative depends purely on the amount of utility derived from their choice.

According to the theory the consumer seeks to maximize the utility from consumption of the available choices given their budget constraints and thus any alternative they choose is thus assumed to be their utility maximizing alternative. The econometric methods of random utility models are based on the reviewed work of McFadden (1974) and Morey (1994). Subsequently probabilistic models have been derived from decisions arising from alternatives available for each given scenario.

Following the RUM and assuming economic agents are rational, we assume that an individual i is a utility maximiser subject to their budget constraint. The utility associated with selecting an option j among the different choice options (access to credit and/or access to savings) can be specified as follows:

$$\bigcup_{ij} (X_{ij}; Z_{ij}) = V_j(X_{ij}; \beta) + \varepsilon_j, i = 1, 2, ..., N; j = 1, 2, ...M$$ 3.1

where,

$U_{ij}(X_{ij}; Z_{ij})_j$ represents the utility enjoyed by individual i, from accessing saving or credit product of alternative j.

X_{ij} represents the observed characteristics of individual i and choice alternative j.

Z_{ij} represents the unobserved characteristics of individual i and choice alternative j.

$V_j(X_{ij}; \beta)$ represents the utility deterministic component.

ε_j is the utility random component

From the utility framework in 3.1, we modelled the decision to access savings and credit products as follows:

$$Max_{(x,d)} U(X, Z)$$

subject to

$$M \geq 0, d=1, q_d=q$$ 3.2

The maximization problem in 3.2 states that the individual maximizes utility subject to three constraints ($M \geq 0$, $d=1$, $q_d=q$). d represents the indicator function such that only one alternative can be selected from the given options namely, 1 if the given alternative is chosen and 0, otherwise. The alternatives available include access to savings, credit equal 1 and 0 otherwise. The first constraint states that the income is either greater than or equal to zero and represents the budget constraint. The third constraint shows that the alternative chosen provides the quality demanded by the individual. However, this constrain is shown in the maximization problem but available data is limited in the extent to which it can investigate quality. In the current format, the model states that individuals receive utility from accessing savings and /or credit subject to their budget constraint and other factors that are largely non-price. The model, therefore, focuses on utility derived from accessing the good or service and not non-use utility.

3.3.3 Empirical Model

The basic model assumes that utility is derived from accessing savings and/ or credit products subject to several factors. Among the factors that affect access to savings mobilisation and credit include age, income, education, marital status social capital, location and gender.

From 3.2, we further assume that the budget is exhausted by the cost of accessing the chosen alternative. Hence,

$$X = M \text{ ....3.3}$$

Now substituting for X in 3.2 yields

$$U_x = U_x(M, V_x) \text{...3.4}$$

where V_x represents other constraints other than income.

The consumer's problem is therefore reduced to solving equation 3.4 stated as

$$Max_{(x)} U_x(M, V_x) \dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots 3.5$$

Solving equation 3.5 will yield a set of demand equations for discrete alternatives as shown in equation 3.6.

$$\delta_j = \begin{cases} 1, if U_j = \max\{U_1, \dots U_x) \\ 0, otherwise \end{cases} \dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots 3.6$$

Discrete demand equations in 3.6 show that individuals reveal their preferences based on their choice alternative. Therefore, the chosen alternative derives more utility than the alternative foregone i.e $U_x > U_{x'}$ for all x' and x. Since not all attributes may be observed by the researcher, it, therefore, defines the randomness in utility hence random utility model. What the researchers do is to predict the probabilities of the chosen alternative being the best in the set. This is possible because our dependent variable is discrete taking on specific values.

From the theoretical framework of utility maximization, we can derive the empirical model used in the estimation equations. In each of the choice alternatives available to consumers, there is an associated random utility to it. Alternative choices have specific utility levels which cannot be observed. Consumers have been exposed to a variety of choices of financial services access strands with respect to savings and credit classified under formal, formal other, non-formal and excluded. The utility model assumes that an individual is rational and that rational decision will prevail in the choices they make. Since each of our dependent variable is dichotomous taking on 1 if the individual has access to savings or credit and 0 otherwise then if we let U_{ij} be individual i's utility of alternative j, then j takes either 0 or 1. Subsequently, we assume that

$$U_{ij} = v(X_{ij}, \beta) + \varepsilon_{ij} \quad \dots\dots\dots 3.7$$

The terms are as described in equation 3.1

A utility-maximizing agent i selects alternative j if $U_{ij} = \max(U_{i1}, U_{i2})$ which means that

$$Y_i = \begin{cases} 1 & \text{if} \quad U_{i1} > U_{i0} \\ 0 & \text{if} \quad U_{i1} < U_{i0}. \end{cases} \quad \dots\dots\dots 3.8$$

If we let the cumulative density function (cdf) of $\varepsilon_{i0} - \varepsilon_{i1}$ be F (z) that is,

$$F(z) = P(\varepsilon_{i0} - \varepsilon_{i1} \leq y). \quad \dots\dots\dots 3.9$$

It follows from 3.9 that

$$E\left(Y_i \mid \mathbf{X}_{i1}, \mathbf{X}_{i0}\right) = P\left(U_{i1} > U_{i0} \mid \mathbf{X}_{i1}, \mathbf{X}_{i0}\right) = P\left(\varepsilon_{i0} - \varepsilon_{i1} < v(\mathbf{X}_{i1}, \boldsymbol{\beta}) - v(\mathbf{X}_{i0}, \boldsymbol{\beta})\right) = F\left(v(\mathbf{X}_{i1}, \boldsymbol{\beta}) - v(\mathbf{X}_{i0}, \boldsymbol{\beta})\right). \dots$$
$$\dots\dots\dots 3.10$$

The function $v(\mathbf{X}_{ij}, \boldsymbol{\beta})$ is assumed to be linear in parameters, that is,

$$v(\mathbf{X}_{ij}, \boldsymbol{\beta}) = \mathbf{X}_{ij}\boldsymbol{\beta} \equiv \beta_0 + \sum_{k=1}^{m} X_{ijk}\beta_k \quad \dots\dots\dots 3.11$$

Following from 3.10, we can write 3.11 as follows;

$$h(\mathbf{X}_{i1}, \mathbf{X}_{i0}, \boldsymbol{\beta}) \equiv E\left(Y_i \mid \mathbf{X}_{i1}, \mathbf{X}_{i0}\right) = F(\mathbf{X}_i\boldsymbol{\beta}) \quad \dots\dots\dots 3.12$$

where $\mathbf{X}_i = \mathbf{X}_{i1} - \mathbf{X}_{i0}$.

This formulation assumes that X_{i1} and X_{i0} are independent and normally distributed, that is

$$\text{Var}\left(\varepsilon_{ij} \mid \mathbf{X}_{i1}, \mathbf{X}_{i0}\right) = \tau_j^2. \quad \dots\dots\dots 3.13$$

Then, restricted by the condition (X_{i1}, X_{i0}), it follows that,

$$\varepsilon_{i1} - \varepsilon_{i0} \sim N\left(0, \tau^2\right) \quad \dots\dots\dots 3.14$$

where $\tau_1^2 + \tau_2^2 = \tau^2$ Hence

$$F(z) = \Phi\left(\frac{y}{\tau}\right), \quad \dots\dots\dots 3.15$$

and the resultant equation is the Probit model

$$h(\mathbf{X}_{i1}, \mathbf{X}_{i0}, \boldsymbol{\beta}) = \Phi\left(\mathbf{X}_i\boldsymbol{\beta}^*\right) \quad \dots\dots\dots 3.16$$

where $\beta^* = \beta/\tau$.

Hence the suitable model is the binary Probit model of the form:

$$y_i = \beta x_i + \varepsilon_i$$

....3.17

y_i is the likelihood that financial mode i (where i is each of the result variables) will be selected. The compressed form of the replica to be approximated thus takes the form:

$$y_i = y_i(x_i, \varepsilon_i)$$

....3.18

Where, y_i is the relevant dummy variable signifying access strands: formal, formal other, informal, and excluded. xi represents independent household attributes in the FinScope and FinAccess datasets. ε_i is the error term. Equation 3.18 resembles equation 3.4 of the utility maximization problem. The choice of variables used in the empirical model is informed by literature and has been extensively used in other studies such as (Le Blanc et al. 2014; Mirach and Hailu 2014; Malapit 2012; Johnson and Morduch 2007) although two key distinctions exist between these studies and the current. First, the current study is set in a completely different environment in terms of time and space. Secondly, the study has a unique combination of variables across the two comparable countries. Indeed, the study uses the quantitative techniques to standardize the variables allowing for comparability. In the empirical model in equation 3.19, we have included non-income factors mainly socioeconomic and demographic factors in the equation.

$$FAccount = \beta_0 + \beta_1 Age + \beta_2 LogAgeSqrt + \beta_3 Gender + \beta_4 Location + \beta_5 MaritalStatus$$
$$+ \beta_6 Education + \beta_7 SocialCapital + \beta_8 Income + \upsilon_s$$...3.19

FAccount is a binary measure of access to savings and credit account.

3.3.4 Seemingly Unrelated Regression Equations (SURE) Models

The equation 3.19 describes the behaviour of account ownership that facilitates access to savings and credit in response to a set of explanatory variables. This is a comparative study of Kenya and Tanzania which involves multiple equations with standardized variables. In each country, at least four equations involving four dependent variables have been estimated. Instead of estimating the four equations separately we adopt seemingly unrelated regression equation (SURE) models to jointly estimate the model. This approach is informed by the fact that the error terms of the four equations may be correlated. In the case that the error terms are correlated then the estimable equations would take the form of a seemingly unrelated regression equations (SURE) model where separate linear equations are related. The adoption of the SURE model approach offers the advantage of introducing more information in addition to the one available from individual equations separately considered. Therefore, it is more informative to consider independent equations jointly in order to draw statistical inferences on the model parameters.

In this study, two countries are considered and the objective is to account for the determinants of access to credit and savings mobilisation. We considered the model comprising of four equations of the form:

$$y_{ti} = \sum x_{tij}\beta_{ij} + \varepsilon_{ti}, t = 1,2.....,T; i = 1,2,......M; j = 1,2,....k_i \quad ....3.20$$

where y_{ti} is the tth observation on the ith response variable which is to be explained by the ith regression equation, x_{tij} is the tth observation on j^{th} predictor variable appearing in the ith equation, β_{ij} is the coefficient associated with x_{tij} at each observation and $\acute{\varepsilon}_{ti}$ is the tth value of the random error component associated with i^{th} equation.

The four equations represented by *M* may be expressed compactly as:

$$y_i = X_i \beta_i + \varepsilon_i, i = 1,2,.....M \;...3.21$$

where y_i is (Tx1) vector with elements y_{ti}; X_i is (TxK$_i$) matrix whose columns represent the T observations on a predictor variable in the ith equation; β_i is a (kx1) vector with elements β_{ij}; and $\acute{\varepsilon}_i$ is a (Tx1) vector of disturbances.

3.3.5 Definition and Measurement of Variables

Dependent Variable

The response variable is defined by the four access strands namely: Formal, formal other, informal and excluded. These strands encompass access to credit and savings mobilisation i.e. formal credit/savings, formal other (credit/savings), informal (credit/savings) and excluded (credit/savings) as shown in Table 3.2. Individuals choose savings and credit products independently from the options according to their maximization objectives.

Table 3.2: Savings mobilisation and credit access alternatives

Access Strands	Savings alternatives	Credit alternatives
Formal	savings and investment account in a bank	Bank loan
Formal other	SACCO account	Loans from SACCOs, government, hire purchase
	MFIs saving	MFIs Loans
Informal	ASCA savings	Informal lenders, loan from employer, buyers of harvest and loans from shops/suppliers
	ROSCA savings	
Excluded	Savings in secret places.	Loans from family/friends and other sources other than those above

Source: FinAccess and FinScope surveys for Kenya and Tanzania

Independent Variables

The independent variables adopted have been used in previous studies (Mirach and Hailu 2014; Malapit 2012; Johnson and Morduch 2007) however, the permutation of these variables is exclusively defined in this chapter as compared to the previous studies. The

variables under deliberation include: age, income, education, gender, marital status, location and social capital. Table 3.3 shows the measurement of variables and the expected sign of the variables.

Table 3.3: Definition, measurement and predicted sign for each explanatory variable

Variable	Notation	Measure	Predicted Effect	Source of data
Log Age squared	LAGE^2	Single years	-	Financial Access
Education	EDU	0=None 1=Some primary 2=Primary completed 3=Some secondary 4=Secondary completed 5=Technical training after secondary school 6=University degree	+	Financial Access
Marital status	MARIST	0=Single 1=Divorced 2=Widowed 3=Married/Living with Partner	+/-	Financial Access
Gender	GENDER	0=Female 1=Male	+/-	Financial Access
Cluster type	LOC	0=Rural 1=Urban	+/-	Financial Access
Social capital	SOCAP	0= none 1=one 2=two 3=more than two	+	Financial Access
Income	INC	0=USD 16-30 1=USD 31-75 2=USD 76-150 3=USD 151-300 4=USD 301-1000 5=USD 1001-2000 6=greater than USD 2000	+	Financial Access

Source: Author's own compilations. Notations: + is positive and - is negative

3.4 Empirical Findings

This section presents the empirical findings of the determinants of access to and use of savings and credit facilities in Kenya and Tanzania using both descriptive statistics and seemingly unrelated regression model from both descriptive and regression analyses. In addition, we also compare the results derived from with those of previous studies.

3.4.1 Summary Statistics

Table 3.4 presents the summary statistics obtained from the cross-sectional data for Kenya and Tanzania. The results reveals that the differences in means is not large and thus there is significant similarity in the data.

Table 3.4: Summary statistics for the single equation model

Variable	Obs	Median	Mean	Std. Dev.	Min	Max
Formal Savings	14436	0.00	0.096	0.295	0	1
Formal Other Savings	14436	0.00	0.076	0.264	0	1
Informal Savings	14436	0.00	0.212	0.409	0	1
Excluded Savings	14436	1.00	0.549	0.498	0	1
Formal Credit	14436	0.00	0.021	0.143	0	1
Formal Other Credit	14436	0.00	0.084	0.277	0	1
Informal Credit	14436	0.00	0.079	0.270	0	1
Excluded Credit	14436	0.00	0.217	0.412	0	1
Log Age squared	7127	7.37	7.393	0.779	6	9
Education	3860	2.00	1.926	1.299	0	6
Marital Status	7127	3.00	2.204	1.108	0	3
Social Capital	3639	0.00	0.135	0.458	0	3
Income	5395	1.00	1.253	1.292	0	6
Location	7127	0.00	0.450	0.498	0	1
Gender	7127	0.00	0.466	0.499	0	1

3.4.2.Correlation Matrix

Table 3.5 shows the correlation matrix after the transformation of the variables. Correlations have different signs depicting varied direction of movement. Notable observations include the negative pairwise correlations between gender and formal saving and between location and credit exclusion. The data also shows that location and formal savings are positively correlated. Similarly, gender and informal savings category are negatively correlated. This pattern can be attributed to varied demographic trends between the two countries and the different sample sizes used in the analysis.

Table 3.5: Correlation matrix

	Formal Savings	Formal Other Savings	Informal Savings	Excluded Savings	Formal Credit	Formal Other Credit	Informal Credit	Excluded Credit	Log Age Squared	Education	Marital Status	Social Capital	Income	Location	Gender
Formal Savings	1.000														
Formal Other Savings	0.209**	1.000													
Informal Savings	0.238**	0.018**	1.000												
Excluded Savings	-0.061**	-0.024**	0.048	1.000											
Formal Credit	0.372**	0.131**	0.109**	0.032	1.000										
Formal Other Credit	0.101**	0.560**	0.054**	-0.008**	0.014**	1.000									
Informal Credit	-0.071**	-0.147**	0.050**	-0.072**	0.038**	-0.043**	1.000								
Excluded Credit	-0.057	0.040**	-0.056**	0.073**	-0.048	0.160**	0.008**	1.000							
Log Age squared	-0.076	0.056**	-0.105**	-0.057**	-0.106	-0.046	0.008**	-0.036**	1.000						
Education	0.584**	0.160**	0.277**	-0.008	0.276**	0.165**	-0.033**	0.071	-0.259**	1.000					
Marital Status	0.067*	0.010**	-0.067**	-0.042**	0.034	0.025**	0.033**	0.072**	0.190**	0.033**	1.000				
Social Capital	0.023**	0.142**	-0.049**	0.034**	0.003**	0.132**	-0.008**	0.018**	0.110	0.042**	0.006	1.000			
Income	0.405**	0.222**	0.325**	-0.027**	0.214**	0.160**	-0.110**	-0.081	-0.060**	0.381**	0.131**	0.067**	1.000		
Location	0.270**	0.159**	0.255**	-0.040**	0.096	0.159	-0.026	-0.179**	-0.018**	0.225**	-0.098*	0.051**	0.197**	1.000	
Gender	-0.141	-0.086**	-0.005**	0.090**	-0.020*	-0.071**	0.024	-0.038**	0.039	-0.112**	-0.617**	0.057**	-0.200**	0.160**	1.000

***$p<0.01$, **$p<0.05$, *$p<0.10$

3.4.3 Determinants of savings mobilisation in Kenya and Tanzania

This chapter adopted standard techniques to investigate the problems associated with using the cross-sectional data. Upon examining the existence of multi-collinearity we establish that Log *age* and *log age squared* are multi-collinear. Table 3.6 shows that the mean VIF is large (9.51) mainly because of the effect of *age* and log of *age squared* and thus the estimation results would be spurious. This problem was overcome by omitting age and hence minimising the problem of multi-collinearity. The resultant mean VIF was found to be within acceptable range.

Table 3. 6: Multicollinearity test: Variance Inflation Factor

Variable	VIF	1/VIF
Log Age squared	34.1	0.029322
Log Age	33.55	0.029806
Gender	1.83	0.547535
Marital status	1.78	0.561574
Education	1.32	0.756352
Income	1.3	0.76689
Location	1.14	0.880932
Social capital	1.03	0.970453
Mean VIF	**9.51**	

Using the Breusch-Pagan LM Test we tested for heteroscedasticity to find out whether error variance is constant or not. Based on the results in Table 3.7, there is evidence of non-constant variances, that is, presence of heteroscedasticity. We addressed the problem by ensuring the use of the correct functional form and re-estimating the model.

Table 3.7: Heteroscedasticity test

Overall System Heteroscedasticity Test:		
Ho: No Overall System Heteroscedasticity		
- Breusch-Pagan LM Test = 54.2290	P-Value > Chi2(6)	0.0000
- Likelihood Ratio LR Test = 54.0889	P-Value > Chi2(6)	0.0000
- Wald Test = 7.47e+05	P-Value > Chi2(6)	0.0000

The seemingly unrelated regression equation (SURE) model was used preferably because it offered the best fit for the available data. In this chapter, we jointly estimated the models for Kenya and Tanzania largely because of the similarities in the design of the data and also because our interest was to understand the key drivers of access to savings mobilisation in the two countries together. This chapter used two separate datasets namely the FinAccess and the FinScope. The two datasets had different assumptions underlying data collection methods but with many similarities that warranted a joint estimation. This was further made easy through standardization of variables across the two datasets.

The findings are presented in Table 3.8. The results show that the coefficient of log age squared is significant across all access strands except formal savings strand. However, we observe that the coefficient of log age squared is positive for *formal other strand* while negative for informal access strand and excluded strands. Therefore, we conclude that as individuals grow old, they are more likely to use *formal other access strand* than formal access strand. This is seen by the relatively large coefficient for *formal other* strand compared to other access strands. On the other hand, age appeared to reduce the use of informal access strands for savings and excluded strands. This indicates that older individuals would not find it prudent to use more riskier avenues to access savings. This view is consistent with the precautionary principle which states that older individuals tend to consume what they saved over the years. However, Efobi et al., (2014), using the Global Findex data set collected over 2011 calendar year observed that age had a negative bivariate inclination to use of banking services. Camara et al., (2015) investigated barriers to financial inclusion in Peru and found out that age appeared to be a significant factor albeit with little importance. They further noted that the turning point existed at age 53 when the relevance of age is suppressed. The findings further show that the risk involved in informal strand is unwarranted for older

members of the society and especially those living on pension and old age security resources. In both countries, age is strongly associated with access to savings mobilisation from formal other strand. However, age is not found to be significantly associated with formal access to savings.

Education appears to be a significant factor. Our findings show that the coefficient of education is positively associated with formal savings access strand. The more educated individuals are the higher the propensity to use formal saving channels as indicated by the positive coefficient. This is depicted by the large coefficients ascending from the lower levels of education to having a university degree. Individuals with university education are shown to be more likely than those without education to access formal channel of saving. Similarly, education was also found to positively influence formal other strand of savings access. The coefficients increase in size as the level of education increases indicating that higher levels of education has greater influence on the use of formal other access strand of saving. Although education was found to be associated with exclusion, the magnitude of influence diminishes as you move from lower levels of education to higher levels. It should however be noted that university degree was not found to be significant with exclusion. This implies that as individuals acquire more education, they are more likely to use formal savings access strand than they would be excluded. The findings in this chapter however deviate from the findings in Kulikov et al., (2007) that indicate that higher levels of education were more likely to lead to lower savings because higher education reflects higher expectations in terms of income and less uncertainty in future incomes. Kibet et al., (2009) corroborate the findings in this chapter by demonstrating that the education level of the household head positively affects the savings behaviour.

In this chapter, we also investigated the effect of marital status on access to savings and we established it to have a positive association with the formal other strand of savings access but negatively associated with exclusion. The results further showed that marital status was not found to be significantly associated with formal savings strand. This chapter established that individuals with divorced status were 7 percent more likely to use formal other strand of access to savings than those in single marital status. On the other hand the married individuals were found to be more likely to access savings from the formal other strand than the single status individuals. According to Sinha (2014), divorced women were more likely to obtain support for their children from the responsible man yet she develops her own mechanisms of fending for herself. This behaviour exposes her to a variety of financial services including savings access that would offer collateral for the future. This chapter also found widows to be more likely to access informal savings by 6 percent. Singles or married individuals were less likely to be excluded from accessing savings by a factor of 0.0662.

This chapter also investigated social capital which has been defined in terms of group membership. However, the groups under investigation may not necessarily be formal groups. We observe that group membership is positively associated with access to savings at all levels except exclusion strand. Individuals with more group membership are shown to have more access than those with no membership. These findings are consistent with literature both in developing and developed countries. The strength of the group coefficient is influenced by the amount of assets the group owns. The greater the coefficient and positive it is, the more the social capital influences savings mobilisation (Kulikov et al., 2007; Camara, et al., 2015). However, social capital was found to be insignificant in relation to savings access exclusion.

Income, in general, was found to increase access to savings across all strands except the exclusion strand. However, we observe that as with increased income earnings, the coefficients for income tend to reduce in the exclusion model indicating that increased income has a tendency to discourage financial exclusion. According to FinAccess (2013) report, poor households tend to be excluded. The study showed that exclusion stands at 42 percent compared to the national average of 17.4 percent in Kenya. Similar results are also recorded in the FinScope Survey carried out during the same period.

In this chapter, we also sought to find out the effect of location on access to savings. Location defined as rural or urban was found to be significant for formal other and informal strands as well as exclusion strands. We observe that being urban compared to rural increases access to savings from formal other and informal channels by a factor 0.035 and 0.0528 respectively but reduces exclusion by a factor 0.0409. These results show that more urban dwellers are likely to access financial services than rural dwellers. This has been attributed to skewed distribution of financial services across the country in favour of urban areas (Llanto 2015). According to Llanto (2015), many financial services favour urban areas due to easier penetration arising from the high level of concentration.

The distribution of financial services almost always affects gender. In most developing countries rural dwellers constitutes the majority who are less endowed with resources (Addae-Korankye 2014). From our results, we observe that men are less likely to access informal savings compared to women. Similarly, men have less likelihood of being excluded from access to savings compared to women. The findings are consistent with several other studies which agree that those who are excluded are mostly women (Demirguc-Kunt 2013; Aterido et al., 2011, Asiedu et al., 2013).

Table 3.8: Results for the Seemingly Unrelated Regression Model for Savings mobilisation

VARIABLES	Formal Savings	Formal Other Savings	Informal Savings	Excluded Savings
Log Age squared	0.00836	0.0380***	-0.0198**	-0.0207**
	(0.00656)	(0.00731)	(0.00825)	(0.00981)
Some primary	0.0180	0.0554***	0.104***	0.111***
	(0.0170)	(0.0190)	(0.0214)	(0.0255)
Primary completed	0.0291*	0.0768***	0.0884***	0.114***
	(0.0173)	(0.0193)	(0.0218)	(0.0259)
Some secondary	0.0932***	0.109***	0.157***	0.118***
	(0.0232)	(0.0258)	(0.0291)	(0.0346)
Secondary completed	0.152***	0.171***	0.168***	0.0901***
	(0.0202)	(0.0224)	(0.0254)	(0.0301)
Technical after Secondary	0.244***	0.190***	0.111***	0.0526
	(0.0271)	(0.0302)	(0.0341)	(0.0406)
University degree	0.296***	0.332***	0.0129	-0.0131
	(0.0386)	(0.0430)	(0.0486)	(0.0578)
Divorced	0.0133	0.0726**	0.0458	0.0447
	(0.0254)	(0.0283)	(0.0319)	(0.0380)
Widowed	-0.00435	0.0344	0.0617**	-0.0438
	(0.0193)	(0.0215)	(0.0242)	(0.0288)
Married/living together	0.0114	0.0487***	0.0272	-0.0662***
	(0.0149)	(0.0165)	(0.0187)	(0.0222)
Belongs to one group	0.0423**	0.0129	0.392***	0.135***
	(0.0210)	(0.0234)	(0.0264)	(0.0314)
Belongs to two groups	-0.0277	0.110**	0.479***	0.211***
	(0.0397)	(0.0442)	(0.0499)	(0.0594)
Belongs to three or more groups	0.0362	0.197***	0.505***	0.271***
	(0.0523)	(0.0582)	(0.0658)	(0.0782)
USD 1-15	0.0131	0.00377	0.0157	0.143
	(0.0135)	(0.0150)	(0.0169)	(0.0201)
USD 16-30	0.0887***	0.0660***	0.0505**	0.163
	(0.0171)	(0.0190)	(0.0215)	(0.0256)
USD 31-75	0.129***	0.137***	0.0724***	0.156
	(0.0199)	(0.0222)	(0.0251)	(0.0298)
USD 76-150	0.115***	0.220***	0.120***	0.180

	(0.0299)	(0.0332)	(0.0376)	(0.0446)
USD 151-300	0.174***	0.259***	0.173***	0.105
	(0.0352)	(0.0393)	(0.0443)	(0.0527)
USD 301-1000	0.355	0.336	0.568**	-0.411
	(0.217)	(0.242)	(0.273)	(0.325)
USD 1001-2000	-0.0558	-0.0718	0.799**	0.686
	(0.306)	(0.341)	(0.385)	(0.458)
USD greater than 2000	0.849***	0.780**	-0.223	0.801
	(0.307)	(0.342)	(0.386)	(0.459)
Urban	-0.0124	0.0350***	0.0528***	-0.0409**
	(0.0116)	(0.0130)	(0.0146)	(0.0174)
Male	-0.00940	-0.0115	-0.122***	-0.0485***
	(0.0118)	(0.0131)	(0.0148)	(0.0176)
Constant	-0.0421	-0.314***	0.221***	0.408***
	(0.0516)	(0.0575)	(0.0650)	(0.0772)
Observation	3,468	3,468	3,468	3,468
R-squared	0.126	0.110	0.158	0.077

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

3.4.3 Determinants of Access to Credit in Kenya and Tanzania

This section focuses on the determinants of access to credit in Kenya and Tanzania. Results presented in Table 3.9 shows that the coefficient of log age squared is significant for formal other access strand and exclusion strand. This implies that an increase in age marginally increases the likelihood of access to formal other strand of credit. In addition, the results affirms that older individuals are less likely to obtain credit although exclusion diminishes.

Education is found to be positively associated with access to formal credit. Specifically, having secondary education compared to having no education was found to increase access to formal credit by a factor 0.0678. Similarly, having technical training after secondary and university degree were more likely to increase access to formal credit by a factor of 0.0752 and 0.183 respectively. The coefficients of education increase from the lower level to the highest level. These findings are corroborated by a survey on access to credit by smallholder farmers in Kenya in which Kiplimo et al., (2015) established that the marginal effects of education showed significant and positive effects on access to credit. The findings have also been supported by the findings in Johnson and Morduch (2007) who concluded that at higher levels of education individuals are able to engage more in activities that generate higher incomes and therefore their ability to access credit is improved.

Married individuals or those living with their partner were shown to have a higher likelihood of accessing formal other credit channel than being excluded. Similarly, being divorced increases the probability of accessing informal credit than the other strands of access. However, a sizeable chance exists for divorced individuals to be excluded from accessing credit. The widowed individuals had minimal chance of accessing formal other credit. The findings obtained from this chapter are corroborated by Ololade and Olagunju (2013) whose findings lay credence to the role of marital status in determining access to credit. The study

found out that not being married reduced immensely the likelihood of accessing credit. Similarly, the social capital was found to be a significant determinant of access to credit. Membership to several groups increased the likelihood of accessing informal credit than those with no group membership by a factor of 0.252. The findings indicate that the type of group could have greater influence on the choices individual's make. Informal groups would increase access to informal financial services. The findings are corroborated by Heikkilä et al., (2016) who investigated the role of social capital in promoting financial access in Uganda. The study established that individual's social capital is significantly associated with access to credit from formal financial institutions.

Income is one of the most important factors influencing access to credit in Kenya and Tanzania. Across all credit access strands, the results show that with increased income there is a high probability of accessing formal credit. However, the size of the coefficients of income on informal and excluded access strands are declining as income increases. This shows that increased income is more likely to reduce access to credit from informal strand. Similarly, more income has been shown to reduce the level of exclusion from credit access. Zins et al., (2016) established that increased income was associated with higher levels of financial inclusion. Similarly, our results are corroborated by Allen et al., (2012) and Fungacova and Weill (2014) who used the worldwide data and established that wealthy individuals were more likely to be financially included than the poor. In addition, the findings in this chapter are consistent with (Al-Hussainy et al., 2008; Johnston and Morduch 2007) which attach greater importance to income as a determinant of access to credit.

Although location measured as urban and rural was not significant for both formal access channels (Formal and formal other credit), it was found to be significant in relation to informal and excluded channels. Being urban relative to rural, an individual was less likely to

access informal credit. This could be attributed to the widespread mainstream financial services in the urban than in the rural areas (Mlachila et al., 2013; Doan et al., 2010). Similarly, being urban was less likely to exclude individuals from accessing credit. Similar findings were reported in Mlachila et al., (2013) showing the importance of variety in promoting financial inclusion.

Coefficients of male category with respect to access to formal credit, formal other credit and informal credit are negative but in ascending order. This shows lesser likelihood of men to access informal credit compared to women and the coefficients taper towards formal credit access. Therefore, women are more constrained to access credit across different strands than men. According to Mayada et al., (1994), women are considered more constrained in the formal financial markets, which limits their capacity to access credit. In another study, Navajas and Tejerina (2006) showed that the main challenge for women to access credit was the cost associated with it.

Table 3.9: Results for the Seemingly Unrelated Regression for Credit access

VARIABLES	Formal Credit	Formal Other Credit	Informal Credit	Excluded Credit
Log Age squared	0.00245	0.00861*	-0.00968	-0.0145**
	(0.00393)	(0.00521)	(0.00683)	(0.00571)
Some primary	-0.00432	0.00681	0.0343*	0.0371**
	(0.0102)	(0.0135)	(0.0177)	(0.0148)
Primary completed	0.0107	0.0452***	0.0617***	0.0471
	(0.0104)	(0.0137)	(0.0180)	(0.0151)
Some secondary	0.0145	0.0775***	0.0317	0.0308
	(0.0139)	(0.0184)	(0.0241)	(0.0202)
Secondary completed	0.0678***	0.107***	0.0615***	0.0193
	(0.0121)	(0.0160)	(0.0210)	(0.0175)
Technical after Secondary	0.0752***	0.102***	0.0703**	0.0630
	(0.0162)	(0.0215)	(0.0282)	(0.0236)
University degree	0.183***	0.243***	0.0200	0.0412
	(0.0231)	(0.0307)	(0.0402)	(0.0336)
Divorced	0.00520	0.0827***	0.135***	0.127***
	(0.0152)	(0.0201)	(0.0264)	(0.0221)
Widowed	0.00199	0.0470***	0.0151	0.0702***
	(0.0115)	(0.0153)	(0.0201)	(0.0168)
Married/living together	0.0157*	0.0581***	0.0212	0.0540***
	(0.00890)	(0.0118)	(0.0155)	(0.0129)
Belongs to one group	0.0297**	0.0311*	0.183***	0.0370**
	(0.0126)	(0.0166)	(0.0218)	(0.0183)
Belongs to two groups	-0.00144	0.0502	0.0971**	0.0282
	(0.0238)	(0.0315)	(0.0413)	(0.0345)
Belongs to three or more groups	0.00939	0.0317	0.252***	0.0540
	(0.0313)	(0.0415)	(0.0544)	(0.0455)
USD 1-15	-0.000574	0.00162	0.0473***	0.0470***
	(0.00807)	(0.0107)	(0.0140)	(0.0117)
USD 16-30	0.00347	0.0276**	0.0318*	0.0354**
	(0.0102)	(0.0136)	(0.0178)	(0.0149)
USD 31-75	0.0580***	0.0580***	0.0301	0.00134
	(0.0119)	(0.0158)	(0.0207)	(0.0173)
USD 76-150	0.133***	0.120***	-0.00341	-0.0194
	(0.0179)	(0.0237)	(0.0311)	(0.0260)
USD 151-300	0.175***	0.108***	0.0130	-0.0343
	(0.0211)	(0.0280)	(0.0367)	(0.0307)
USD 301-1000	-0.0583	0.373**	0.201	0.350*
	(0.130)	(0.172)	(0.226)	(0.189)
USD 1001-2000	-0.0184	-0.0626	-0.157	-0.119
	(0.184)	(0.243)	(0.319)	(0.267)
USD greater than 2000	-0.0562	0.898***	-0.0596	-0.0353

	(0.184)	(0.243)	(0.319)	(0.267)
Urban	0.00713	0.00537	-0.0336***	-0.0465***
	(0.00697)	(0.00924)	(0.0121)	(0.0101)
Male	-0.0156**	-0.0270***	-0.0462***	-0.00843
	(0.00705)	(0.00934)	(0.0122)	(0.0102)
Constant	-0.0249	-0.0998**	0.141***	0.117***
	(0.0309)	(0.0410)	(0.0537)	(0.0449)
Observation	3,468	3,468	3,468	3,468
R-squared	0.115	0.085	0.063	0.038

Standard errors in parentheses
*** $p<0.01$, ** $p<0.05$, * $p<0.1$

3.4.4 Marginal Effects on Savings Mobilisation

This section presents marginal effects of the variables on savings mobilisation for Kenya and Tanzania jointly as shown in Table 3.10. The results of the marginal effects of income and education on formal savings mobilisation are more pronounced. For instance, a one-unit increase in the level of education increases the likelihood of accessing formal savings by 4.6 percent compared to income which is likely to increase access to formal savings by 4 percent. Tesfamariam (2012) carried out a study to investigate the determinants of savings mobilization among rural co-operators in Tigrai region in Ethiopia. The empirical results showed that education was statistically significant but negatively influenced savings. Results from Abdelkhalek et al., (2010) however showed that education determines formal savings mobilization more than income. These findings corroborate the results in the current chapter, which established that education determines access to formal savings more than income.

Table 3.10: Marginal effects on savings mobilisation

Variable	dy/dx	Std. Err.	z	P>z	[95%	C.I.]	X
Log Age squared	0.012	0.006	1.850	0.065	-0.001	0.024	7.402
Education	0.046	0.004	12.060	0.000	0.039	0.054	2.093
Marital Status	0.002	0.005	0.510	0.611	-0.007	0.012	2.134
Social Capital	0.008	0.012	0.660	0.508	-0.015	0.030	0.134
Income	0.040	0.005	8.660	0.000	0.031	0.049	1.205
Location	-0.011	0.012	-0.940	0.349	-0.034	0.012	0.612
Gender	-0.009	0.011	-0.780	0.435	-0.031	0.013	0.595

3.4.5 Marginal Effects on Credit Access

This section deals with marginal analysis of credit mobilisation in Kenya and Tanzania. Similar to access to savings mobilisation, education and income influence access to credit in significant ways. Table 3.11 shows that an increase in education by one level has the potential of increasing access to credit by a factor of 0.021 while increasing income by one unit would increase access to credit by a factor of 0.027.

Table 3.11: Marginal Effects for Credit Access

Variable	dy/dx	Std. Err.	z	P>z	[95%	C.I.]	X
Log Age squared	0.006	0.004	1.520	0.129	-0.002	0.013	7.402
Education	0.021	0.002	8.990	0.000	0.016	0.025	2.093
Marital Status	0.006	0.003	2.050	0.040	0.000	0.012	2.134
Social Capital	0.004	0.007	0.590	0.553	-0.010	0.018	0.134
Income	0.027	0.003	9.720	0.000	0.022	0.033	1.205
Location	0.011	0.007	1.620	0.104	-0.002	0.025	0.612
Gender	-0.017	0.007	-2.540	0.011	-0.031	-0.004	0.595

3.4.6 Conclusion and Policy Implications

This chapter aimed at examining the socioeconomic and demographic characteristics of access to and use of credit and savings mobilisation in Kenya and Tanzania. More specifically, it aimed at investigating: (1) the determinants of access to and use of credit in Kenya and Tanzania, (2) the determinants of access to and use of savings mobilization in Kenya and Tanzania and (3) examine the marginal effects of socioeconomic and demographic factors on access to credit and savings mobilization among households in Tanzania and Kenya.

The findings suggest that the overall points for the analysis of savings mobilisation and credit access are as follows: First, both socioeconomic and demographic factors are key determinants of access to savings and credit in Kenya and Tanzania. The chapter underscores the importance of social institutions such as gender, age, marital status, education, income and social capital in facilitating effective financial inclusion in the two countries jointly.

Secondly, the chapter has underscored the importance of other strands of access to savings and credits namely formal, formal other, informal and exclusion. These strands are influenced by several factors prevailing in both countries. These factors contribute in significant ways towards shaping the financial landscape of the two countries.

The findings have important policy implications and help obtain deeper insights into economic theory. The thesis focused on two key policy issues: access to credit and savings mobilisation. Throughout this chapter, the focus has been on access (the likelihood of using the financial services) to specified financial services. Indeed, access has been loosely used to also mean actual use of the financial services. The implication of having more people access formal savings and credit is to prevent unnecessary risks associated with informality and/or exclusion. Economic theory opines that savings increase investment funds through the savings-investment identity. Access to credit on the other hand ensures that households are not deprived of income to smoothen their consumption. Majority of the people in Kenya and Tanzania are poor and therefore require stable source of income for their livelihoods. It is in this regard that access to credit and savings is critical to improving the lives of the people. Education plays the most critical role in ensuring that choices preferred by individuals are not only rational but also beneficial. More education has been shown to lead to more access to financial services and enabled people live in urban areas and facilitated them to create networks to fulfil their desires. Studies have shown that more educated individuals have nucleated family setups compared to less educated individuals and have a higher influence on their level of interaction with financial services. Therefore, promotion of education is critical to ensuring financial inclusion but of great importance is financial literacy which directly enlighten consumers of different aspects of financial products.

CHAPTER FOUR

THE ROLE OF MOBILE BANKING IN ENHANCING WELFARE IN KENYA

4.1 Introduction

The recognition that financial inclusion plays an integral role towards poverty alleviation is increasingly drawing the attention of policy makers. Financial inclusion facilitates access to savings and credit and therefore cushions individuals against erratic consumption patterns and vulnerabilities (Demirguc-Kunt and Klapper 2012). Despite the benefits of financial inclusion a large proportion of individuals within the economies of developing countries do not have access to basic financial services thus the lack of access to savings and credit facilities impedes their participation in meaningful economic development and instead encourages informal financial sector which is not only risky but also unreliable.

To bridge the existing financial services access gap branchless[12] banking, a relatively new phenomenon holds hope to bridge this gap and is shaping the financial sector in many emerging market economies. In Kenya for instance, branchless banking is viewed as a key aspect of technological innovation that encourages quicker access to and utilization of a wide range of financial services alongside the traditional brick and mortar-banking model. This new banking model has made access to transactions or payments systems, deposits to bank account and transfer of money from one point to the other cheap and convenient in conducting business. Cellular[13] technology and agents have become a vital segment of branchless banking. Cellular technology therefore enables individuals to access their accounts in commercial banks thereby making majority of the people access financial services that were hitherto scarce. While cellular banking and agency banking are only a part of the wider

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[12] "Branchless Banking" is defined here as availing financial services outside the traditional banking halls. The use of mobile technology and agency banking become the main instruments of fulfilling these services. Internationally, the concepts of agency banking and branchless banking appear to be closely aligned or even synonymous.

[13] Cellular is synonymous to mobile phone.

branchless banking platform, they nevertheless constitute the most popular and convenient means to transact in Kenya. Other than cellular banking, automated teller machines (ATMs), credit cards, debit cards and other electronic funds transfer channels constitute branchless banking technological innovations in Kenya.

The utilization of cellular and agency banking platforms is an emerging reality with more and more people acquiring the technology. Available empirical evidence shows that branchless banking is increasingly becoming an important part of development growth (Mbiti and Weil 2011). Several mobile money platforms operating in Kenya include M-pesa, Airtel cash, Yu Cash, among others. These platforms are connected to formal financial institutions, which convey financial transactions transmitted through the mobile phone.

The cellular and agency banking technologies present an alternative way of ensuring that more variety of financial services are available and affordable. Through this initiative, welfare can be enhanced both at individual level and at economy-wide level. This perspective advances the role of utilization of finance in growth and development literature (Beck et al., 2004; Karlan and Morduch 2009). The accentuation is placed on how available and accessible the people are to financial services and how these people's welfare is impacted. The growing realisation that financial inclusion is paramount to bringing people to the formal financial system is anchored on the concept of inclusive growth. Inclusive growth would guarantee more opportunities to many people who would otherwise be excluded.

Financial inclusion has undergone significant improvements over the last decade as reflected in several rounds of surveys. For instance, in 2011 the first round of Global Findex survey was undertaken showing significant improvements in account penetration across Africa. In 2014 round of survey, there were major milestones in access to financial services in Africa.

Although Africa is making progress in financial inclusion, the major hindrance is that there is lack of regular data to access the variations in financial inclusion across and within countries. Available data shows that these improvements in financial inclusion have been contributed largely by mobile money revolution.

Kenya, like many other African countries, has risen to the challenge of ensuring improvement in its communications infrastructure base and increase in accessibility to a majority of the population. This has prompted expanded permeation of mobile network coverage and internet access to a large consumer base consequently generating interest for other financial services. However, due to the large geographical area that constitutes Kenya, private sector investors who largely offer financial services would be constrained in their effort to broaden the clientele base mainly because of high capital required to set up the financial infrastructure across the country. The diffusion of cellular innovation and expanded network space has provided an avenue to enable people have access to financial services. Mobile handset owners have an opportunity to use cellular and agency technologies to access their accounts at any location so long as the network coverage is available. There is no doubt that cellular technology has increased the usability of the mobile banking and enhanced uptake of some of the financial services such as savings and credit facilities. Like cellular technology, agency banking is a more recent phenomenon in Kenya. It was first launched in Kenya in 2010 but now facilitates more than 106.1 million transactions valued at more than USD 571.5 billion (CBK Annual Report 2014). This development was unprecedented and has proved to be dependable in many parts of the country. In order to ensure mobile and agency banking services fully benefit majority of the people, it is incumbent upon the private sector service providers to device strategies of reaching out to different regions for the purpose of bringing people to the formal financial system. Although these efforts may prove costly to the private sector, it remains the responsibility of the government to provide sound business environment

for effective financial innovation to thrive. To do this, it is necessary to explore the factors that may influence adoption and usage of these services and therefore device the best approach to address the problem of financial exclusion. Despite the recent improvements in financial inclusion across many economies in sub-Saharan Africa, welfare[14] of households in Kenya has not changed commensurate with it (Banerjee et al., 2015). It is against this background that this chapter focused on the welfare effects of mobile banking innovation. This empirical chapter gives mobile banking special attention. The transformations brought about by financial inclusion have been aided by technological innovations. Access to credit or savings mobilisation can now be undertaken through mobile phone platform. Ongoing efforts in Kenya to unveil M-Akiba Infrastructure savings product are envisaged to target small savers who have not been able to sample a variety of savings products due to the limited supply.

4.1.1 Statement of the Problem

Financial inclusion has attracted the global attention and numerous nations both developing and developed have formulated approaches that would enhance access to and utilization of a wide range of financial services that were hitherto only available to the elite. Despite these efforts, the number of individuals who remain excluded is still high. Globally, approximately 48 percent of adults 15 years or more do not have a formal account, most of them are found in developing countries (Demirguc-Kunt et al., 2015). In Kenya, about 55.2 percent of the adults 15 years and above have access to formal account in a financial institution while 43.8 do not have an account majority of whom reside in rural areas (Demirguc-Kunt et al., (2015). The proportion of those who have a formal bank account linked to their mobile phone and who actively use this service could even be lower although actual data on voluntary exclusion is not available. This unbanked group hardly benefit from the available financial services that

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[14] Welfare is defined in terms of poverty. This looks at poverty as being deprivation of access to relevant financial instruments and the opportunity to use these instruments to improve their lives.

would positively influence welfare. While this has been the case, the situation is slowly changing with increased penetration of mobile phone technology and agency banking services in Kenya.

Considering the recent developments in the financial sector, it should be noted that Kenya has taken on the technological path with the aim of providing efficient financial services to the people. Although several studies (Must and Ludewig 2010, Ala and Ngugi 2013) have focused on mobile banking in a developing country context, this chapter investigates the welfare effects of mobile phone technology and considers factors beyond these studies that would fundamentally affect the outcome results. For instance, social capital has not been considered in previous studies as an important factor influencing adoption and usage of branchless banking in Kenya. Similarly, we do not know of any study that has derived the welfare measure in the context of Kenya the same way this empirical chapter has done. Indeed many studies have always used the direct income responses despite the fact that the authenticity of such responses is not known (Ravallion et al., 2016; Muyanga et al., 2013). So that the welfare measure is properly derived we adopt the construction of the asset index as the most convincing method.

The concept of financial inclusion has been touted as important in dealing with income inequalities and poverty in developing countries. There is a growing misconception that poverty is similar to lack of money income. Poverty rather is the lack of access to relevant financial instruments and the opportunity to use the instruments to improve lives. Although, financial exclusion has been largely blamed on the slow growth of the economy (Beck et al., 2009), this does not necessary mean that the poor households lack vibrant financial lives. The vacuum created by the supply side constraints has in fact been filled with risky but sophisticated informal instruments. Informal instruments limit the households' ability to access savings, credit, and manage risk.

With the rising consumer base and development of financial services, demand for mobile banking services is expected to rise substantially. The major challenge is however finding appropriate models to broaden the financial services frontier to reach majority of the people most of whom are poor. The entry of mobile money technology is seen as the panacea to providing access to formal financial services to millions of subscribers. CGAP (2012) estimates that globally, 1 billion people own a mobile phone but have no account with a bank. This means that they will still be classified as financially excluded if they are not on mobile money platform.

Although challenges of implementing mobile banking innovation are abound, this technology holds the key to transforming financial inclusion landscape in Kenya. Mobile banking is expected to increase productivity by ensuring high efficiency and reduction in transactions cost, job creation, providing a platform upon which other businesses can thrive and improving security of transactions. While extensive literature has focused on the mobile banking innovations, a disproportionate attention has been placed on savings and credit (Higgins et al., 2012; Demombynes and Thegeya 2012; Balkenhol 2007). A few studies have also focused on the transformational impact of mobile money services on economic growth and development (Aker et al., 2008; Morawczynski and Pickens 2009) and welfare (Jack and Suri 2014). Other studies have looked at the frequency of mobile money transactions/payments (Mas and Siedek 2010).

This chapter deviates from these studies in several ways: First, basing on the work of (Mas and Ngw'eno 2010), it takes cognisance of the fact that most common financial inclusion models used are 'savings led' and 'credit led' yet an equally important model of payments/transactions led approach plays a critical role in the promotion of the broader

financial services. Second, while studies on the impact of mobile money services on economic growth and development have looked at Kenya's community-level economic effects, the current study considers the specific households obtained from a country-wide nationally sampled survey. In addition, the focus of this chapter per se is not on growth and development but rather on the indirect effects of the same on welfare. Third, this chapter adopts a different methodology of constructing the welfare measure that is most appropriate and robust unlike the welfare studies conducted in Kenya. We adopt indirect effects approach to understanding the effects of mobile banking technology on welfare through household's payment/transactions services.

This empirical chapter investigated the effect of expanding mobile banking on welfare improvement in Kenya. The chapter uses the asset-based index to measure welfare and addresses the following questions:

1. What determines the mobile banking services usage in Kenya?
2. What is the impact of mobile banking on wellbeing in Kenya?

4.1.2 Research Objectives

The main purpose of this chapter was to scrutinize the welfare impact of branchless banking in Kenya. The precise aims are to:

1. Identify factors that influence the adoption and usage of mobile banking services in Kenya.
2. Analyze the effect of mobile banking services on welfare in Kenya

4.1.3 Significance of the Study

Despite the significant strides made by developing countries in undertaking financial sector reforms, a higher proportion of the population remain financially excluded with majority of them residing in rural areas where adoption of /technology is relatively low. The inadequacy

and lack of accessibility to relevant financial services has adverse outcomes on the aggregate and household-level welfare. Financial services influence household consumption and welfare through a few channels (Zeller et al., 1998). For instance, un-constraining capital, transaction cost reduction, reduction in search and communication costs, and conveyance of financial services among others.

Availability and accessibility of relevant financial services to rural households is becoming an integral part of poverty alleviation initiative that facilitates uptake of credit and savings products. This guarantees that consumption smoothing and risk-pooling effect protects people against inevitable vulnerabilities. In spite of the advantages that accompany financial inclusion, a larger part of the population remains out of reach of the available financial services in developing countries (Demirguc-Kunt and Klapper 2012). Limited access to financial services constrains the capacity of the people to borrow and invest. Therefore, if the focus shifts to the role technology is going to play in the financial sector would generate interesting findings capable of transforming Kenya's financial inclusion landscape.

This chapter contributes to the existing literature in the following ways: First, it provides empirical evidence from Kenya on the effects of mobile banking on welfare outcomes using the asset index. This is important because Kenya stands out as a country where mobile money services have expanded the sphere of financial services. Although several studies have looked at Kenya's experience with mobile banking technology (Ibrahim 2015; Kirui et al., (2012), none has focused on how it impacts households welfare using the asset index approach. In addition, this chapter examines the direct effects of using the households' payments channel on welfare.

Second, by using the most recent FinAccess, 2013 data on financial access to examine the factors responsible for adoption and use of mobile and agency banking in Kenya. The chapter deviates from extant literature that mostly focused on commercial banks' adoption and use of

mobile banking technology (Keli 2012; Muisyo et al., 2014) and those that applied Technology Acceptance Models (TAM) (Kazi and Mannan 2013; Karma et al., 2014)

4.1.4 Scope and Limitations

This chapter utilized the FinAccess (2013), a nationally representative cross-sectional survey data comprising of 6,449 observations with numerous variables at a point in time. Although the validity of the results obtained using cross-sectional data have been highlighted using the standard techniques, a few more data points would have created better results. In building the asset index, the chapter combined all assets possessed by individual household heads including the dwelling variables. The advantage of using the asset index as welfare measure is that it forms the basis upon which conclusions may be drawn.

4.2 Literature Review

4.2.1 Introduction

The emergence of cellular technology and agency banking platforms in Africa created a huge consumer market. Its emergence extended financial services that were only available in urban areas to the rural set ups. Businesses and entrepreneurs have been challenged to supply the much-needed financial services to widely dispersed population across the country. The key concern is the manner in which access to financial services will re-invigorate the economy and enhance welfare. This chapter reviews the relevant theoretical and empirical literature and gives an overview that identifies the gaps in literature.

4.2.2 Theoretical Literature

The idea of branchless banking is progressively being perceived as a feature of technological changes from the traditional banking halls. With the widespread use of mobile phone technology, it has received immense attention in literature. With the technological advancement in banking, individuals are no longer required to contact mainstream banking

halls to obtain service. With the emergence of mobile phone and internet banking, access to financial services by customers have become convenient and more feasible demonstrating that innovations in the traditional banking models enabled by technology is capable of reducing transaction costs by ensuring customers obtain services at their convenience. Likewise, more individuals are brought into the financial system without being discriminated based on region, ethnicity or status in the society. In practically all areas in Kenya, mobile phones are the primary method of communication although challenges with network coverage are still abound.

4.2.2.1 Diffusion of Innovation Theory

Numerous studies have emerged based on online banking (Wang et al., 2008, Polatoglu and Ekin 2001). However, studies on mobile banking and agency banking in Kenya have not received as much attention (Puschel et al., 2010; Suoranta and Mattila 2004). The uptake of mobile and agency banking innovation has been illustrated using different models. Rogers (1983), clarifies how diffusion of technology is enshrined in social systems. Using this approach, Rogers ascribes adoption to perception of qualities. The theory holds that people accumulate and synthesize information about technology before they eventually adopt it or reject it. But a condition for diffusion is expressed by Agarwal and Prasad (1998) to be that of similarity with individual's quality and social framework which is authenticated by Chen (2013), who shows that in spite of the fact that people may receive a specific kind of advancement, their behavioural patterns and perception of risks and returns might be divergent. For instance, the fact that people have adopted the technology does not necessarily decipher convergence in the way they perceive risks and return.

Availability of financial services will not always decipher adoption. Numerous components have been shown to influence the adoption rates. Indeed, even with wide coverage of network and strong agency programme across the country, this offers a necessary condition but not

sufficient enough to guarantee full adoption. However, it would be sufficient to ensure that continued presence of the relevant conditions that generate more adopters of innovations exists even if it comes later. According to Rodgers (1983), diffusion of innovations is a process of ensuring continued passage of information to others through varied channels over a period of time. Therefore, an idea may give birth to an innovation which is in turn adopted through appropriate communication and adoption channels. Media plays a facilitating role of passing information about an innovation that drives adoption decision. The diffusion of innovation theory therefore needs to identify appropriate channels of communication that are likely to reach majority of the people. The theory further espouses the need to adopt a phased approach in the quest to reach majority of the people with innovation.

4.2.2.2 Institutional Theory

Institutional theory holds that pressure may compel individuals to embrace better approaches for directing business. This theory works through pressure envisaged in the following attributes: Coercion, standardizing and mimetic. Wang et al., (2008) analyzed the part of institutional pressure and established that force may influence uptake of internet technology. The exchange of psychosocial, economic and demographic attributes influences the rate of technology uptake. This would hence clarify differential proportions of individuals who have access and utilize financial services.

Worldwide statistics show that around 50 percent of the adult population are unbanked while just 22 percent report saving in a formal financial institution (Demirgüç-Kunt and Klapper 2012) and 9 percent report acquiring credit through formal accounts. Chandy and Gertz (2011) established that more than half of the world's population continue living in poverty as at the end of 2015 notwithstanding coordinated efforts to have more people become financially included. The world is largely characterized by high poverty prevalence brought about by inequality. Literature has sought to link finance to growth and development

(Banerjee and Newman 1993; Beck et al., 2004; Karlan and Morduch 2009). A number of these studies have demonstrated that pro-poor finance impact positively on people's welfare. It has likewise been demonstrated that in nations where financial sector is developed, infant mortality rates have dropped. Other characteristics inherent in poor nations have tended to support the functioning of the financial sector.

The main aim of a stable and vibrant financial sector is to ensure that individuals have access to credit, can make payments, invest and manage their risk in old age (Al-Hussainy et al., 2008, Hawkins 2010, Klapper and Singer 2013). As more individuals are brought into the formal economy, they are relied upon to make use of the available services to better their lives. In sub-Saharan Africa, the entry of mobile phone technology into the market is likely to reduce search costs and improve market efficiency. Most markets are imperfect and lack full information about the products being sold. As a result, information has become too costly if the traditional search mechanisms are used (Aker 2008). But with massive rollout of mobile technology in Africa, the search time and cost has reduced significantly.

4.2.2.3 Multidimensionality of Poverty

Poverty is increasingly being understood from a multidimensional perspective rather than from an income perspective and this pragmatic shift has been motivated by the many approaches that attempt to put poverty into perspective. Those who view poverty from the existence of market imperfections consider income as the sole indicator of well-being as unsatisfactory (Atkinson et al., 2004; Duclos et al., 2006). This approach is favoured by welfarists while the non-welfarists focus on the multiple dimensions rather than utility space. This brings to the fore the two key aspects: the basic needs and the capability approach. The basic needs approach is based on Rawl's theory of justice that considers well-being from a set of primary goods that determine living a good life (Streeten 1981). The capability approach is reflected in the idea of individual freedom to choose the life they want to lead (Sen 1976).

Since people will always want good things, then the definition of poverty must incorporate all the three approaches advanced by the two schools of thought: Welfarists and non-Welfarists. The problem that emanate from the three key approaches advanced by the two schools of thought is that a definition of poverty must be multi-dimensional and that it should be amenable to comparisons between two distributions and should enable judgement about which of the two exhibit higher poverty. In order to attain a measure that exhibits this attribute, several approaches have been used in literature. Most of these approaches are data reduction because they create a composite indicator of poverty from many variables. The most commonly cited methods include factor analysis (FA) and the principal components analysis (PCA). However, this chapter employs one of the approaches that is rarely used for data reduction namely the multiple correspondence analysis (MCA). Multiple correspondence analysis (MCA) has some advantages over the factor analysis and principal components analysis. MCA generates multi-dimensional weights   used in the construction of a composite poverty index that satisfies the poverty axioms (Ezzrari and Verme 2012). Due to the challenges experienced in measuring poverty, asset based measures are increasingly being used as proxy for household welfare (Vyas and Kumaranayake 2006).

4.2.3 Empirical Literature

4.2.3.1 Agency Banking

The entry of agency banking into the Kenyan market is a recent phenomenon. Nonetheless, its services have quickly spread across the country with more than 106.1 million transactions valued at Kshs 571.5 billion (CBK Annual Report 2014) having been undertaken. The scope of services offered include: withdrawals of received client money, facilitate payments of salary and bills, funds transfer among others.

Agency banking takes different forms such as general stores, post office, supermarkets (Kumar et al., 2006). Kenya has come of age and many of the financial services available are

outsourced. For the general population, agency banking has largely lessened the expenses and time utilized in searching for services from banks. Then again, banks have acquired the capacity to develop more products that are affordable given the reduced cost of delivering them.

The idea of agency banking has created an enormous network of systems offering financial services. Brazil for instance utilizes lottery outlets to offer services initially offered by mainstream banks while Philippines utilizes mobile services to offer financial products to the people (Mas and Siedek 2008) in spite agents being involved. In Kenya, these outlets are required to meet some regulatory standards which often impede expansion to more remote areas (Lyman et al., 2006). Bold (2011) discovered specific limitations on agents that could be seen as an obstacle to the expansion agency network. Tarazi and Breloff (2011) revealed that putting a regulatory measure on the outlets gives banks an opportunity for carrying our due diligence on the agents. Mainstream banks have a responsibility to constantly monitor and train the agents in order to provide sustainable services to the clients (Owens 2006). The agency model has linked remote areas to mainstream financial institutions lessening the distances travelled to obtain service. The services have also acquired a fair system of pricing (Arora and Ferrand 2007) and a regular upgrading to ensure it operates optimally (Lyman et al., 2006). The entry into the market of agency banking has brought financial services closer to the consumers and services that were hitherto not available to consumers have been made possible.

4.2.3.2 Mobile Banking

Access to a variety of financial services to a large segment of the population is the initial indicator of financial inclusion. Over the years, people have been forced to physically look for the services thereby increasing the cost of accessing financial services. However, financial innovation has increasingly reduced distances to financial service providers while improving

the convenience of the services. Beck et al., (2016) observes that in less developed economies notably sub Saharan African economies; the quickest and easily identifiable service with majority of the people is the payments/transactions services. However, not much has been done to leverage on the wide spread nature of this service to bring more people to use a wider spectrum of similar services. The discovery of the mobile phone technology couldn't have come at a better time to take advantage of the existing platform. While efforts to increase access to a wide variety of financial services have been used, the challenge remains to target efforts so that maximum benefit is derived (Beck et al., 2016).

The mobile money innovation came much earlier compared to agency banking. Early literature emphasized on technology to conveniently transact on this platform. With subscribers to mobile phones technology increasing by day, more people are likely to benefit from a wide range of services provided through the technology. In their study, Mckay and Pickens (2010) analysed data on a sample of 16,000 clients who own and use mobile phone based services and realised that use of branchless banking potentially reached vast areas of the country transforming poor lives.

The achievement of mobile money service popularly known as M-pesa in Kenya is attributable to various factors. A few studies have focused on the reasons for the rapid spread of M-pesa and found out that in the Kenyan economy, there existed a dominant mobile network operator Safaricom holding about 70 percent market share (Heyer and Mas 2011). This dominance has been attributed to technological advantage over the competitors and perhaps fair pricing model. Other than dominance, convenience in making transactions regardless of the location has been the key driver to the rapid spread of the mobile money technology (Morawcznski and Pickens 2009).

In their study to determine the drivers of use of mobile banking in Malaysia, Amin et al., (2008) discovered that the apparent convenience and the amount of information at the disposal of the customer coupled with pressure from the surrounding users were key drivers in explaining adoption of mobile banking. In a similar fashion, Gunesh and Issuree (2014) carried out a study in South Korea to determine the reason for adoption of mobile banking. They demonstrated that adoption followed the usefulness perceived to be offered by the service, the amount of risk involved and compatibility with individual lifestyle. Palani and Yasodha (2012) revealed that income, gender and education were key factors that influenced how fast the adoption of mobile banking would be undertaken in India.

One of the key impediments to agency and mobile banking has been the question of revenue sharing with established financial institutions. Agents have often been disadvantaged in the process. This issue has however been resolved through principal-agent contractual relationships. Other barriers identified include lack of compatibility of the handsets with the mobile application and inadequacy of privacy and security (Bamoriya and Singh 2013; Laforet and Li 2005).

4.2.4 Impact of Mobile Banking on Poor households

Evidence from early literature has shown that adoption of branchless banking had the potential to benefit the households through improved risk management, increased investment activities, access to credit and savings. These findings are largely anecdotal and lack empirical support. In Kenya, early adopters of cellular technology were probably wealthier, had formal occupation, youthful and perhaps lived in urban areas. But further findings reveal that laggards majority of whom reside in rural areas were poor and less educated (Jack and Suri 2011). With a reversal in the trend of technology, the question that needs to be addressed is whether household welfare is likely to be enhanced with branchless banking.

According to Jensen (2007), mobile network coverage was critical in revamping the fisheries sector in India. The study observed that there were less price dispersion across markets and to a large extent information was symmetric. Ezzrari and Verme (2012) used the MCA to construct a multidimensional poverty indicator in Morocco whose findings showed a decline in poverty according to multidimensional and monetary indicators. In this study, there was marked improvement in the poverty measure. Similarly, Booyseen et al., (2008) compares poverty over time and across countries and found out that the asset index improved mainly due to progress in accumulated private assets although there was a decline in access in public service. The asset index was constructed using the MCA. The MCA approach possesses one major drawback in that it may not capture accurately the changes in welfare because the assets are normally slow in changing and discrete.

4.2.5 Summary and Gaps in Knowledge

Branchless banking, a promoter of inclusive growth has attracted interest from the global players as indicated by the great deal of reviewed literature focusing on the mobile phone technology. The vast majority of those studies have concentrated on the determinants of adoption of mobile phone technology while others have looked at accessibility and use of the technology. However, not all these findings address how the technology affects household welfare. In addition, the studies did not apply appropriate quantitative tools of welfare measurement thus the need for more empirical studies that address these shortcomings. The findings may be used to provide policy advice to both the private sector and government policy makers.

Table 4.1 summarizes the relevant empirical literature that looks into the role of innovations in enhancing welfare. From the findings, we observe that when mobile phone penetration enters the local market economy, the market experiences a dramatic decline and less dispersion in prices (Jensen 2007). Similarly, Jack and Suri (2011) observed that the

consumption by non-users of mobile money services-Mpesa reduced due to shocks while that of users remained unaffected. This in principle reinforced the importance of innovation in the financial sector as absorbing the negative effects of shocks and sustaining the welfare of individual households. According to (Laforet and Li 2005), attitudinal behaviour of consumers towards online and mobile banking is affected by gender, education, security, perception of risk, computer and technological skills and their culture of cash-carry banking. On the other hand, perception and credibility play a greater role towards adoption of mobile banking in developing countries (Gunesh and Issuree 2014) and as such increase the opportunities for welfare improvement. Different technological innovations come with different levels of risk exposure and as Bamoriya and Singh (2013) notes, the internet and mobile banking are relatively insecure compared to the use of Automated Teller Machine, which is perceived to be one of the most useful electronic channels.

Kenya being among the few countries in the sub-Saharan Africa with high financial innovation adoption rates and with the evolving nature of the understanding of financial inclusion concepts, it is necessary to investigate the determinants of usage of mobile banking services and the welfare effects of the innovation on individual households.

Table 4.1: Summary of Selected Empirical Literature on impact of innovation adoption on welfare

Author and year	Topic	Methodology	Findings
Bamoriya and Singh (2013)	Perceptual mapping of electronic banking channels in India	Alternating Least-Squares Scaling	The findings give the Automated Teller Machine (ATMs) versatility and more security than other forms of accessing electronic funds.
Palani and Yasodha (2012)	A customer perception towards mobile banking in Indian Overseas Bank Chennai	Descriptive statistics	Education, gender and income were found to be the most important factors affecting access and usage of mobile banking services
Heyer and Mas (2011)	Seeking Fertile Grounds for Mobile Money	Content Analysis	The findings show that the extent to which financial services are spread across different regions in developing countries is influenced by the socio-political and environmental factors.
Gunesh and Issuree (2014)	Factor determining mobile banking adoption in Mauritius.	Multiple regression	They infer that perception and credibility contribute immensely to adoption of mobile banking mode.
Jack and Suri (2011)	Risk Sharing and Transaction costs: Evidence from Kenya's mobile money revolution	Difference-in-difference estimation	The study found out that in the presence of shocks, the consumption of non-users of mobile money service was greatly affected compared to users of mobile money services.
Jensen (2007)	The Digital Provide: Information (Technology), Market Performance and Welfare in the South Indian Fisheries Sector	Regression Equations	The findings reveal that entry of mobile phones into the market led to a dramatic price reduction and less dispersion and waste.
Laforet and Li (2005)	Consumers' attitudes towards online and mobile banking in China	Descriptive Statistics	The findings provide evidence that the attitude of consumers towards mobile and online banking is affected by their level of education, gender, the perception of risk, security, technological skills and the culture of cash-carry banking.

Source: Author's compilation

4.3 Methodology

4.3.1 Research design

The research design used in his study is based on the quantitative relationships among the variables. The principle source of data in this chapter is the FinAccess survey carried out during the 2013 calendar year. The survey interviewed 8,250 people constituting 740 groups made up of 11 family units. Out of this sample, the completed interviews were 6,449. These surveys have been conducted in Kenya since 2006 at an interval of 3 years. The survey also has information on household attributes such as region, income, education, age, and gender. This section presents the theoretical framework for welfare measurement. It also presents the asset index, a measure of individual household welfare constructed using the Multiple

Correspondence Analysis (MCA) approach. We also present the empirical model to be estimated.

4.3.2 Theoretical Framework

Estimation of welfare has taken diverse methodologies in various disciplines and it is therefore important to adopt a more concrete and yet founded on strong theoretical underpinning. The methodological approach pursued in this chapter is based on welfare economics. Consumers are exposed to a wide variety of financial services to choose from and hence enables them to reveal their preferences for particular services (Knight and Gumatilaka 2014). If we let m represent the individuals whose vector of financial services is given by (x1, x2, x3,.........x$_m$), then the general function for the individual welfare may be given by the expression:

$$W(x) = V(x_1, x_2, x_3,.........x_m) \quad\text{...}4.1$$

Assuming that the welfare function is homogeneous of order one, then the function may be transformed into the following:

$$W(x) = \mu(1 - I) \quad\text{...}4.2$$

I is the inequality degree and cannot perhaps surpass one and μI signify the inequality cost. A movement from W to I will generate the Atkinson Index, I_A.

Let's consider a welfare function of the form:

$$W = \frac{1}{n} \sum_i \frac{x_i^{1-\varepsilon}}{1-\varepsilon} \quad\text{...}4.3$$

where ε is the aversion monitoring inequality and cannot be equal to 1. To remove the indeterminacy of the welfare function when $\varepsilon=1$, we apply derivatives to the function to obtain:

$$\frac{\partial W / \partial x_i}{\partial W / \partial x_j} = \left(\frac{x_i}{x_j}\right)^{-\varepsilon} \quad\text{..}4.4$$

if the ε tends to infinity, the marginal utility for the poor people dominates. This is the Rawlsian situation. However, if ε tends to zero, more weight is put on the rich. With this assumptions we derive the Atkinson Index stated as:

$$I_A = 1 - \left(\frac{1}{n} \sum_i \left(\frac{x_i}{\mu} \right)^{1-\varepsilon} \right)^{\frac{1}{1-\varepsilon}}$$ 4.5

if ε tend to 1, the index in 4.5 becomes multiplicative as shown below.

$$I_A = 1 - \prod \left(\frac{x_i}{\mu} \right)^{\frac{1}{n}}$$ 4.6

Atkinson's index I_A is expressed as a function of x. This may be expressed as follows:

$$I_A = f(x_i)$$ 4.7

Therefore, when we express welfare in the form, $W(X)$ where $X=(x_1,\ldots\ldots\ldots\ldots x_m)$, we are simply showing the relationship between welfare and income distribution. In this chapter, we used asset distribution instead of reported income to develop the Index.

4.3.4 Empirical Models

From the expression in 4.7, we assume that the distribution of income or assets is dependent upon the households' characteristics. Subsequently, welfare may be affected as a result of this key assumption. Therefore, in this chapter, we assess the effect of these individual characteristics on welfare where the individual characteristics is a composite comprising of log age squared, gender, marital status, education, social capital, province and location. Overall, these characteristics, therefore, affect welfare through asset distribution.

Using the FinAccess dataset, the available household information is used to examine the effect of individual characteristics on the adoption of mobile banking. Further, we estimate the effects of household characteristics on mobile banking and welfare index.

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In addition, the chapter also sought to compare the relevance of using different measures of welfare. Specifically, the chapter compared reported income as a measure of welfare and the reported asset. From the expression in 4.7 and the assumption that income and asset distributions depend on the households' characteristics, we obtain our empirical model of the form:

$$Mobilebanking / AssetIndex / Income = \beta_0 + \sum_{i=j=1}^{n} \beta_i X_j + \omega_i \dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots 4.8$$

Where X is a vector of households' characteristics affecting adoption of mobile banking, asset and income distribution. Equation 4.8 may be used to assess the strength of using the reported income or asset distribution as a measure of welfare. Where this is the case, X becomes a vector of assets owned by households. If Income is a good measure of welfare then the basket of assets should explain large variations in income. The coefficients of the models are not interpreted mainly because the purpose of the models was for comparing their reliability in measuring welfare.

Therefore, we estimate the adoption of mobile banking model on the basis of household characteristics as follows:

$$MobileBanking = \beta_0 + \beta_1 \log Agesquared + \beta_2 Education + \beta_3 Gender + \beta_4 Location$$
$$+ \beta_5 Maritalstatus + \beta_6 Socialcapital + \beta_7 Income + \beta_8 \Pr ovince + \omega_i \dots\dots\dots\dots 4.9$$

The welfare index used in this chapter was normalized using the standard approaches proposed in Freudenberg (2003) which involve aggregation and which find applicability in (Massara and Mialou 2014). In this chapter, we, however, adopted the Multiple Correspondence Analysis (MCA) that is preferable due to its advantages over other approaches. Equation 4.10 was used to estimate the effect of household characteristics on welfare index. We note that after normalizing the welfare index, we generated wealth quintiles specifically to help us understand the wealth distribution among the households. Hence:

$$Wealthqu \text{int} iles = \beta_0 + \beta_1 LogAgesquared + \beta_2 Education + \beta_3 Gender + \beta_4 Location + \beta_5 MaritalStatus$$
$$+ \beta_6 Socialcapital + \beta_7 AgencyBanking + \beta_8 MobileBanking + \beta_9 \text{Pr} ovince + \mu_i ....4.10$$

4.3.5 Definition and Measurement of Variables

4.3.5.1 Dependent Variables

This chapter has 2 dependent variables; *Mobile and Agency banking are a set that collectively is referred to as branchless banking and the Asset index*. Mobile banking captures individuals currently using mobile services to transmit funds to and from their bank account while agency banking captures individuals who have ever used agency services provided by various banks within the last 12 months preceding the survey. *Asset index* is the other dependent variable constructed using the MCA approach and individual households' asset allocation.

4.3.5.2 Construction of an Asset Index and welfare measure

This section focuses on the construction of the wealth index using ownership of assets. This approach of using the asset index to derive the welfare measure is not a new phenomenon (Sahn and Stifel (2000) and Filmer and Prichett (2001). The assets possessed by individual households are derived from the FinAccess survey and ranges from movable assets such as electronic appliances, furniture, livestock to immovable assets such as the living house.

In developing the asset index, we follow the four key steps as proposed in Vyas and Kumaranayake (2006) where in the first step a choice of the asset variables to be included in the asset index is determined. Generally, the assets must be owned across different classes of people. The selection of variables is followed by the application of the Multiple Correspondence Analysis (MCA) on those variables to extract the dimensions explaining the proportion of variance accounted for. The third step involves using the dimensions and weights to create the index. This step requires that the index so far generated is standardized to make it easy to interpret. The non-standardized index is difficult to analyse as it contains both negative and positive numbers.

4.3.5.3 Step 1: Identifying and selecting variables

The FinAccess survey collected a variety of data related to household socioeconomic statuses, such as dwelling ownership and characteristics of a variety of assets such as refrigerators, radios, and bicycle among others. The variables selected are consistent with those commonly used in constructing the wealth index in many demographic and health surveys. Table 4.2 shows the asset variables utilized in the asset index construction.

Table 4.2: Asset ownership descriptive statistics

	Count	Mean	SD	Min	Max
Type of dwelling	6449	1.989921	0.929956	1	5
Type of permanent dwelling	2048	1.831055	1.063574	1	4
Floor materials	2048	1.383789	0.959447	1	4
Wall materials	6449	2.992712	1.485698	1	9
Cooking fuel source	6449	2.74027	4.610175	1	11
Lighting source	6449	4.21042	1.048266	1	10
Water source	6449	5.484416	3.050411	1	12
Toilet type	6449	3.514808	1.260369	1	7
Has radio	6449	1.324857	0.468357	1	2
Has black & white TV	6449	1.931462	0.25267	1	2
Has Colour TV	6449	1.770197	0.420739	1	2
Has bicycle	6449	1.769111	0.421434	1	2
Has motorcycle	6449	1.952086	0.213602	1	2
Has computer	6449	1.958288	0.199946	1	2
Has kitchen sink	6449	1.939215	0.238953	1	2
Has refrigerator	6449	1.954722	0.2079301	1	2
Has electric stove	6449	1.976586	0.1512276	1	2
Has VCD/DVD player	6449	1.807567	0.3942418	1	2
Has charcoal iron	6449	1.771903	0.4196383	1	2
Has electric iron	6449	1.872383	0.3336884	1	2
Camera	6449	1.961855	0.1915622	1	2
Microwave oven	6449	1.979532	0.1416067	1	2
Has Hifi/music centre	6449	1.956427	0.2041581	1	2
Has vacuum cleaner	6449	1.994728	0.0724234	1	2
Has Deep freezer	6449	1.991472	0.0919621	1	2
Has Frying pan	6449	1.405799	0.4910841	1	2
Has towel	6449	1.329974	0.4702396	1	2
Has car	6449	1.965886	0.1815356	1	2
Has mosquito net	6449	1.277407	0.4477539	1	2
Has fixed telephone	6449	1.997209	0.0527615	1	2
Has solar lamp	6449	1.972244	0.1642864	1	2
Has land	6449	1.394635	0.48881	1	2
Has house	6449	1.338502	0.4732369	1	2

Source: Computed by the author based on FinAccess 2013

The index under construction is based on both binary as well as categorical indicators. The idea of aggregating variables to define a poverty measure emanates from the reasoning that poverty is a value judgement and deviates from the technical exercise often used in determining certain aggregate measures (Sen, 1976). This view focuses on three key aspects that form the dimensions of poverty namely: health, education and living standards. The most

important dimension of poverty has focused on assessing the living standards of individuals rather than their income. This approach to the poverty measurement has some advantages, which include parsimonious results, easy interpretability and comparability.

4.3.5.4 Step 2: Application of Multiple Correspondence Analysis

MCA is among the many approaches used to compute weights of an asset index in literature. Other methods used comprise of the principal components analysis (PCA), the multivariate regression and factor analysis. MCA technique is similar to PCA but involves more detailed analysis of the data to generate the asset index (Galbraith et al., 2002). The benefit of MCA over other techniques is that of appropriateness for the analysis of categorical data (Booyseen et al., 2008).

To construct the asset index, we proceed as follows: we denote x_j as the weight of category j and Z_{ij} as the response of individual household i to category j. Each of these products was allocated a weight produced via the multiple correspondence analyses (MCA) and subsequently, the consequential asset scores were produced using the standard normal allocation. The MCA thus generates the asset index via equation 4.10 where Z_{ij} denotes household $i's$ ownership of asset j. Hence:

$$MCA_i = \sum_{j=1}^{J} x_j Z_{ij}$$ 4.11

This index calculated in 4.11 contains both positive and negative values. The interpretability of such an index may generate inaccurate results and therefore requires that the MCA is normalized between 0 and 100. This normalization allows for easy interpretation of inter-temporal and cross-boundary comparisons through the formula:

$$MCA_i\_normalized = \frac{MCA_i - \min(MCA)}{\max(MCA) - \min(MCA)} \times 100$$ 4.12

This, however, involves relating the index to a set of explanatory variables and observing its behaviour. The index so far created ranges from 0 being the lowest wealth indicator to 100

being the highest wealth indicator[15]. In this chapter, all households were assigned the standardized wealth index score classifying them according to their wealth endowments.

The MCA index possesses some limitations in terms of how well it can approximate the current household wealth. This index has been shown not only to be critical in measuring wealth but also shows the level of household involvement in the contemporary economy against the traditional sector (Bingenheimer 2007). This approach assigns high positive weighting to valuable goods owned by households and low weight for less durable items. The author used the existing data collected in the FinAccess survey and therefore the core assets used were those in the dataset and not based on standard selection. There is therefore a possibility that the predictive power of the index is more likely to vary with different asset choice (Howe et al., 2008)

The MCA approach possesses challenges and should be carefully used although it has many advantages over metric measures of welfare as propagated by welfarists. Table 4.3 shows the results from the multiple correspondence analyses (MCA) with normalized principal inertias. The coordinates have been scaled by principal inertias and the Burt matrix, and the adjustments show that 82 percent of the total inertia is contained in the first two dimensions.

Table 4.3: MCA with normalized principal inertias

Dimension	Principal Inertia	Percent	Cumulative percent
Dimension 1	0.0134808	66.19	66.19
Dimension 2	0.0033139	16.27	82.46
Dimension 3	0.000805	3.95	86.41
Dimension 4	0.000097	0.48	86.89
Dimension 5	0.0000322	0.16	87.05
Dimension 6	0.0000115	0.06	87.10
Dimension 7	2.63e-06	0.01	87.12
Total	**0.0203671**	**100**	

Figure 4.1 presents the multiple correspondence analysis plots that make it easy to observe data associations. Most of the variable indicators are dichotomous and therefore the association largely shows the relationships represented by the options given.

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[15] The limitations of index number theory are well known; however, the index helps us to get a good handle on the full range of possibilities between 1 and 100.

Figure 4.1: MCA Coordinate plot
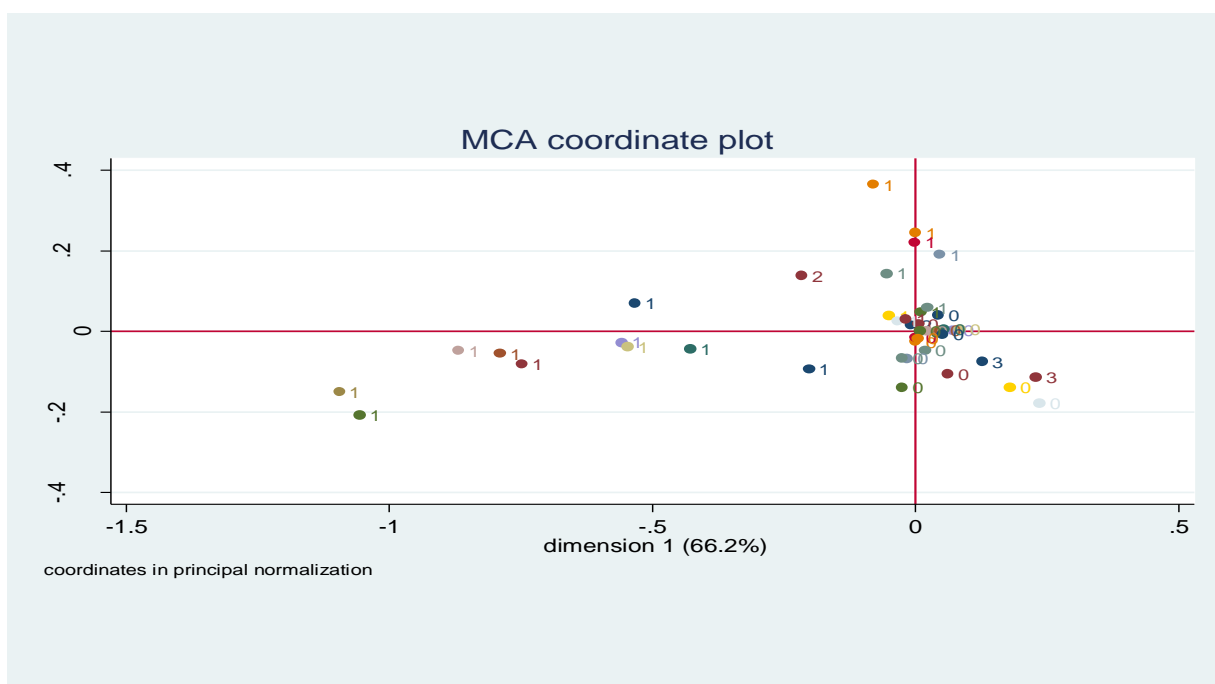
For instance, there is close association between ownership of wooden structures and type of permanent dwelling. The figure 4.1 also shows a plot of two dimensions which explains the largest inertia accounting for 82 percent. The principal normalization in figure 4.1 allows for asset associations between row and column categories and therefore analysis can be carried out separately for rows and columns.

4.3.5.5. Independent Variables

The descriptive variables to be utilized in this part include: *Education, Marital status, log Age squared, Gender, and Cluster type (Location).* Agency and mobile banking variables were used so as to assess the wealth index changes. Table 4.4 shows the variables and their measurements.

Table 4.4: Definition, measurement and predicted sign for each explanatory variable

Variables	Details	Measures	Forecasted effects	Data source
Log Age squared	LAGESQRT	Years lived	+/-	FinAccess
Education	EDU	0= None 1= Primary 2= Completed primary 3= Secondary 4= Completed secondary 5=Technical education after secondary school 6=University degree	+	FinAccess
Marital status	MARIST	0=Single 1= Separated/Divorced 2= Widowed 3= Living with partner/Married 4= Don't know	+/-	FinAccess
Gender	GENDER	0= Female 1=Male	+/-	FinAccess
Cluster type	LOC	0= Rural 1=Urban	+/-	FinAccess
Social capital	SOCAP	0=none 1=one group 2=two groups 3= more than two groups	+	FinAccess
Province		0=Nairobi 1=Coast 2=Eastern 3=Central 4=Nyanza 5=Rift Valley 6=Western		FinAccess
Wealth Quintiles	WELFARE	Computed using MCA (0-100)	+	FinAccess

Source: Author's own compilations. Notations: + is positive and - negative

4.4 Empirical Findings

4.4.1 Introduction

The results of empirical analysis summarizing the characteristics and effect of variables on key indicators are shown. The descriptive statistics related to the variables used in this chapter are also shown. This section also draws insights into the nature of relationships among the selected variables and compares with similar studies.

4.4.2 Descriptive Statistics and Correlation Matrix

Table 4.5 shows the summary statistics of the variables used in this chapter. The constructed index is normalized and the average individual household's index is 89 percent and ranges between 0 and 100. The summary statistics also reveal that the asset distribution is skewed to the right.

Table 4.5: Descriptive statistics

Variable	Obs	Mean	Median	Std. Dev.	Min	Max
Index(Normalized)	6,449	89.60	91.00	8.11	0	100
Agency Banking	6,449	0.09	0.00	0.28	0	1
Mobile Banking	4,221	0.04	0.00	0.20	0	1
Log Age squared	3,210	7.40	7.38	0.87	6	9
Education	3,210	2.07	2.00	1.65	0	6
Marital Status	3,210	2.13	3.00	1.17	0	4
Social Capital	3,210	0.45	0.00	0.73	0	3
Gender	3,210	0.60	1.00	0.49	0	1
Location	3,210	0.64	1.00	0.48	0	1
Province	6,449	3.13	3.00	1.81	0	6

Source: FinAccess 2013

Table 4.6 shows the correlation matrix of all the variables used in the model. Although the correlation between agency banking, mobile banking and the measure of welfare appear negative, this reflects the inclination of the majority in the sample selected. However, the actual effect of the measures is determined by the strength of their coefficients.

In order to compare the measures of welfare, we constructed an asset index and obtained income values directly from the respondents. The asset index was obtained from a basket of assets available in the FinAccess dataset. These assets are commonly owned by individual households in different proportions but give a good measure of the welfare than the income approach. The respondents' can easily provide information on material possession than revealing their income directly. Table 4.7 shows the results of equation 4.8 comparing the strength of predictability of the welfare measures. As can be seen from Table 4.7, the basket of assets explains a huge percentage (96.5 %) of the variations in the asset Index model compared to 23.5% in the income model. The estimated coefficients of the Index model are

different from those in the income model. The results show that welfare measures based on asset/wealth index is a better indicator compared to the income measure. Income data as a measure of welfare has been shown to have limitations with respect to accuracy and measurements in most of the developing countries. This is mainly because of the seasonality of income arising from irregularity as to when such income is earned and in what form it is earned. Most of the households have weak power to recollect and attach value to their sources of income thereby exposing data on income to potential errors. Therefore, income proves to be a poor measure of household welfare.

Table 4.6: Correlation Matrix

	Index	Agency Banking	Mobile Banking	Branchless	Log age squared	Education	Marital Status	Social Capital	Gender	Location	Province
Index	1.000										
Agency Banking	-0.140**	1.000									
Mobile Banking	-0.174**	0.191**	1.000								
Branchless	-0.196**	0.874**	0.644**	1.000							
Log age squared	0.040**	-0.019**	0.001	-0.015	1.000						
Education	-0.406**	0.236**	0.183**	0.274**	-0.108**	1.000					
Marital Status	0.049**	-0.057**	-0.020	-0.055**	0.168**	-0.130**	1.000				
Social Capital	-0.020**	0.041**	0.052**	0.058**	0.017	-0.022**	0.020	1.000			
Gender	0.026*	-0.083**	-0.071**	-0.100**	-0.008*	-0.123**	-0.289**	0.132**	1.000		
Location	-0.233**	0.140**	0.106**	0.162**	-0.095**	0.304**	-0.259**	0.001**	0.003	1.000	
Province	0.187**	-0.150**	-0.089**	-0.161**	-0.003	-0.167**	0.098**	0.011	0.038**	-0.164*	1.000

***$p<0.01$,**$p<0.05$,*$p<0.1$

Table 4.7: Income and MCA index regressed by Assets

VARIABLES	MCA Index	Income
Type of permanent dwelling	0.0753	0.135***
	(0.0485)	(0.0416)
Floor materials	0.641***	-0.166***
	(0.0547)	(0.0456)
Radio	-0.688***	-0.0962
	(0.116)	(0.0984)
Black and white TV	-0.0748	0.352**
	(0.177)	(0.163)
Bicycle	0.929***	-0.254**
	(0.120)	(0.107)
Motorcycle	0.0418	-0.479**
	(0.205)	(0.195)
Desktop/laptop	9.206***	-0.654***
	(0.186)	(0.158)
Fridge	8.871***	-0.694***
	(0.183)	(0.172)
Electric stove and oven	11.73***	-0.0801
	(0.254)	(0.244)
Charcoal iron	-1.033***	0.0263
	(0.123)	(0.110)
Hifi/Music Centre	6.848***	-0.441***
	(0.169)	(0.151)
Vacuum Cleaner	13.97***	0.104
	(0.525)	(0.476)
Deep freezer	11.83***	-0.633*
	(0.350)	(0.365)
Frying pan	3.092***	-0.0376
	(0.131)	(0.102)
Towel	3.879***	-0.598***
	(0.163)	(0.125)
Car	7.987***	-0.200
	(0.196)	(0.194)
Mosquito net	1.033***	-0.216**
	(0.121)	(0.0992)
Fixed telephone	14.77***	-0.803
	(0.596)	(0.568)
Solar lamp	0.757***	-0.273
	(0.245)	(0.239)
Land	-0.999***	-0.390***
	(0.102)	(0.0911)
Constant	-89.75***	11.20***
	(1.618)	(1.490)
Observations	2,048	993
R-squared	0.965	0.235

Source: FinAccess 2013   Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Figure 4.2 shows the households' assets distribution where it is evident that there is lack of symmetry as most of the sampled households appear to possess the selected assets. Majority of the people fall above the third 20 percent category of wealth implying a relatively higher number of individuals who own most of the assets.

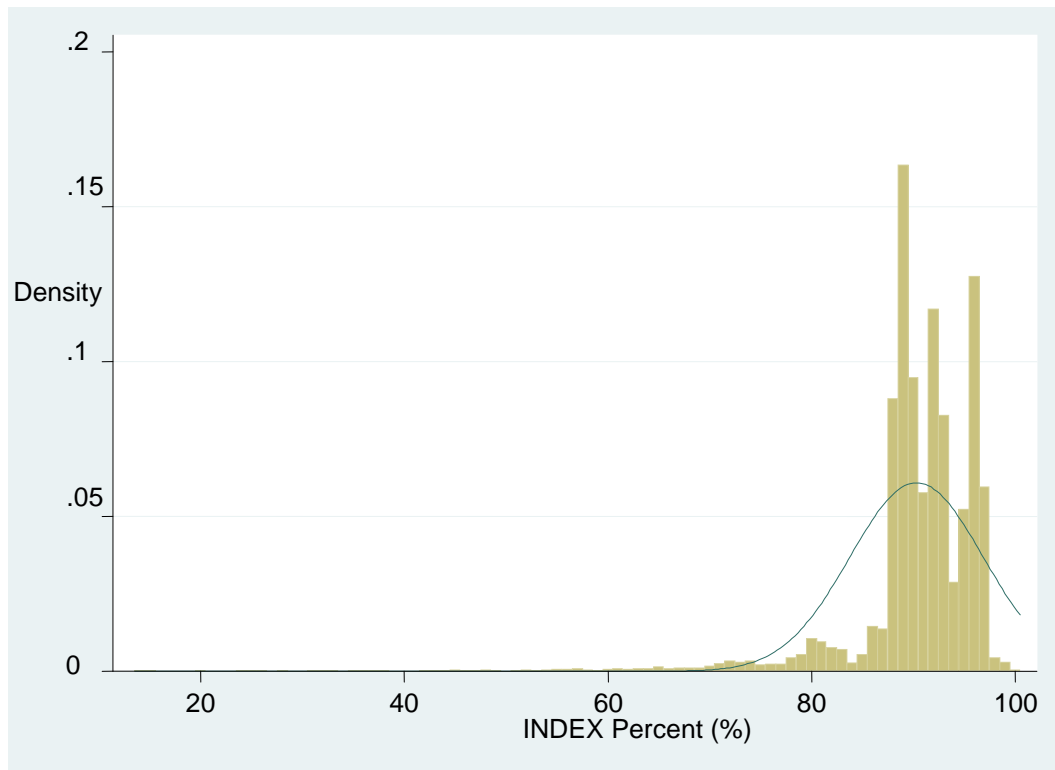**Figure 4.2: Asset Index distribution**

Figure 4.2 further shows how households are ranked on the basis of asset ownership with the following classifications adopted: The poorest 20 percent followed by the second 20 percent, third 20 percent, fourth 20 percent and the richest 20 percent. The asset ownership questions largely focused on possession but its value could however not be authenticated at the time of the survey and as such there is a likelihood that some households reported being in possession of some assets though not in use. As a result, there is need to be cautious with the findings arising from such analysis as possession does not necessarily imply utilisation

Kenya's poverty and inequality assessment based on the Kenya Integrated household budget survey (2005/2006) showed that almost half of Kenya's population is poor with majority of them living in the rural areas. Although efforts have been made towards poverty reduction in rural areas (Nyoro et al., 2008), the character of poverty remains rural. The situation depicted in figure 4.2 reveals that majority of those sampled were from the urban areas and therefore more likely to

possess the selected assets. About 64 percent of the households were from urban and only 36 from the rural areas. Inequality experienced across households shows that rural set ups are more disadvantaged compared to urban areas.

### 4.4.3 Non-parametric analysis of wealth distribution

The quintile analysis in Table 4.8 shows the number of unique index values in each asset index category. The poorest 20 percent constitute 4 individual households, while the second 20 percent category has 23 individuals. Cumulatively, only 27 individuals fall in the first 40 percent category. Across the middle category to the fourth 20 percent, it becomes clear that asset possession increases with the richest category constituting nearly 90 percent. However, it should be expected that with more people in the urban areas, more asset possession is bound to be likely high.

Table 4.8: Number of unique index values by quintile

Quintile of Asset Index	Unique Values
Poorest 20%	4
Second 20%	23
Middle 20%	81
Fourth 20%	358
Richest 20%	5,983

Figure 4.3 shows the quintile distribution of wealth among households. There is a progressive increase in the number of individuals with durable assets from the poorest 20% to the richest 20%. The picture depicted in the figure 4.3 means that inequalities brought about by the welfare measure have remained invariant.

Figure 4.3: Quintile distribution of household wealth
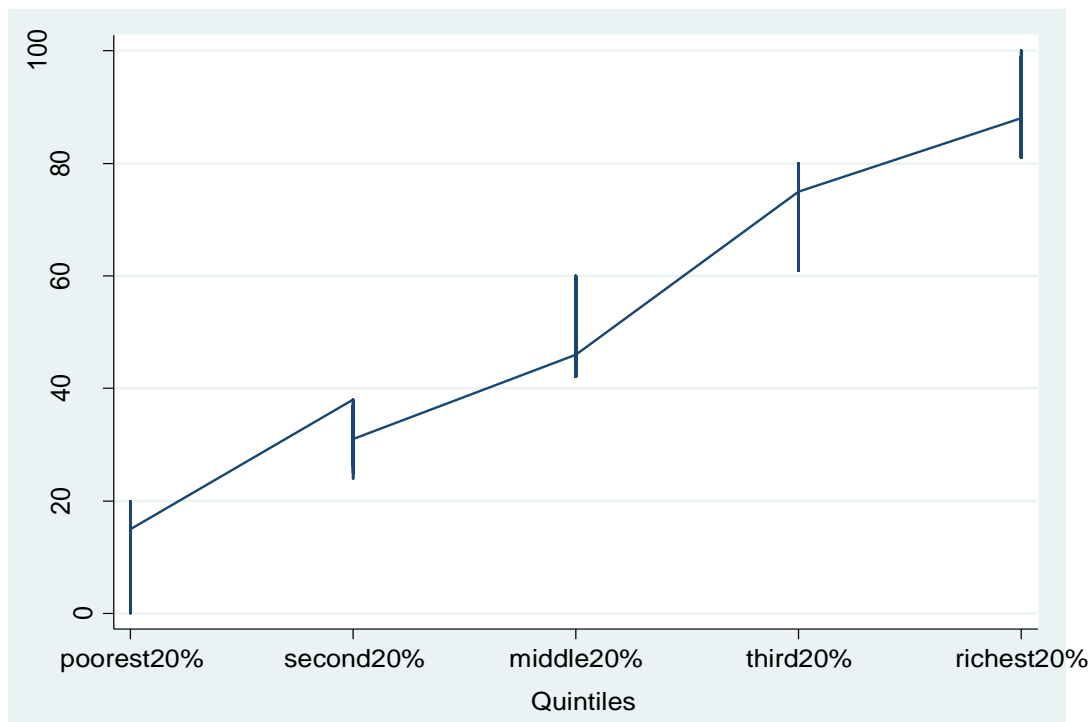
4.4.4 Further Empirical Analysis

The contemporary debate on improving the welfare of individual households has revolved around financial innovation that brings the services closer to the people. Some of the initiatives currently being undertaken include the establishment of branchless banking which reduces the distance travelled to the nearest financial service provider. The question many scholars have attempted to address is whether bringing services closer to the people has the potential to spur demand for the services. In order to have insights into this issue, it is imperative to understand what influences the adoption and usage of branchless banking. As discussed in the literature, the findings of many studies have pointed to the potential gains of branchless banking. For instance, Von Rosen (2013) examines gender, age, educational status, geographical location and income based on a sample of 100 individuals of which urban dwellers constituted half of the population. The overall finding showed that welfare improved because of branchless banking.

4.4.5 Factors that Influence Usage and Adoption of Kenya Mobile banking

Table 4.9 shows the factors and their effects on mobile banking in Kenya as derived from equation 4.8. Estimation results shows that age has no significant influence on mobile banking in Kenya and this could be attributed to the fact that mobile phone ownership in Kenya cuts across all ages and mobile money services are not necessarily embedded on mobile phones of users as its usage is voluntary. It is thus not surprising that age was found not to be a significant determinant of mobile banking because anecdotal evidence shows that the consumers' propensity to use mobile phones to carry out a banking transaction depended on the sophistication of the phone they are using and not the age of the consumer.

Among all the other factors considered, they were found to be significant except for marital status. For instance, the respondent's level of education is positive and significantly related to mobile banking adoption at 1 percent level of significance which is in line with the findings in Cruz et al. (2010), Dineshwar and Steven (2013) who also found that high level of education is likely to tilt people towards adopting mobile banking. Social capital defined as the number of groups an individual respondent belongs to is found to positively influence the adoption of mobile banking with the association being significant at 1 percent level. Similarly, group membership plays an important role in influencing individual behaviour. Isham, (2000), and Täube and Joye, (2001) show findings similar to the current chapter in that social capital is more likely to lead to the adoption of mobile technology. We also established that the adoption of mobile banking is significantly related to gender in Kenya with the significant relationship being at 5 percent. Indeed the disparity in mobile banking in Kenya has been attributed to gender and which according to Mbiti and Weil (2011) male use mobile banking than female. On the contrary, some studies have also found gender not to be associated with the adoption of mobile banking (Dineshwar and Steven 2013). We also established that the location of the respondent

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defined as urban or rural is a significant factor affecting the adoption of mobile banking with the relationship being negative.. Living in rural areas is less likely to increase the adoption of mobile banking because the rural area set up experience challenges of access to and use of financial services which can be attributed to the disproportionate distribution of network coverage in favour of urban areas (Njenga 2009).

The chapter also sought to find out the effect of province on the likelihood of adoption of mobile banking. Province constitutes a combination of counties within the same region defined by the defunct administrative units. This chapter found province to be significant and negatively associated with mobile bank adoption. The assumption made in the construction of this variable focuses on the headquarters which presents a variety of financial services from which individuals can choose from. In addition, the concept of mobile banking is relatively new and many people have not fully embraced it. For instance, in 2012 the number of people using mobile banking service rose from 6 percent to 18 percent in 2013 (Jeong and Yoon 2013). Although the growth in mobile banking has been witnessed in many parts of the world, mobile transactions are yet to meet the peoples' expectations (Suoranta and Mattila, 2004, Kleijnen, et al., 2004). Out of an estimated 5 billion mobile users worldwide, only 200 million people use mobile banking services. Mobile banking remains low even within developed countries where it is ubiquitous: Sweden at 20 percent, USA at 22 percent and UK at 20.4 percent (Lenart and Frederiksen 2012).

The results in this chapter, therefore, are consistent with the prevailing literature even within the developed countries. There is a lag between the introduction of innovation and adoption. This period is marred with some level of uncertainty which influences the choice individuals make.

Table 4.9: Estimation results on the factors affecting branchless banking in Kenya

Variables	Mobile Banking	Agency Banking
Log Age squared	0.00580	0.00205
	(0.00599)	(0.00583)
Education	0.0165***	0.0339***
	(0.00412)	(0.00426)
Marital Status	-0.00164	-0.00720
	(0.00479)	(0.00526)
Social Capital	0.00990**	0.0156***
	(0.00504)	(0.00592)
Gender	0.0190*	0.0243**
	(0.00977)	(0.0104)
Location	-0.0176	-0.0310**
	(0.0108)	(0.0127)
Province	-0.00567*	-0.0151***
	(0.00292)	(0.00294)
Income	0.0192***	0.0309***
	(0.00491)	(0.00570)
Constant	-0.0470	0.0424
	(0.0496)	(0.0489)
Observations	2,162	3,210
R-squared	0.056	0.118

Standard errors in parentheses
*** $p<0.01$, ** $p<0.05$, * $p<0.1$

Table 4.10 shows the test for multicollinearity performed using the variance inflation factor analysis of the variables used in the model. The variables used have been corrected for multicollinearity as shown in Table 4.10.

Table 4.10: Variance Inflation factor

	Mobile Banking Model		Agency Banking Model	
Variable VIF	**VIF**	**1/VIF**	**VIF**	**1/VIF**
Education	1.32	0.758209	1.47	0.678902
Income	1.29	0.776094	1.39	0.717037
Location	1.23	0.814810	1.22	0.821513
Marital Status	1.20	0.834616	1.18	0.850452
Gender	1.18	0.843891	1.16	0.860932
Log age squared	1.06	0.947499	1.07	0.934985
Province	1.04	0.961335	1.06	0.947718
Social capital	1.03	0.975443	1.03	0.970397
Mean VIF	**1.17**		**1.20**	

Table 4.11 presents the results for the Breusch-Pagan (B-P) tests for heteroscedasticity. The B-P test has two hypotheses to be tested. The null hypothesis states that the error variances are constant while the alternative hypothesis states that the error variances are not constant. In this

case, the alternative hypothesis is the non-constant variance hypothesis showing that the error variances could be a multiplicative function of other variables. From the results, we find that the chi-square is large indicating the presence of heteroscedasticity. The large values of chi-square indicate that the error variances are unlikely to be constant.

Table 4.11: Heteroscedasticity tests

Breusch-Pagan / Cook-Weisberg test for heteroscedasticity	Breusch-Pagan / Cook-Weisberg test for heteroscedasticity
Ho: Constant variance	Ho: Constant variance
Variables: fitted values of Mobile Banking	Variables: fitted values of Agency Banking
Chi2(1) = 847.41	Chi2(1) = 1236.62
Prob > Chi2 = 0.0000	Prob > Chi2 = 0.0000

Models with mobile banking and agency banking show the presence of heteroscedasticity. The problem was corrected by re-estimating the model using the robust standard errors which relax some of the assumptions contained in the ordinary least squares method.

This chapter also investigated the effect of self-reported income on mobile and agency banking and we found that income positively affects mobile banking and is significant at 1 percent. This is in line with the findings in Fall and Birba (2015) that low-income regions experience low uptake of mobile banking compared to high-income areas. Therefore income is an important factor that increases the likelihood of individuals adopting mobile banking.

The chapter also investigated the factors that lead to the adoption of agency banking. Agency banking like mobile banking is a recent phenomenon in Kenya that has not fully penetrated all regions of the country. Although more agents are offering the financial services in many parts of the country, the majority of the people are yet to fully embrace the model. These people are however found in both urban areas as well as rural areas. The concept of agency banking is regulated by the Central bank of Kenya.

4.4.6 Effect of Mobile Banking on Welfare

Mobile and agency banking has become the key components of financial inclusion in Kenya. They provide a variety of financial services that are closer to the people, unlike the mainstream banking halls. This chapter investigated the effect of mobile and agency banking on welfare improvement in Kenya. Do mobile and agency banking improve livelihoods? This chapter provides insights into the extent to which these services can help to improve welfare. Table 4.12 shows the Quintile regression panel derived from equation 4.8. If agency banking is implemented to improve the welfare of individuals across different socioeconomic groups, then it would not achieve the desired results. However, the results show that if agency banking targets certain specific wealth groups, it is likely to achieve greater welfare improvement. On the right-hand side panel, Table 4.12 shows that agency banking for the people categorized as Third 20 percent under the wealth quintiles would have the greatest improvement in welfare. Therefore, any policy intervention that intends to achieve greater improvement in welfare should target the specific segment of the wealth quintile. The quintile regression results treat the Richest 20 percent category as the reference category and therefore omitted. Individuals in this category can act as the first target group of policy intervention and through their individual characteristics transfer the benefits of policy to relatives through a trickledown effect. The trickledown effect ensures that appropriate mechanism of channelling benefits is designed to other lower segments within the wealth quintile. Therefore, targeting is critical if the hope of realizing welfare improvement is to be achieved. This also explains why the poor still choose informal financial tools that are risky and sometimes unreliable despite the fact that financial intervention policies are enacted (Omwansa and Waema 2014; Collins et al., 2009; Guirkinger 2008, 2005). The findings in this chapter are corroborated by (Sandford 2013; Ferguson 2011; Donner and Tellez

2008) who established that agency banking as a financial innovation plays an important role towards welfare improvement.

The effect of mobile banking, on the other hand, is shown in Table 4.12 for specific quintiles. We found out that implementing mobile banking to the whole population is more likely to lead to loss of welfare of some segments of the wealth quintile. However, mobile banking like agency banking should be targeted to specific categories of households. The target category mobile banking intervention is the Middle 20 percent. While over 70 percent of Kenyans have access to mobile financial services, majority of them do not have access to mobile banking. This can be attributed to many factors including literacy, trust among others. Compared to the Richest 20 percent, the Middle 20 percent are more likely to improve their welfare through adoption of mobile banking. The finding that mobile banking can improve welfare has been cited by other studies (Mbiti and Weil 2011; Jack and Suri 2011).

Table 4.12: Quintile regression parameter estimates

VARIABLES	Quintile Regressions parameter estimates			
	Poorest20%	Second20%	Middle20%	Third20%
Log Squared Age	-0.00124	-0.00125	-0.000509	-0.000205
	(0.00157)	(0.00169)	(0.000443)	(0.000185)
Education	1.590**	1.179***	1.414***	0.605***
	(0.718)	(0.438)	(0.214)	(0.0660)
Gender	13.46	-2.512**	0.00660	-0.184
	(827.1)	(1.010)	(0.471)	(0.200)
Location	-14.01	-1.306	-1.753***	-0.858***
	(650.1)	(1.188)	(0.648)	(0.197)
Marital Status	-0.114	0.666*	-0.218	0.0964
	(0.459)	(0.401)	(0.157)	(0.0736)
Social capital	-0.0411	0.109	-0.0659	0.0717
	(0.923)	(0.150)	(0.257)	(0.0586)
Agency Banking	-14.54	0.0663	-0.442	0.621***
	(1,225)	(0.990)	(0.502)	(0.194)
Mobile Banking	1.197	1.359	0.829*	-0.106
	(1.338)	(1.046)	(0.490)	(0.309)
Province	-0.150	-0.384	-0.151	-0.145***
	(0.307)	(0.277)	(0.105)	(0.0493)
Constant	-28.34	-12.13***	-10.15***	-4.693***
	(827.1)	(4.294)	(1.700)	(0.614)
Observations	2,162	2,162	2,162	2,162

Normal errors in parenthesis
P< 0.01, p< 0.05, p< 0.1

Table 4.13 shows the variance inflation factor analysis results shows how the multicollinearity by was addressed.

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Table 4.13: Variance Inflation Factor

	Quintiles	
Variable VIF	VIF	1/VIF
Marital Status	1.23	0.816291
Education	1.21	0.826722
Location	1.19	0.843444
Gender	1.16	0.863186
Agency banking	1.11	0.903088
Mobile Banking	1.07	0.935072
Province	1.06	0.940826
Log age squared	1.04	0.960860
Social capital	1.03	0.972102
Mean VIF	1.12	

Table 4.14 shows the Breusch-Pagan test for heteroscedasticity. The Breusch-Pagan test provides evidence that heteroscedasticity is present. We compared the chi-square test statistic and the F-test statistics and found out that they all pointed to the existence of non-constant variance. We also observed this situation from the large chi-square values in Table 4.14. Therefore, in order to deal with this problem, we re-estimated the model using the robust standard errors in STATA 13 software and obtained constant variance showing the existence of homoscedasticity.

Table 4. 14: Results of heteroscedasticity test

Breusch-Pagan/Cook-Weisberg test for heteroscedasticity
Ho: Constant variance
Variables: fitted values of Index
Chi2(1)=1,161.53
Prob>chi2=0.000
F(1, 2160)=95.98
Prob>F=0.0000

4.5 Conclusion and Policy Implication

This section presents an overview of the findings and puts into perspective the issues of great concern to both the policymakers and existing literature. This chapter focused on the assessment of the role of agency and mobile banking on welfare improvement in Kenya. Many countries have invested a lot towards ensuring better lives for their citizens. One way has been to ensure expansion in financial inclusion interventions. Consensus on the exact measurement or even

definition of financial inclusion is yet to be reached. It is imperative to pursue financial inclusion in order to promote welfare of households in Kenya.

The first objective was to identify the factors responsible for the adoption of mobile and agency banking services in Kenya. The findings have shown that in Kenya, no consideration of age is necessary as it is insignificant. Indeed the new trend in Kenya shows massive acquisition of mobile phone handsets regardless of the age. Mobile banking innovation, a relatively new phenomenon in Kenya remains restricted to individuals with certain specific characteristics. Similarly, age does not appear to be an important factor in influencing adoption of agency banking. Mobile banking and agency banking were introduced in Kenya almost at the same period of time hence its penetration to different regions of the country has not fully been achieved. The two platforms also utilize the same concept of linking the customers to mainstream banks or financial institutions. However, the number of people and volumes of transactions have started to increase over time.

Marital status was also considered in the current chapter but failed to present a significant relationship with mobile and/or agency banking. The residential characteristics of individuals defined by location play a key role in influencing the level of adoption of branchless banking. In most cases, urban dwellers are more advantaged than rural dwellers because they have a wide range of financial services to choose from and the distance to the nearest service provider is shorter. This explains the high propensity to use these services in urban areas than in rural. In addition, the services provided in the urban areas are more efficient and any technological interruption on service delivery is handled efficiently. But since most financial services are provided by the private sector driven by the motive to maximize profits, reaching out to the rural dwellers would be helpful.

The chapter also investigated whether gender plays a role in the adoption of branchless banking in Kenya. The results showed more male than female likely to use branchless banking. This view can be supported in the context of Kenya because more male than female migrates to urban areas in search of jobs. Therefore, they are more likely to be exposed to these platforms more easily than their counterparts back home.

Social capital influences adoption of both mobile banking and agency banking. It is a critical factor that should be considered when designing products at all levels. The knowledge about the functionality of mobile and agency banking can be acquired through social groupings. Therefore, individuals who belong to groups have a more likelihood of using these services than those who do not. In fact, the more groups one belongs to the more the chances of using these platforms. Education is also key to usage of mobile and agency banking. The higher the level of education the more likely one is to use the two platforms. Therefore, the penetration of these services largely depends on the level of understanding of individuals but more importantly the way they perceive them. An educated person is able to analyse the magnitude of risk involved in any transaction and make informed decisions. General education is good but even more important is the specific financial literacy that will greatly transform the peoples' perceptions about financial services.

Income is also a critical factor influencing adoption of agency and mobile banking in Kenya. Financial services by their very nature carry a cost and therefore individuals with income find it easy to transact than those without. Most of the urban dwellers earn a leaving by engaging in some economic activity that ensures some steady income. Their counterparts in rural areas

largely depend on farming or on transfers from their relatives living in major towns. The current

chapter also sought to investigate the role of province constructed by aggregating counties with

some specific characteristics. Since Kenya passed a new constitution in 2010, the provincial set

up was replaced by the county administration. Therefore, the economic unit that is known as the

county was established in every region of Kenya. The findings of this chapter showed that

province is negatively related to the adoption of mobile and agency banking in Kenya. The

development of counties has led to wide ranging financial services being availed to consumers.

In fact, there is no county in Kenya that lacks a financial institution. The low likelihood of

uptake of mobile and agency banking on the basis of province can also be explained by the most

common financial services available or accustomed to within the province.

The second objective of this chapter was to analyse the effect of mobile banking on welfare in

Kenya. The overall effect of agency and mobile banking has been found to be improvement of

welfare. The findings point to a targeted approach to achieve greater results. The findings

showed that agency banking services would have a positive significant effect on the welfare if it

targeted individuals in the third 20 percent wealth category. On the other hand, the mobile

banking services would be relevant if applied on the Middle 20 percent individuals. In

conclusion, promotion of agency and mobile banking is necessary for welfare improvement.

Measurement of poverty or welfare has taken different approaches in different countries. There is

no consensus on which method best suits what kind of data. However, attempts have been made

to strengthen measures by employing different methodological approaches. This chapter used the

asset index approach to determine which subgroups are most affected by the socioeconomic

characteristics of the household head. In addition, the chapter incorporated social capital in the

model to ascertain the role it plays. While social capital has been defined in many different ways, this chapter adopted its own definition and subjected it to the Kenyan data. Social capital was considered an externality created through social interactions and how it influenced welfare. The study by (Mwangi and Ouma 2012) used social capital to access the effect on access to credit in Kenya. This study used a dummy variable to define social capital (1 if an individual belonged to a group 0 otherwise), unlike the current empirical chapter that focuses on the effects of social capital externalities on welfare.

CHAPTER FIVE
SUMMARY, CONCLUSIONS AND POLICY IMPLICATIONS

5.1 Introduction

In this chapter, we provide a summary of the key findings arising from the empirical analysis. The findings are also compared to already established theoretical or empirical facts with a view to establishing convergence or otherwise between the theoretical and conceptual arguments thus helping bring out areas of future research.

Even though until today, many studies have been carried out on financial inclusion and welfare (Park and Mercado 2016; Gattoo and Akhtar 2014; Triki and Faye 2013; Reddy and Singh 2015; Demirguc-Kunt et al., 2015; Allen et al., 2016; Honohan, 2008) there is no consensus in the literature yet on what financial inclusion constitutes and has attracted various functional and conceptual definitions. Although this has been the case, there is some basic understanding acceptable across the varying definitions that financial inclusion entails access, usage and quality of financial services. This thesis, therefore, finds space in attempting to provide a definition of financial inclusion guided by the available data.

Data on financial inclusion especially in developing countries is scanty and irregular, but efforts towards collecting regular demand-side data on financial inclusion across many economies have been put in place including in Sub-Sahara Africa. The first comprehensive demand-side data on financial inclusion amenable to cross-country comparisons were collected in 2011 by World Bank: The Global Findex. Since then two rounds of surveys have been carried out. In Kenya, under the stewardship of the Central Bank of Kenya (CBK) and Financial Sector Deepening (FSD), demand-side data on access to and use of financial services have been collected on a

regular basis since 2006. So far, four rounds of surveys have been conducted. In Uganda, Rwanda and Tanzania data on financial inclusion have been collected by Fin Mark: The Fin Scope and a few more countries are also involved in collecting this type of data across Africa. Given the increasing availability of financial inclusion data from Africa, this thesis fills the research gap on financial inclusion which has mainly been due to limited availability of data and thus makes use of the Global Findex and financial access surveys (FinAccess and FinScope) to ascertain the relationships between welfare and financial inclusion measures.

Although a number of studies using Global Findex datasets have been carried out in various regions, not much of these are in Africa and more sore Sub Saharan Africa. In addition, these data sets are not quite similar therefore carrying out a comparative study proves inadequate. It is in this context that we found a major research gap worth interrogating and this comes at a time when financial inclusion issues have attracted immense attention across the whole world. This thesis, therefore, makes very important contributions to financial inclusion literature in several ways. First, this thesis provides a benchmark by examining the differences in financial inclusion indicators in and between selected African states. Secondly, it further compares financial inclusion indicators between Kenya and Tanzania and finally, it looks in detail at the role of banking and mobile agency in the growth of welfare in Kenya.

5.2 Summary of Findings

This thesis examined the extent of financial inclusion in selected SSA countries using a multilevel model approach to establish the factors responsible for the observed variations between countries. We, therefore, established that country differences accounts for more than 17 percent of the variations in account ownership with a 10 percent minimum benchmark based on intra-class correlation. We equally established that lower levels of income are associated with

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lower levels of bank account ownership although higher for account ownership with mobile phone service providers. These results clearly show that majority of those transacting through the mobile account platform are less endowed with resources. Similarly, age was found to be associated with account ownership with older individuals being less likely to own an account. Age was found to have negative association with account ownership meaning ageing diminishes the likelihood of owning an account. Education was also found to be a significant determinant of account ownership. More education tended to create the need for account ownership either with a financial institution or with a mobile phone service provider. However, females were less likely to be account holders compared to males. This shows male are more financially included than females and this could mainly be due to societal cultural beliefs, practices and roles. In addition, more male have attained higher levels of education than their female counterparts have.

The results further showed that there are marked differences across countries with regard to financial inclusion. However, despite the critical role played by country differences, differences in individual characteristics largely explains the variations in the extent of financial inclusion and although many barriers were investigated, the most outstanding barriers included *lack of money income*, *high cost of financial services* and *distance* from the nearest financial service point. The regression model was applied in determining the effect of socioeconomic and demographic factors on the barriers to financial inclusion. These barriers were associated with lower income levels and low educational attainment. We conclude that account ownership serves lower end individuals in the case of mobile phone service compared to other forms of account ownership. Aging is also an important factor that has the tendency to switch financial services over time.

The second empirical chapter sought to investigate the determinants of savings mobilisation and credit access. The chapter focused on the access strands for savings and credit access that

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included: formal other, formal, excluded and informal. Socioeconomic characteristics of access to and use of credit and savings mobilisation in Tanzania and Kenya were examined. The findings suggest that the overall points for the analysis of savings mobilisation and credit access are as follows: First, both demographic and socioeconomic factors are critical determinants of access to savings and credit in Kenya and Tanzania. Emphasis was laid on the importance of social institutions such as gender, education, age, social capital, marital status, and income.

Secondly, the findings have underscored the importance of other strands of access to savings and credit namely formal other, informal and exclusion. These strands are influenced by several factors prevailing in Kenya and Tanzania which has significantly shaped the financial architecture in the respective countries. The findings have important policy implications and help obtain deeper insights into economic theory. We focused on two key policy issues: access to credit and savings mobilisation. Throughout the chapter, the focus was on access (the likelihood of using the financial services) to specified financial services. Indeed, access has been loosely used to also mean actual use of the financial services. The implication of having more people access formal savings and credit is to prevent unnecessary risks associated with informality and/or exclusion. Economic theory opines that savings increase investment funds through the savings-investment identity. Access to credit, on the other hand, ensures that households are not deprived of income to smoothen their consumption. Majority of the people in Kenya and Tanzania are relatively poor and therefore require a stable source of income for their livelihoods. It is in this regard that access to credit and savings is critical to improving the lives of the people.

Education plays the most critical role in ensuring that people are enlightened and make choices that are not only rational but also beneficial. More educated individuals are likely to earn more income, live in urban areas and join network of other people to fulfil their desires. There has also

been a revelation that educated individuals are more likely to have lean and nucleated families which in turn has a major influence on the way they interact with financial services.

This assessment was carried out with both social institutional factors, demographic factors as well as economic factors. Specifically, the variables of interest included: age, gender, location, education, marital status, social capital and income. The thesis notes that each strand of savings and/or credit access had its own critical variables. The policy package across the two countries should bring about convergence and encourage innovative ways of promoting financial inclusion.

The third objective focused on evaluating the role of mobile banking on welfare enhancement. The overall effect of agency and mobile banking has been found to improve welfare. This has, however, to be carefully done to target the relevant category of individuals on the basis of their wealth levels. The findings show that agency banking services would have a positive significant effect on the welfare if it targeted individuals in the third 20 percent wealth quintile. On the other hand, the mobile banking services would be relevant if applied on the Middle 20 percent individuals. In conclusion, promotion of agency and mobile banking is necessary for welfare improvement if accurately targeted.

5.3 Conclusions

Overall, the results confirm that changes in the socioeconomic and demographic factors influence the variations across countries leading to differences in the level of financial inclusion. Some countries in the sub-Saharan Africa are more financially included than others although the extent of inclusion is determined by the factors across time. The thesis also established that if the country's points of service are too far away from the households, then it impedes the utilisation of the financial packages available.

Majority of the people in Kenya and Tanzania are poor and therefore require stable source of income for their livelihoods and therefore access to credit and savings among this segment is critical to improving their welfare. Mobile and agency banking, a relatively new phenomena, potentially holds the key to financial inclusion in Kenya and with technological innovation in the financial sector the level of financial inclusion has drastically risen. While quantitative increase in access to financial services is slowly being achieved, the focus should now shift to qualitative access to and use of financial services. In addition, conscious efforts should be instituted to provide people with the requisite financial tools to enable them use wide ranging financial services.

Currently, majority of the users of financial services have attained higher levels of education, higher incomes and are mostly urban residents. The poor people who constitute the majority are found in the rural areas, have less education and low incomes. The challenge for most of the private sector financial service providers is how to discriminate their prices to take care of the low-income earners. The disproportionate distribution of financial services has disadvantaged the rural poor who are forced to depend on the limited available financial services. This explains the continued building up and harmonious co-existence of both formal and informal financial services portfolios which is an indication that financial inclusion is yet to be fully achieved creating a "missing market" phenomenon.

5.4 Policy Implications

The issues discussed in this thesis can be extended in a number of ways and in different directions from a policy perspective. In general, the government should provide a better environment for schooling to allow the majority of the people to acquire education. This policy should be an affirmative action in favour of women. In addition, there is need for financial

literacy for both gender. The private sector players should identify appropriate products for the aging and incentivize them to scale the uptake of those products. The sub-Saharan Africa countries should invest in basic infrastructural projects that will open remote areas where majority of the people reside. Another critical policy area that requires government intervention is in providing appropriate regulatory framework necessary to promote innovation in the financial sector. Determining a balance between regulation and innovation should be given priority for future research. This is critical because an optimal regulatory environment will guide industry players to take the sector to a higher level.

The key social institutional factors considered call for strategies that will widen and deepen the scope of coverage and access of financial services. Different aspects of financial inclusion are affected differently. However, there is need for policy makers to examine the contribution of each aspect and determine the best policy going forward. Fundamentally, this thesis considers the findings to be self fulfilling in light of the countries under review. Indeed, the findings are likely to be an important consideration for discussion in forums for regional integration and lend support for unification and standardization of systems across the integral units within these economies. This will create an expanded market with unique financial needs thus paving way for innovative ways of capturing the market. Access to credit and savings mobilisation is likely to increase bringing more individuals to the formal financial system.

Kenya's financial sector has grown over the years to be among the top in Africa and this has been greatly driven by financial innovation especially those that target potential markets. Although most of it has been focused on quantitative growth, it is imperative to focus efforts where the impact is greatest.

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