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Mobile Money and Financial Inclusion in Kenya and Tanzania

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by

Edward Long

LNGEDW001

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Supervisor: Assoc./Prof. Latif Alhassan

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Abstract

Despite great efforts by the public and private sector in recent years to improve financial inclusion throughout Sub-Saharan Africa (SSA), 45.8 million people remain financially excluded in the SADC (Southern African Development Community) alone. Financial inclusion is a critical component of economic growth, and therefore it is an issue that every country should be concerned with. Mobile money has been seen to be one of the most effective methods to improve levels of financial inclusion throughout SSA, helping millions gain access to basic financial services and products over recent years. This study set out to determine the effect of mobile money on financial inclusion in Kenya and Tanzania. Kenya has been seen to be the leader in mobile money which made it the ideal country to compare and contrast with Tanzania, who is behind Kenya in its mobile money adoption and financial inclusion levels. To achieve the objective of the study, a/the multivariate logistic regression technique was employed to estimate cross sectional regression model of roughly 3,000 respondents in both countries. To investigate how mobile money effected financial inclusion, the study sourced data from Financial Inclusion Insights (FII) Tracker Survey data set from 2017. A variety of independent variables related to mobile money ranging from demographics to mobile money behavior variables were chosen to determine what has the greatest impact on improving an individual's chances of being financially included.

Evidence from this study shows that phone ownership and using MM are two of the greatest factors that increase the likelihood of a person being financially included in Kenya and Tanzania. Many of the findings in this study go against the current body of research. Most noteworthy, the data on gender disparities in rural financial inclusion were discovered to be the complete opposite of what many studies have stated to be true in SSA. The data clearly showed higher levels of financial inclusion amongst rural women compared to men in 2017. This finding highlighted a need for future gender specific studies on rural financial inclusion. Additionally, this study presented the idea that a new financially included criterion is needed for the younger population. The data from Kenya showed that respondents between the ages of 15 – 34 were at a disadvantage compared to the older population in becoming financially included.

Based on the findings this study recommends that the public and private sector should work together to make mobile financial products more affordable, study mobile money's effect on financial inclusion on a country-by-country basis and work together to ensure regulation keeps up with innovation.

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List of Abbreviations

Boston Consulting Group (BCG)

Error Correction Method (ECM)

Financial Inclusion (FI)

Financial Inclusion Insights (FIS)

Financial Technology (FinTech)

Gross Domestic Product (GDP)

Know Your Customer (KYC)

Mobile Money (MM)

Multivariate Analysis (MVA)

National Financial Inclusion Framework (NFIF)

Odds Ratio (OR)

Small and Mid-Size Enterprises (SME)

Southern African Development Community (SADC)

Sub-Saharan Africa (SSA)

1. Chapter One

Introduction

1.1 Background of the study

It is well-known that mobile money has a positive effect on financial inclusion. Financial inclusion refers to transactions, savings, payments, credit, and insurance being dispersed responsibly and sustainably. Financial inclusion has been seen to improve household welfare, boost small business activity, increase employment, stimulate economic growth, as well as improve the effective execution of development priorities (Abel et al., 2018).

Despite significant efforts in many countries throughout Africa in recent history to improve financial inclusion, millions remain excluded. Today 45.8 million people remain financially excluded in the SADC alone. Financial inclusion barriers can be classified into depth, efficiency, and access (Karpowicz, 2014). The access barrier is related to the infrastructure (roads, electricity, internet penetration, etc.) of a country and the various documents required by financial institutions and governments to access finance. Depth pertains to the obstacles related to collateral requirements, required user information, and contract enforcement procedures. Lastly, efficiency includes the distance to locations, demanding paperwork requirements, and any other requirements that deter people. In short, financial exclusion manifests itself most heavily in countries that are underdeveloped with weak governments and financial systems.

This study investigated the effect that mobile money has on financial inclusion in Kenya and Tanzania. Kenya is the leader in mobile money in Africa, and much can be learned by looking into the country's mobile money success and failures. To accomplish this objective, this study looked at Kenya's success and used a variety of independent variables relating to mobile money to see what has had the greatest impact on increasing financial inclusion in both countries.

1.2 Research Problem and Research Questions

Financial technology (FinTech) has been seen as a successful way to improve economic growth and development in Africa. It helps to lower the cost of financial services, improve access to more customers, extend credit, promote savings, and reduce the fees associated with cross-border transfers (Sy et al., 2019). Mobile money has been the most successful FinTech solution in Africa, giving millions of people access to financial services they were previously unable to access due to the barriers described above. Today, Africa has the largest and fastest-growing mobile money market in the world with nearly 20% of GDP in transactions occurring through mobile money networks compared with 7% of GDP in Asia and less than 2% in other areas (Sy et al., 2019). The decrease in the number of people across the continent financially excluded has had a positive impact on economic growth, but not all mobile money efforts have been successful. Forty out of forty-five sub-Saharan African countries are now actively using various forms of mobile money, but not all countries have had the same success (Sy et al., 2019). The varying levels of success can be seen by looking at the percentage of active mobile money users in the country. When comparing Kenya's 67% active mobile money user rate to neighboring Tanzania's 42%, it is clear that each country presents specific challenges for success (Naghavi, 2020). The varying levels of mobile money success can also be seen by looking at yearly financial inclusion data. In 2017, 73.3% of Kenyans were financially included versus 56.1% among Tanzanians (Financial Inclusion Insights, 2018). Mobile money has been a main driver of improving financial inclusion in both countries, but it is clear that Kenya has made much more progress.

Despite the success that mobile money has had, there still exists a gap between the level of economic growth African countries are operating at and the level of economic growth at which they could reach. To fill the gap, the IMF has found that it would take the average SSA country an additional 1.5% additional annual growth (Cui et al., 2012). Mobile money and other FinTech solutions have the potential to help fill this void and increase financial inclusion.

Mobile money has reduced transaction costs, created the ability to transact without traditional financial infrastructure, boosted microfinance, and has helped millions access financial services. Despite all of this, the level of financial inclusion in Africa is still lagging far behind the developed world, meaning there is still a great deal of room to improve the level of inclusion on the continent. For example, mobile phone use is growing among the poor, women, and the less educated. (Cui et

al., 2012). This represents a larger number of people that could potentially become financially included if the right services were offered. For future mobile money and other FinTech solutions to bridge this gap, they must know the factors that will lead to their success, and the areas they must concentrate their efforts on to be effective at improving financial inclusion and economic growth. Much of the research done on how mobile money impacts financial inclusion fails to take a holistic approach in how the relationship is analyzed. Many key variables are often ignored, leaving a gap in the body of knowledge. One of the most often-forgotten variables is the rural-specific challenges that impact financial inclusion. With nearly two-thirds of both Kenya and Tanzania's populations living in rural areas, it is a factor that must be considered. This study will investigated mobile money, rural-specific, and other key variables to better understand how mobile money affects financial inclusion in both countries. This study will help to fill this gap and provide the knowledge required to increase annual growth by 1.5%, and get more people financially included through the use of mobile technology.

1.3 Research Question

What is the effect of mobile money on financial inclusion in Kenya and Tanzania?

1.4 Research Objectives

The research objectives this study aims to accomplish are:

- To analyze the effect of mobile money on financial inclusion in Kenya and Tanzania.

1.5 Scope and Justification of the study

This study will help to inform governments, banks, and mobile money providers on ways that they can help to better contribute to increasing financial inclusion. By taking a more holistic approach to analyzing how mobile money affects financial inclusion in Kenya and Tanzania, new perspectives will be found on how the public and private sector can work together to help citizens in both countries. To create a more well-rounded analysis, this study looked at all the available literature and theories, analyzed historical survey data on financial inclusion and mobile money,

and conducted a statistical analysis. This will help to provide a much more complete picture on how mobile money effects financial inclusion, and all the factors that relate to it. It is important to do this because much of the previous research on mobile money's effect on financial inclusion ignores many key variables that have a direct impact on mobile money and financial inclusion such as rural-specific challenges, regulation, socioeconomic, demographic, etc. By taking all of these into account, this study will be able to provide actionable recommendations to the public and private sector on how they can improve mobile money and increase financial inclusion.

This study is necessary because mobile money has been seen to be a key driver in improving financial inclusion in SSA, and there is still a great deal of work to do to increase financial inclusion. To increase annual growth by 1.5% and get more people financially included, studies such as this are crucial.

1.6 Organization of the study

Chapter one will include a basic introduction to the study. Following this, there will be five sections. The first will provide background information on the topic and themes, as well an overview of mobile money and financial inclusion in SSA. The rest of the chapter will include stating the research problem, the objectives, justification, and the organization of the entire study.

Chapter two will be the literature review, which will be split into several different sections. This section will be broken up into an overview of mobile money and financial inclusion in both Kenya and Tanzania, an overview of the most relevant theoretical research, and lastly the empirical research surrounding the topic.

Chapter three will be focused on methodology. This chapter will break down the research approach and the research design. This includes sampling, type of analysis, unit of analysis, etc. This section will also go into depth about where the data is from, and how the surveys on mobile money usage and financial inclusion were conducted.

Chapter four will primarily be a discussion of the findings in chapter three. This chapter will be focused on digesting the statistical analysis provided on mobile money's effect on financial inclusion.

Chapter five will function as a conclusion to the study. This final chapter is where recommendations will be provided. Lastly, the chapter will discuss the meaning of the results, how they can benefit the area of study, and it will suggest the best way forward.

2. Chapter Two

Literature Review

2.1 Introduction

This section will begin with a list of key terms and concepts and an overview of financial inclusion and mobile money in Kenya and Tanzania. Afterward, the theoretical framework on the topic will be presented, and lastly the empirical literature on the subject will be discussed.

2.2 Definition of Terms

Mobile money is widely understood as a digital medium of exchange and store of value facilitated by mobile agents. Mobile money is stored in mobile money accounts, which are accessible through mobile phones, enabling low-cost and small-scale financial transactions. The technology has expanded financial service access beyond those offered by alternative financial service providers, which includes digital banking (Sy et al., 2019). Mobile money in Africa has a very large number of use cases, and it is not used in the same way throughout the entire continent. To avoid complications, this study identifies mobile money as simply any financial transaction that is conducted using a mobile phone. The most prominent mobile money applications in Africa today are mobile banking, mobile transfer, and mobile commerce.

Financial Inclusion: The World Bank (2018) states that financial inclusion describes individuals and businesses have access to useful and affordable financial products and services that meet their needs – transactions, payments, savings, credit and insurance – delivered in a responsible and sustainable way. Financially included individuals are those who have an account in their name with a full-service financial institution (World Bank, 2018). As of 2019, some 1.7 billion people around the world lack access to basic financial services. Mobile financial services have proven to bring this population into the modern financial system (BCG, 2019). Christine Lagarde, Managing Director International Monetary Fund (IMF) said it best that, “financial inclusion can mean the difference between being empowered and being marginalized” (KPMG, 2018, pg. 2).

2.3 Mobile Money & Financial Inclusion Overview

2.3.1 Overview of the Mobile Economy in Africa

A study done by the GSMA estimates that half of the adult population in Sub-Saharan Africa will subscribe to mobile services by 2025. Over the past several years, Sub-Saharan Africa has seen rapid growth in mobile services. At the end of 2018 there were 456 million mobile subscribers in Sub-Saharan Africa, which was an increase of 20 million from 2017. Currently Sub-Saharan Africa has a mobile penetration rate of 44%, showing an overall readiness in the region to adopt mobile money services. In 2019, 3G overtook 2G and is now the dominant cellular frequency in the region. 3G nearly doubled from 2016-2018 as coverage expanded and mobile phone prices became cheaper. 3G and later 4G (once it is further implemented) will play a crucial role in improving financial inclusion as faster mobile internet connections and greater smartphone adoption will allow mobile money providers to offer more mobile products to meet their customer's needs (BCG, 2019). Table 1 below shows the projected growth in the mobile economy.

Table 1: SSA Mobile Sector Growth

SSA Mobile Sector Growth			
Category	**2018**	**2025**	**% Increase**
4G Connections (% of Total Connections)	7%	23%	229%
Mobile Internet Users (m)	239	483	102%
Smart Phones (% of Total Connections)	39%	66%	69%
Unique Mobile Subscribers (m)	456	623	37%
SIM Connections (bn)	0.77	1.04	34%
Operator Revenues (bn)	42	51	21%

Source: (GSMA, 2019)

2.3.2 Sub-Saharan Africa Mobile Money Overview

Sub-Saharan Africa remains the hotbed for mobile money worldwide. By the end of 2019 there were 469.2 million registered accounts in the region, processing $41.5bn annually. Mobile money accounts in SSA represent nearly half of all global mobile money accounts. The mobile ecosystem contributed $144 billion to the SSA economy, nearly $40 billion of which was a direct contribution

(Naghavi, 2020). The GSMA anticipates mobile technology's contribution to GDP to reach $185 billion by 2023, an increase of 28%. The countries that will lead the uptake in mobile money usage are Africa's highest populated countries: Nigeria, Ethiopia, and Egypt. These countries all show a large portion of the population becoming adults and owning a mobile phone, low rates of financial inclusion, and limited availability of formal financial services. However, several steps need to be taken to spark an increase in adoption in these countries. Both Egypt and Nigeria have been handicapped by regulatory frameworks that only allow a few mobile money operators in the country. These regulatory issues have directly led to lower levels of investment, innovation in the mobile money space, and a reduction in the availability of mobile financial products and services. Ethiopia has dealt with similar regulatory issues, but also faces a very low level of internet connectivity and financial literacy (Naghavi, 2020). The regulatory issues in all three countries have restricted competition among companies, which has greatly limited the uptake in mobile money services. Competition has been seen to have a direct correlation with financial inclusion in Sub-Saharan Africa (Rowan, 2017). Nigeria and Egypt realized the shortcomings associated with their regulatory issues and in 2018 passed a new regulatory framework aimed at improving mobile money and financial inclusion. Table 2 below highlights the growth in mobile money in SSA from 2017 to 2019.

Table 2: Growth of mobile money in SSA

SSA Mobile Money Growth				
Year	**Registered Accounts (m)**	**Active 90-day Accounts (m)**	**Transaction Volume (bn)**	**Value (USD bn)**
2017	348.3	128.3	1.5	23.3
2019	469.2	180.8	2.1	41.5
% Increase	**35%**	**41%**	**40%**	**78%**

Source (GSMA, 2019)

2.3.3 Mobile Money Trends

Improving the customer experience, regulation issues, and a focus on SMEs are three of the major trends seen in the Sub-Saharan mobile money system. The mobile money ecosystem has seen an increase in providers aiming to improve the customer experience. As will be discussed with Kenya and Tanzania, interoperability has become a strong focus in many Sub-Saharan countries. Allowing users to transact with other people on different networks is a crucial step in improving

usage and financial inclusion. As smartphones become cheaper and 3G and later 4G becomes more widespread, the customer experience will improve drastically.

As previously mentioned, regulation has been seen to hinder mobile money growth in many Sub-Saharan countries. In Kenya, mobile operators have been successful due to the country's enabling regulatory environment (Central Bank of Kenya, 2016). Regulators have worked directly with mobile operators like M-Pesa to ensure that regulation has kept up with the rapid pace of mobile money innovation. Another key issue stemming from regulation is the issue of mobile money taxation. The entire mobile industry is already one of the highest taxed in all of SSA. The GSMA found in 2018 that taxing mobile money has a very small impact on supporting public finances or to advance the positive contributions it could bring to SSA countries (Naghavi, 2020). Governments should follow in the footsteps of Kenya and aim to support the growth of mobile money by doing all they can to ensure regulation and taxation do not limit mobile money growth. Some alternate behaviors Sub-Saharan governments should consider is digitalizing the payment of fees, rates, taxes, and any other money due to the government from taxpayers through mobile phones. This would help to incentivize the adult population to switch to mobile money services, and it would likely lead to higher levels of financial inclusion.

Another major trend in the mobile money space is to focus even more on SMEs to drive mobile money growth. The GSMA analyzed SMEs throughout Sub-Saharan Africa and found that they often transacted much more than an individual user. In fact, 30% of the studied SMEs were seen to be receiving mobile money payments and paying suppliers and bills (Naghavi, 2020). Focusing on SMEs is crucial for mobile money providers, as smartphone adoption and interoperability with third parties increases throughout Sub-Saharan Africa SME usage will likely increase. Mobile money providers are focusing on services to help SMEs to get paid by customers, receive small business loans, provide incentives in the form of discounts to customers, get better data analysis on their business, etc. (Sy et al., 2019). If a large portion of SMEs switch to mobile money merchant services, it will spur an uptake in usage by their customers. Mobile money providers hold the power of being able to financially incentivize SMEs to switch to mobile merchant services and therefore they will be motivated to convert their clientele to use mobile money payment products as well. However, there are prominent roadblocks in Sub-Saharan Africa. Varying levels

of financial literacy, income, consumer financial preferences, mobile phone penetration, smartphone adoption, etc., will all impact how SMEs adapt to mobile money merchant systems.

Improving the customer experience, making sure regulation keeps up with innovation, and focusing on SMEs are three steps that will help to reduce financial exclusion and improve economic growth in Sub-Saharan Africa. The table below highlights four of the main trends seen in mobile money today.

Four Key MM Trends

Enhanced Customer Experience	Diversification of the Financial Services Ecosystem	Complex Regulation	Expanding the MM Value Proposition
• Bulk dispatchments (mostly wages) grew 29% in 2018. • MM is becoming a partner for enterprises. • Bill payments grew by 41% globally in 2018. • More advanced MM services are being adopted by businesses and citizens across the globe. • Interoperability between providers is increasing. • Smartphone adoption is driving more advanced MM platform use.	• New business (non-financial) models are emerging with a mobile payment focus. • Uber, Jumia, Facebook, etc. are all focused on mobile payment and smartphone app usage. • The uptick in global interest in the SSA financial ecosystem will naturally help to improve financial inclusion through competition and investment.	• Most successful mobile operators operate in regulatory enabling markets (Kenya). • Taxation, KYC, cross-border remittances, national financial inclusion strategies, etc. all impact financial inclusion. • Regulation must keep up with mobile innovation for mobile money to be successful.	• Providers mainly make money from customer fees, which has created the need to improve the MM value proposition. • Meeting individuals and small business needs has become a priority. • "Payments as a platform" approach where providers connect consumers with third-party services across many different industries. • Goal is to diversify revenue streams and offer more solutions to individuals and businesses.

Key MM Trends: Source (GSMA, 2019)

2.4 Overview of Mobile Money and Financial Inclusion in Kenya

This section will provide a complete overview of mobile money in Kenya. It will start with the origins of the concept and end with where mobile money is today and where it is heading. Today Kenya is the leader in mobile money with nearly 70% of the adult population being active mobile money users and 89% of the adult population considered financially included (Central Bank of Kenya, 2016). Kenya led the transition to mobile money starting around 2006-2007 when Vodafone's subsidiary Safaricom created M-Pesa to begin managing microloans for farmers in

rural areas. At the time, the UK Department for International Development and other international development agencies were finding it challenging getting money to Kenyan farmers in rural areas. The farmers they were trying to help typically lived far from formal banks, which made physically distributing cash impractical. During this time period, around 54% of the adult population in Kenya had a mobile phone or had easy access to one which made M-Pesa a perfect solution to get the farmers their loans and repayments. Shortly thereafter, Safaricom realized that Kenyans were using M-Pesa for other purposes like sending and receiving money. Safaricom recognized the potential M-Pesa had and they set up a large network of mobile money agents to payout or receive payments through an M-Pesa account. The establishment of the mobile agent network acted as the spark and mobile money soon took off rapidly throughout the country (BCG, 2019).

Kenya quickly had a system where people working in large cities could send money to their families who lived in rural areas. The simplicity of only needing a basic mobile phone that could send and receive SMSs (short message service messages) made the service a simple solution for most Kenyans, and the service grew rapidly. Important to note is that the Kenyan government has a 35% stake in Safaricom, giving them a direct financial incentive to help ensure long-term profitability and success. Additionally, the large stake in the company also helped to speed up the rapid adoption of the service. The Kenyan government worked closely with Safaricom to provide help in terms of loosening KYC (Know Your Customer) requirements and other regulations to help speed up adoption (Rowan, 2017). Kenya created a model where regulation has kept up with innovation and that has been seen to be an essential formula for any FinTech venture's success (Abel et al., 2018).

Today M-Pesa continues to be the dominant mobile money provider in Kenya, having on average 75% market share over the past decade. In 2018, Kenyans moved nearly half of the country’s GDP through their mobile phones, and it is an essential part of the country’s economic engine. Furthermore, mobile money has proven its ability to elevate people out of poverty, create jobs, decrease the number of people financially excluded, and increase economic growth. A 2016 study found that mobile money has directly helped nearly 2% (194,000 people) of Kenyan households out of extreme poverty, and it also allowed 185,000 women to move out of subsistence farming into business or sales jobs (Jack & Suri, 2011).

In addition to M-Pesa, several other providers are competing for market share, such as Airtel Money, Equitel Money, T-Kash, and Tangaza. As mobile money and the overall fintech space in Kenya continue to develop, these will likely be the main players competing to provide new innovative financing solutions to the adult population. The services that M-Pesa and the other providers in the space offer have developed well beyond simply sending and receiving money. There has been a rapid uptake in more advanced uses of mobile money such as merchant services, bill paying, government payments and transfers, mobile lines of credit, savings, investments, and insurance policies (Financial Inclusion Insights, 2018a). These more advanced mobile money behaviors have a great deal of room for improvement and will be crucial to further increasing economic growth in Kenya in the coming years. These more advanced behaviors will be discussed in more depth later in this section. Table 3 below provides an overview from 2013-2017 of the mobile money and financial account statistics in Kenya.

Table 3: Overview of MM and Financial Accounts by Gender and Location in Kenya

Key Indicators	2014	2015	2016	2017	Base Definition
	%, Base n	%, Base n	%, Base n	%, Base n	
Adults (15+) who have active digital stored-value accounts	59% (+/- 2.6%)	62% (+/- 2.0%)	61% (+/- 1.9%)	68% (+/- 2.0%)	All adults
	2,995	2,994	3,000	3,129	
Poor adults (15+) who have active digital stored-value accounts	43% (+/- 3.5%)	48% (+/- 2.9%)	45% (+/- 2.8%)	51% (+/- 3.8%)	All poor
	1,502	1,474	1,324	889	
Poor women (15+) who have active digital stored-value accounts	39% (+/- 4.3%)	44% (+/- 3.8%)	42% (+/- 3.6%)	48% (+/- 4.6%)	All poor females
	916	929	817	576	
Rural women (15+) who have active digital stored-value accounts	47% (+/- 4.3%)	54% (+/- 3.8%)	51% (+/- 3.4%)	61% (+/- 3.5%)	All rural females
	1,068	1,105	1,061	1,202	
Adults (15+) who actively use digital stored-value accounts and have accessed at least one advanced financial service (beyond basic wallet & P2P)	43% (+/- 2.4%)	48% (+/- 1.9%)	51% (+/- 2.0%)	60% (+/- 2.0%)	All adults
	2,995	2,994	3,000	3,129	
Poor adults (15+) who actively use digital stored-value accounts and have accessed at least one advanced financial service (beyond basic wallet & P2P)	26% (+/- 2.8%)	31% (+/- 2.5%)	32% (+/- 2.8%)	37% (+/- 3.5%)	All poor
	1,502	1,474	1,324	889	
Poor women (15+) who actively use digital stored-value accounts and have accessed at least one advanced financial service (beyond basic wallet & P2P)	21% (+/- 3.6%)	26% (+/- 3.0%)	27% (+/- 3.2%)	32% (+/- 4.2%)	All poor females
	916	929	817	576	
Rural women (15+) who actively use digital stored-value accounts and have accessed at least one advanced financial service (beyond basic wallet & P2P)	27% (+/- 3.4%)	35% (+/- 3.3%)	37% (+/- 3.6%)	46% (+/- 3.4%)	All rural females
	1,068	1,105	1,061	1,202	

Source: Financial Inclusion Insights (2018b)

2.4.1 Current Mobile Money and Financial Inclusion Issues

Although Kenya has emerged as the leader in mobile money and has made great strides in reducing financial exclusion throughout the country, issues still remain. In 2019, 11% of the adult population in Kenya was still financially excluded. Several demographics such as education level, gender, the rural-urban divide, socioeconomic levels, and livelihoods compose this figure. Additionally, 30.1% of the adult population still rely on informal financial services in their daily

lives. These financial services include “secret hiding spots” for cash and goods from local shopkeepers, and groups aka Chamas (Central Bank of Kenya, 2016). In addition to these large-scale issues, there exist many opportunities to improve and expand mobile money services to help more Kenyans become financially included and improve the quality of their lives. Specifically, these areas include savings, credit, insurance, and investment services. As mentioned in the definition of financial inclusion, payments, savings, credit and insurance are considered the four-core affordable financial services one must have to be considered financially included. Investing exists outside of this definition but as seen in the developed world, it too plays a crucial role in saving and building wealth over time. The issue in Kenya is that 30% of the adult population simply don’t have the money to invest, open a mobile money account, purchase insurance, etc., but that means 70% of the population potentially do. Savings, credit, and insurance usage are all on the rise but many Kenyans state that affordability is the main reason for not using these more advanced financial services. In addition to the issue of affordability is the problem of a lack of collateral or credit history for mobile borrowers. In short, there are a large percentage of Kenyans seeking out these more advanced products but certain roadblocks are inhibiting their access to them, like affordability and KYC requirements (Central Bank of Kenya, 2016). Work is being done to analyze Kenyans with little to no credit history or build credit history, but more can be done. It is clear that there would be a large uptake in the more advanced mobile behaviors if more affordable products were offered and KYC challenges were solved. Working to help the 11% of Kenyans excluded from financial services and improving access to more advanced mobile behaviors is an economic growth opportunity that Kenya needs to address.

2.4.2 The Future of Mobile Money and Financial Inclusion in Kenya

To conclude this overview on mobile money in Kenya, the more “advanced” mobile money behaviors such as mobile loans, mobile insurance, mobile investing, etc. will be discussed to understand the current state of the industry and where it is headed in the coming years. In Kenya, digital loan usage is up greatly with 8.3% of users taking a digital loan in 2019. This is nearly 10% of all the credit or loans for 2019, an impressive figure. Although mobile credit and loans have been on the rise in Kenya, savings growth has stagnated. Similar to Tanzania, many Kenyans still keep a balance in the form of e-money for short term savings rather than putting their money into an interest-bearing account. This could partly be explained by the fact that 48.7% of Kenyans

simply save for day-to-day household needs (Central Bank of Kenya, p. 14). Closely related to savings is investing, and 30.2% of Kenyans cite not having any money to invest as the reason for not doing so. Additionally, 22.7% state that they have never heard of the securities market or simply do not understand how to invest (Central Bank of Kenya, 2016). This presents a clear opportunity for mobile money providers to increase the number of users who save and provide them easier access to the securities market in the coming years. To fill this void, there will need to be more fintech startups similar to Robinhood Markets, Inc., which operates in the U.S. Robinhood has provided an on ramp for millions of retail investors in the U.S. through an easy to use, no-fee, trading app. Investing in financial markets can be a daunting and intimidating to a person unfamiliar with online trading. Robinhood recognized this and eliminated this fear for millions through education and ease of use. As the Nairobi Securities Exchange and other SSA exchanges grow in the coming years, emphasis needs to be put on bringing more retail investors to help encourage long-term savings, and wealth accumulation. Next, the current state of mobile credit in Kenya will be discussed.

A major issue hampering credit and loan uptake is a lack of KYC and credit history. However, work is being done to help users gain access to digital loans and credit lines. In 2011 Safaricom partnered with the Commercial Bank of Africa (CBA) to create M-Shwari. Users of M-Shwari use their mobile phones to open a bank account at the CBA and deposit money from their M-Pesa account to request a loan. M-Shwari is helping to improve the roadblock of not having a credit history by using a credit scoring algorithm. The algorithm evaluates a prospective client by looking at their airtime purchases and mobile money transactions to determine their creditworthiness. The product was very successful, and by 2015 M-Shwari had over 10 million Kenyans registered (Suri, 2017). Additionally, a company called Branch offers a similar credit offering by evaluating a user's GPS info, SMS logs, social media data, and contact lists to create a credit score and make a lending decision. A user can lower their interest rate and get larger loans by increasing their usage of the product. These companies started a trend and now many companies ranging from mobile money providers to pay-per-use solar companies are evaluating a user's creditworthiness in innovative ways. These startups are helping to provide more Kenyans with credit history and improve their access to more advanced financial services and become financially included. More innovative fintech work like the examples above are needed to further decrease the impact that limited credit

history has on financial inclusion. Next, the current state of mobile insurance and mobile payments will be discussed.

Insurance is on the rise in Kenya, and mobile money has become the primary channel for paying insurance premiums. It is noteworthy that mobile insurance usage in Kenya has seen an uptake in rural areas. This shows that the financial health of impoverished areas is making improvements in their more advanced financial behaviors. However, the main issue with insurance products is a lack of affordability. As stated before, 30% of Kenyans cannot afford to use mobile money products. Insurance is on the rise in poorer areas, but it still remains a product for mostly the wealthier demographics. Kenya still has a great amount of work to do in lowering the cost of insurance and providing it to the majority of its poor rural population. Lastly, the current state of SMEs and mobile payments will be discussed.

Lastly, there is still a massive opportunity for mobile money to help SME's. In 2019 94% of SMSEs cited cash as their preference for business transactions, and only 3.7% said mobile money (Central Bank of Kenya, 2016). Incentivizing SMEs to start accepting mobile money payments will likely lead to more mobile money usage throughout Kenya. The government can play a crucial role in this by providing tax benefits and other incentives to SMEs who generate a certain percentage of revenue through mobile money payments. This will encourage SMEs to start using the service, more mobile money users to adopt the service, and will lead to many economic benefits for the country. However, SME mobile money payments are still in their infancy, and this will take many years to grow.

2.4.3 Conclusion: Overview of Mobile Money and Financial Inclusion in Kenya

To conclude this overview of mobile money in Kenya, account ownership has grown greatly in recent years, but savings, credit, and insurance services have room to improve (Financial Inclusion Insights, 2018). Most importantly, affordability still remains the largest issue across all mobile money products and services. There is a large amount of work that needs to be done to make products more affordable for all, increase adoption, and increase financial inclusion.

2.5 Overview of Mobile Money and Financial Inclusion in Tanzania

Tanzania quickly followed in Kenya's footsteps and introduced M-Pesa in 2008. Since mobile money's introduction to the country, there are now over 40 million accounts which constitute 43% of the adult population and transact nearly $1.6 billion per month. Tanzanians use their mobile money accounts mostly to send and receive money, pay bills, and other more simple financial transactions (Nagvahi, 2020). The main players in the mobile money space in Tanzania are M-Pesa, Tigo-Pesa, and Airtel money. Similar to Kenya, M-Pesa remains the dominant provider with around 40-50% market share on any given month.

In 2017, 77% of the adult population in Tanzania lived below the poverty level of $2.50 per day, and only 56% of the country was financially included (Financial Inclusion Insights, 2018b). Several years before this, in an attempt to boost mobile money adoption and usage as well as reduce the number of Tanzanians financially excluded, the government launched the National Financial Inclusion Framework (NFIF) in 2014. The program set out to boost financial inclusion by overcoming many inclusion barriers that the county faces. The main barriers that Tanzania set out to address are: (i) Proximity: Improving access channels through mobile financial services, agent banking, stand-alone ATMs, etc.; (ii) Wider electronic platform coverage: This includes developing and expanding new and existing information and communication technology payment platforms to help provide affordable access to financial services; (iii) KYC requirements: The government launched a new national ID implementation plan and, increased credit bureau use, and improved identification systems that are linked to citizens' financial accounts; (iv) Financial literacy: Improved methods to provide financial education to more people and increased consumer protection capabilities (Finscope Survey, 2018)

Since the launch of the NFIF in 2014, the framework has had some challenges and financial inclusion still remains an issue throughout Tanzania. One very positive outcome that stemmed from the framework was an increase in the interoperability of mobile financial services throughout the country. A common theme in many countries that offer mobile financial services is that a large percentage of citizens usually have one or more accounts with different providers. Making it easier for Tanzanians to transact across multiple platforms was a crucial step in developing the mobile

financial ecosystem. More Tanzanians are transacting across several different networks at no cost thanks to an increase in public-private partnerships. In the first six months of interoperability, 6% of M-Pesa users had sent or received peer to peer (P2P) transfers to a Tigo Pesa or Aitel money account (GSMA, 2019). By 2016, Tanzania became the first country to achieve full interoperability between all of its mobile operators (GSMA, 2019). Table 4 below provides an overview from 2013-2017 of the MM and financial account statistics in Tanzania.

Table 4: Overview of MM and Financial Accounts by Gender and Location in Tanzania

Key Indicators	2014	2015	2016	2017	Base Definition
	%, Base n	%, Base n	%, Base n	%, Base n	
Adults (15+) who have active digital stored-value accounts	35% (+/- 2.8%)	54% (+/- 2.8%)	41% (+/- 2.1%)	43% (+/- 1.9%)	All adults
	3,000	3,001	3,029	3,060	
Poor adults (15+) who have active digital stored-value accounts	32% (+/- 2.8%)	49% (+/- 3.0%)	33% (+/- 2.4%)	35% (+/- 2.0%)	All poor
	2,633	2,484	2,338	2,392	
Poor women (15+) who have active digital stored-value accounts	29% (+/- 3.4%)	46% (+/- 3.6%)	27% (+/- 2.8%)	30% (+/- 2.5%)	All poor females
	1,389	1,288	1,419	1,517	
Rural women (15+) who have active digital stored-value accounts	25% (+/- 3.6%)	38% (+/- 4.2%)	22% (+/- 3.3%)	27% (+/- 2.8%)	All rural females
	1,049	995	1,161	1,258	
Adults (15+) who actively use digital stored-value accounts and have accessed at least one advanced financial service (beyond basic wallet & P2P)	24% (+/- 2.4%)	29% (+/- 2.6%)	24% (+/- 1.8%)	29% (+/- 1.9%)	All adults
	3,000	3,001	3,029	3,060	
Poor adults (15+) who actively use digital stored-value accounts and have accessed at least one advanced financial service (beyond basic wallet & P2P)	21% (+/- 2.3%)	24% (+/- 2.6%)	17% (+/- 1.8%)	21% (+/- 1.8%)	All poor
	2,633	2,484	2,338	2,392	
Poor women (15+) who actively use digital stored-value accounts and have accessed at least one advanced financial service (beyond basic wallet & P2P)	18% (+/- 2.6%)	22% (+/- 3.3%)	12% (+/- 1.7%)	16% (+/- 1.9%)	All poor females
	1,389	1,288	1,419	1,517	
Rural women (15+) who actively use digital stored-value accounts and have accessed at least one advanced financial service (beyond basic wallet & P2P)	15% (+/- 2.6%)	13% (+/- 3.0%)	8% (+/- 1.9%)	14% (+/- 2.3%)	All rural females
	1,049	995	1,161	1,258	

Source: Financial Inclusion Insights (2018b)

2.5.1 Current Mobile Money and Financial Inclusion Issues

Creating a mobile financial system that is more interconnected was a critical step forward for Tanzania, but other parts of the framework did not develop as planned. The national identification overhaul is behind schedule and had issues with corruption in 2017. Improving KYC documentation across the country is a major challenge that if solved will improve financial access greatly. Lastly, the government raised taxes on mobile money transactions in 2016 which increased the transaction costs, and had a negative impact on mobile money adoption throughout the country (Financial Inclusion Insights, 2018b). Mobile money has seen to be the driver of improving financial access in Tanzania, and poor government decisions like raising taxes are detrimental to making greater progress.

Mobile money has been and will continue to be the driver of improving financial inclusion in Tanzania. However, it is in a consolidation phase at the moment due to several factors. For one, there was a flood of marketing and promotions in 2014-2015 which brought an increase in usage, but from 2017 onward access did not greatly change. Similar to Kenya, it is evident that the current mobile financial products do not meet the needs of the general adult population in Tanzania, which is limiting progress towards reducing financial exclusion. As previously mentioned, around two-thirds of Tanzanians live below the $2.50 per day and in 2017, 36% of the adult population had never accessed any formal financial service. In 2017, FII reported that 47% of adults surveyed said that high fees discouraged them from not registering a bank account or mobile money service (Financial Inclusion Insights, 2018b). For a population that is overall very poor, this is a troubling figure. However, it is even more apparent that banking and mobile financial services are not meeting the needs of the average Tanzanian when you look at the "advanced user" segment of the survey. FII states that an advanced user is, "an active registered user who uses their account for saving, borrowing, insurance, investment, paying bills or receiving wages or government benefits" (Financial Inclusion Insights, 2018b). In 2017, 29% of the adults surveyed were advanced users who primarily used mobile money to save and pay bills. Compared to Kenya, this "advanced" behavior is considered the norm among mobile money users. What is concerning about the advanced users in Tanzania is that they are mostly from the privileged demographic groups – male, urban, and living above the poverty line. This goes to show that Tanzania shares the same issue of mobile money affordability with Kenya.

Looking at the FII data, it is clear that Tanzania has financial products that do not meet the needs of the overall population and the more "advanced" mobile money behaviors are behind in comparison to countries like Kenya. This presents a massive growth opportunity to change the financial services landscape in Tanzania, and the country has a high level of readiness to adopt modern financial services like mobile money. The key factor of a country's ability to adopt mobile financial services is the percentage of the population with a mobile phone that can send or receive SMS messages. In 2017, 74% of the adult population could send and receive SMS messages. This clearly shows the readiness that Tanzania has to adopt mobile financial services. However, expensive financial products, KYC challenges due to a poor rollout of the national ID system, and a lack of support from private and public sector has hampered the growth mobile money could be

having throughout the country. Data from FII indicates that more needs to be done to resolve these issues. Tanzania will be able to get millions more citizens financially included and see a wide range of economic benefits if it does a better job of confronting these issues.

2.5.2 The Future of Mobile Money and Financial Inclusion in Tanzania

To conclude this overview on mobile money in Tanzania, the more "advanced" mobile money behaviors such as mobile loans, mobile insurance, mobile investing, etc. will be discussed to understand the current state of the industry and where it is headed in the coming years. The more sophisticated mobile money behaviors are slowly growing in Tanzania, but they have yet to take off. As previously mentioned, the "advanced" users in Tanzania are mostly saving money as well as paying their bills. This is a clear sign that in Tanzania, the "advanced" behaviors are not as advanced as they seem. Additionally, these behaviors can be seen to be most prevalent among the wealthier urban demographic. In short, the more sophisticated behaviors are still in their infancy in Tanzania, and they are not widely used.

Despite the lack of widespread use, there are some positive signs of advanced mobile money use throughout the country. In 2017, 9% of the adult population took out digital loans or mobile lines of credit. However, 53% of people that accessed digital loans or mobile lines of credit had late payments. The users that were late on their payments cited a lack of money and too short of a payment window to be the main reasons for being late on their payments (Financial Inclusion Insights, 2018). Once again, a lack of money can be cited as one of the main reasons for digital loans and mobile credit have not been successful. Next, mobile money savings will be discussed.

Similar to Kenya, most savings behavior in Tanzania is informal safekeeping at home or in the form of e-money on their mobile money account, despite having the option to earn interest in a mobile savings account. A recent study on the financial behavior of Tanzanians concluded that savings are mostly used to set money aside to keep it safe for future use. The study also found that age and level of education are the key determinants for saving among Tanzanians, and that financial education did not impact savings behavior. Furthermore, the study found that women in Tanzania save less than men and rely on more informal sources. This can partially be explained

by their role in the household. Women in Tanzania are expected to spend more money on household needs, which is a reason they often have lower levels of savings in comparison to men. Lastly, the study noted that the National Financial Inclusion Framework (NFIF) may not be as effective as the government hopes if Tanzanians are not first equipped with a higher level of basic education (Mori, 2019). Next, mobile money bill payment and mobile insurance will be explored.

Similar to savings and bill repayment, mobile insurance is the most prevalent among advanced users. Specifically, it is most prevalent in users that are employed in the formal sector. However, only 33% of advanced users had insurance, and less than 25% of adults in the other segments had coverage (Financial Inclusion Insights, 2018b). These numbers are low, and it clearly shows the opportunity for further development of the mobile insurance market in Tanzania. However, mobile insurance providers are likely to find the issue of poverty limiting the uptake in usage. Most of the population live below the poverty line, making mobile insurance products difficult to sell.

2.5.3 Conclusion: Overview of Mobile Money and Financial Inclusion in Tanzania

To conclude, Tanzania shares many of the same issues limiting mobile money's effect on financial inclusion that Kenya has. Affordability remains the largest overarching issue limiting the adoption and usage of mobile money products and services. The products remain the most useful and affordable for the wealthier demographic who typically live in urban areas. With the majority of the country living in rural areas, this is a significant issue for Tanzania. Where Tanzania and Kenya differ is the number of users and what they use mobile money for. There are more Kenyans using mobile money products and the advanced users actually use mobile credit, insurance, savings, etc. The "advanced" users in Tanzania use mobile money for sending and receiving money, saving, and bill payments. These behaviors are considered the norm in Kenya. The public and private sector have many challenges to overcome in Tanzania, such as making mobile money products affordable for all, creating an enabling regulatory environment, figuring out innovative ways to evaluate and develop a user's credit score, etc. These issues need to be solved before basic mobile money products and services can add more value to the average user.

2.6 Theoretical Framework: Mobile Money and Financial Inclusion

This next section presents a basic theoretical framework on how digital financial services effect financial inclusion. This theoretical framework explains the transmission mechanism of how mobile money use improves financial inclusion through three main channels: (i) improving access to credit and deposits; (ii) increasing the efficiency of credit allocation; (iii) facilitating financial transfers (Andrianaivo & Kpodar, 2012, as cited in Pradhan & Sahoo, 2021). Mobile money has been seen to have a direct impact on these three channels, which has helped to increase financial inclusion in SSA. This theoretical framework along with the supporting research will now be discussed.

2.6.1 Improved Access to Credit and Deposits

The first channel through which mobile money enhances financial inclusion is through improving access to credit and deposits. Due to the lack of collateral and credit history among the average user, accessing credit is a challenge for most mobile money users throughout SSA. However, mobile money is beginning to improve access to credit through innovative ways of evaluating a user's credit risk. As previously mentioned, startups like M-Shwari are helping to underwrite millions of mobile money users' credit risk by looking at their airtime purchases and mobile money transactions. The company has been very successful and was it was able to evaluate 10 million users' credit risk from 2011-2015. This has helped millions of previously excluded users gain access to credit and become financially included (Suri, 2017). As this study has noted, mobile credit is still in its early stages throughout most of SSA, but it has been seen to be the driver in credit usage growth (Financial Inclusion Insights, 2018b).

Additionally, mobile money has been seen to directly increase deposits and the research surrounding the impact of mobile money on deposits is in agreement that mobile money leads to an increase in deposits. The GSMA (2019) found that mobile money is linked to a greater amount of currency being held within the financial system (deposits and loans). The GSMA's research also found that mobile money helps to mobilize deposits and it helps enable customers use more commercial banking services. In summation, mobile money has positively impacted financial

inclusion through this channel by helping to improve access to credit and increase the level of user deposits.

2.6.2 Efficient Credit Allocation

The second channel through which mobile money improves financial inclusion is through the efficient allocation of credit. In addition to improving how financial institutions underwrite a user's credit risk, mobile money platforms also help to more efficiently monitor a user's credit behavior. Enhanced financial behavior monitoring capabilities allow lenders to adjust a user's credit allocation based on a variety of data points ranging from savings, payment history, credit utilization, etc. (Andrianaivo & Kpodar, 2012). These new credit risk and monitoring methods help qualify a mobile money user's access to credit and increase their credit limits over time. As credit is a key financial behavior, and one must have access to credit to be considered financially included, this channel directly improves financial inclusion.

2.6.3 Facilitation of financial transfers

The third and final channel through which mobile money improves financial inclusion is the facilitation of financial transfers. The World Bank states that financial inclusion indicates that individuals and businesses have access to useful and affordable financial products and services that meet their needs – transactions, payments, savings, credit and insurance – delivered in a responsible and sustainable way (The World Bank, 2018). This channel is concerned with the transaction category of this definition. This study has made it clear that mobile money gained popularity in Kenya due to the ease of sending and receiving money (transfers) to family and friends through a basic mobile phone. As previously mentioned, sending and receiving money remain the top two transactions throughout SSA (Financial Inclusion Insights, 2018b). The ease at which a user can register an account and begin to send and receive money has helped millions throughout SSA begin the process of becoming financially included. Sending and receiving money is one of the five key financial behaviors one must perform to be considered financially included, and therefore this channel has helped enhance financial inclusion in SSA.

2.6.4 Theoretical Framework Conclusion

As demonstrated above, these three channels have a significant effect on increasing financial inclusion in SSA and therefore will serve as the general theoretical framework for this study. This study takes a holistic approach to analyzing the effect that mobile money has on financial inclusion by incorporating various independent variables from survey data. Keeping the three channels that were presented in close consideration, these variables will consist of various mobile money behaviors, demographic variables, and other variables related to mobile money and financial inclusion. By taking a holistic approach, this study was able to pull out specific variables that have been shown to statistically have the largest effect on financial inclusion in Kenya and Tanzania. As Kenya is ahead of Tanzania in mobile money development and has higher levels of financial inclusion, this study has the potential to benefit Tanzania greatly.

2.7 Empirical Literature

The last section of the literature review will provide a brief overview of the determinants of financial inclusion in SSA and will be followed by relevant literature on how the advent of digital financial services has impacted financial inclusion.

2.7.1 Determinants of Financial Inclusion

The determinants of financial inclusion vary through SSA, and the research done on the major factors across the region is still limited. Much of the work is done on a country basis and does not consider the region as a whole. Some of the most recent work regarding the characteristics impacting financial inclusion was done by Allen et al. (2016). The study found that high-quality institutions, efficient laws, political stability, and strong contract enforcement bring about more financial inclusion. This study is in line with what Eldomiaty et al. (2020) recently found, that financial inclusion is more of a governance issue and less of a financial issue in developing economies. The empirical results from their study showed that controlling corruption, government effectiveness, political stability and voice, and government accountability to influence financial inclusion significantly.

The empirical work above focuses more so on government and institutional determinants of financial inclusion, but there is a significant amount of work done on other factors as well. It has been stated that the determinants of financial inclusion can be supply- or demand-side driven (Abel et al., 2018). The work regarding the demand-side points to the obvious socio-economic factors such as income, age, education, gender, etc., to be determinants. As seen in the case of Kenya and Tanzania, these factors are relevant in the adult population accessing financial services. On the other side, supply-side determinants include an individual's attitude and perception which then influence one's decision to use financial services (Abel et al., 2018). This too can be seen in both Kenya and Tanzania where perceptions of cost and trust in the financial services system impact a user's decision to use financial services.

In addition to governmental, institutional, emotional, and socio-economic factors are the "African roadblocks" that naturally limit financial inclusion. These include high levels of poverty, poor infrastructure, high transaction costs, lack of KYC documentation, regulation, illiteracy, etc. that are widespread throughout SSA (Chikalipah, 2017). Africa's high poverty levels are a prominent roadblock for people accessing financial services. As stated in the Kenya and Tanzania overview, many adults cite a lack of any money to seek out formal financial services. This creates an issue that is challenging to solve for financial service providers, and it has been found that it is not profitable to tailor solutions to the poor (Chikalipah, 2017). This is why in the case of many countries, in addition to Kenya and Tanzania, there is a concentration of financial services in densely populated urban areas. Additionally, due to the lack of profitability, financial services are often skewed towards the wealthier demographic (Beck & Maimbo, 2012). Furthermore, a general lack of KYC documentation is a major issue throughout all of Africa, which limits financial inclusion. Formal banking and mobile money providers require government identification to register an account, a prerequisite that much of the adult population does not have. Lastly, illiteracy is one of the largest reasons limiting financial inclusion in SSA. In 2014 the World Bank found that nearly 40% of the adult population in SSA (160 million people) were illiterate, with two-thirds of that figure being women. This presents a clear issue in improving financial inclusion. If an adult cannot read, then they will likely face a much steeper uphill battle in becoming financially included and later using more advanced financial services.

Many of these issues can be fixed somewhat easily over time, but the issues of poverty and illiteracy are major challenges. Governments can work to improve national identification systems, develop infrastructure, boost education, and fix regulation but reducing poverty and improving literacy levels are not as easy. Improving education systems for the younger population can help improve literacy rates, but how do you teach an adult population how to read and write? This presents a major challenge in improving financial inclusion. As long as much of the adult population lives below the poverty line and is illiterate, this will be a major deterrent for financial inclusion throughout Africa.

2.7.2 Digital Financial Services and Financial Inclusion

It is widely accepted by most empirical studies that digital financial services are key drivers of financial inclusion (Jack & Suri 2016; Ghosh 2016; Tchamyou et al., 2019, Gosavi 2018). There have been several studies similar to Ghosh (2016) which show the positive correlation between mobile phone penetration and financial inclusion throughout SSA. These studies show that countries with higher levels of telecom sector development and mobile phone users typically have higher levels of financial inclusion.

Most recently, Bede Uzoma et al., (2020) studied the relationship between digital finance and financial inclusion in 27 SSA countries from 2007-2017. The authors found an ECM (error correction method) of less than zero which shows strong evidence of a long-run multiplier effect between digital financial services and inclusive finance. What this means is that during the period of analysis, any unit increase in digital financial services led to an increase in financial inclusion. Their findings are in line with Jack and Suri (2014), Ozili (2018), and Vo et al. (2019). These authors have suggested through their studies that digital financial services can improve access to affordable financial products and services, help the poor create wealth, lower poverty levels, and narrow the inequality gap in SSA. Uzoma et al. (2020) show very clearly that the advent of digital financial services has had a positive effect on financial inclusion in SSA since 2007.

Digital financial services have been shown to increase financial inclusion on the household level as well. Many studies have highlighted a positive relationship between mobile money use and household financial inclusion (Jack & Suri 2011; Mbiti & Weil 2011; Ouma, et al., 2017). The reason for this relationship is based on the premise that a household with at least one mobile money account is more likely to have a full-service bank account, be able to send and receive money, and save more. Essentially, these studies have shown the positive trickle-down benefits that having at least one mobile money account in a household can provide. As previously mentioned, more studies like these are needed to better understand mobile money and financial inclusion in SSA. An individual in a household may not have a mobile phone or mobile money account, but their family member who they share a home with might. This then allows them to be able to perform most of the basic financially included behaviors (send/receive, save, insurance, credit) without being considered financially included by most studies. Until this gap in the current body of research is consistently filled, there will exist a void in what we truly know about digital financial services and their impact on financial inclusion.

Gosavi (2018) is one of a handful of researchers that have studied the impact of digital financial services on SME financial inclusion. When considering the topic of financial inclusion, most people think financial inclusion only pertains to individuals, which is false. SMEs need access to affordable savings, credit, insurance, and payments as well. A small business needs credit to expand, insurance to be protected from loss, savings to whether economic downturn, and the ability to accept digital payments at an affordable rate. Without access to these four, SMEs will struggle to grow and will have a limited impact on economies. Gosavi in his study found mobile money to have a positive effect on SME financial inclusion in SSA. Mobile money has incentivized SMEs to adopt digital financial services, which has led them to use other digital financial services as well. As previously mentioned in this study, the percentage of SMEs accepting mobile payments and paying suppliers and bills is still low in SSA. The GSMA (2020) found that around 30% of the SMEs they observed were performing these types of financial transactions in SSA. Gosavi's work confirms that as mobile money use increases, SME use of mobile money is likely to increase as well. This area of financial inclusion needs to be studied further. Gosavi shows a direct relationship between digital financial services and their impact on SME financial inclusion, but more studies are needed.

2.7.3 Digital Financial Services Impact on Lower-Income Groups and Women

While in many SSA countries there still exists a gap in financial inclusion between income groups, gender, race, demographic, geographic location, etc., there is no denying that the advent of digital financial services has had an immensely positive impact on lower-income groups. Prior to digital financial services, millions of people throughout SSA had very limited access to a full suite of affordable financial services. This was especially true for those that lived in rural areas. It was and it still is unprofitable in most cases for banks to keep branches and ATMs in scarcely populated rural areas. In the past, this led the rural population to rely solely on the informal financial system, or not use any financial products at all. Digital financial services filled this void in the traditional financial system by extending the reach of financial institutions to where they previously did not go. By establishing mobile money and agent networks, vulnerable groups began to gain access to the modern financial system. Ozili (2018) builds off much of the research in this space and confirms the pivotal role that digital financial services played in filling this gap. As it has been mentioned before, more studies like Ozili's (2018) and Suri and Jack (2016) are needed to better understand the impact that digital financial services have had on vulnerable groups throughout SSA. Surveys like the Financial Inclusion Insights Tracker 2017 have shown us that there still exists a varying gap between the upper-income demographic and the lower-income vulnerable groups, but there is a lack of information regarding financially excluded groups. These surveys have told us that in SSA the excluded population cites a lack of money, lack of understanding, trust, etc. to be the leading reasons for not using mobile money. However, there has not been any work done to find solutions to these reasons for not using mobile money. Until these questions begin to be answered, there will be a gap in the body of knowledge on how to use digital financial services to improve financial inclusion amongst vulnerable groups.

While the advent of digital financial services has helped lower-income groups as a whole, they have arguably impacted women the most. Women throughout SSA are often not afforded the same opportunities as men. They typically have lower levels of education, limited property rights (Gaafar, 2014; Mueller & Mulinge, 2001), and they usually have many more restrictions in their

financial activities compared to men (Aterido et al., 2013; Demirguc-Kunt et al., 2013). For example, many financial institutions throughout SSA require women to obtain permission from their husband to perform basic financial transactions. This institutional discrimination has created a much larger barrier for women to access affordable financial services, which therefore has given them less power in their households and made them more dependent on male family members (Fanta & Mutsonziwa, 2016).

However, accessing affordable financial services is becoming easier for women throughout SSA in large part due to digital financial services. Mobile money has improved female financial inclusion because it enables women to be independent and bypass discriminatory financial institutions. Not having to get permission from their husbands, women are now able to access and conduct financial transactions on their own (GSMA, 2019). As shown by Suri and Jack (2016), this has allowed hundreds of thousands of women to get out of subsistence farming, create small businesses, and improve their financial situations. Female empowerment through digital financial services is crucial because women have been shown to improve not just their own livelihoods, but their children as well. Studies have shown that women are much more likely to use their financial resources to benefit their families (Kabeer, 2009; Maru & Chemjor, 2013). This in turn leads to a number of benefits for their children ranging from increasing the likelihood that they will go to school, stay in school, and have better outcomes when they get older.

Despite all of the positive benefits the advent of digital financial services has brought women throughout SSA, issues still remain. Societal norms in many countries continue to regard women as inferior to men, which impacts their education levels, property rights, voice in the household, economic opportunities, etc. Conditions are improving, however the progress has been slow. More countries need to tackle this issue head on to create better societal conditions for women to thrive in. Not to mention, this is a major setback to SSA economies. Women who break out of subsistence farming have the potential to add greatly to the SSA economy, which will benefit the region as a whole.

2.8 Conclusion

This literature review provided a thorough overview of mobile money, a review of the current literature related to the topic and highlighted the gaps in the research throughout. Additionally, the available theory related to mobile money usage was provided. This section helped to establish a base of knowledge and showcased how much more opportunity for mobile money growth exists in SSA. Next, the research methodology will be provided to show how this study analyzed the effect of mobile money on financial inclusion.

3. Chapter Three

Methodology

3.1 Introduction

This chapter will explain the research methodology this study used to analyze how mobile money effects financials inclusion in Kenya and Tanzania. Section two will explain the data and how surveys were conducted by Financial Inclusion Insights in 2017. Section three will then describe the analytical framework. This section will touch on the regression technique used, the regression formula, the basics of SPSS multivariable regression modeling, and it will provide an explanation on why each variable was chosen. Additionally, section three will provide the variables that SPSS estimation deemed to be the most relevant for the model. Section four will provide the limitation of the chosen methodology, and it will conclude the chapter.

3.2 Research Design

This study chose a quantitative research method to study the effect of mobile money on financial inclusion in Kenya and Tanzania. Specifically, a causal-comparative design was used to study the relationship. The Encyclopedia of Research Design states that a casual-comparative design is "a research design that seeks to find relationships between independent and dependent variables after an action or event has already occurred. The researcher's goal is to determine whether the independent variable affected the outcome, or dependent variable, by comparing two or more groups of individuals" (Brewer & Kuhn, 2010). Due to the fact that this study looked at the effect mobile money use has on financial inclusion; this design was deemed the best fit.

3.2.1 Data source and sample

The data was sourced from InterMedia's Financial Inclusion Insight (FII) tracker survey data set from 2017 in both Kenya and Tanzania (Financial Inclusion Insights, 2018b). This study was conducted throughout SSA from 2013-2017 to gain insights into citizens' financial behavior, mobile money use, household life, livelihoods, etc. To study the relationship between mobile

money and financial inclusion, this study took out several variables from the most recent 2017 survey that will be discussed later in this chapter. The data was obtained from 3,062 respondents in Tanzania and 3,129 in Kenya through in person interviews that took roughly one hour to complete. The surveys were taken randomly throughout different areas of both countries which allowed for an accurate representation of both countries.

3.3 Analytical Framework

3.3.1 Regression Model

The MVA regression model is directly in line with the research objective of analyzing the effect of mobile money on financial inclusion. It looks at all the variables and outputs the probability score that the variable has in leading to financial inclusion. For example, phone ownership is an independent variable in the MVA regression model for both countries. The model will analyze all of the respondents who are financially included and output how much more likely a respondent who owns a phone is to be financially included. Because of the MVA's capabilities, it was deemed the most suitable model in analyzing the effect various MM independent variables have on financial inclusion.

There are two basic equations used in multivariate (MVA) logistic regression, they are:

$$\pi(X) = \frac{e^{\beta_0+\beta_1 X_1+\beta_2 X_2+\ldots+\beta_p X_p}}{1+e^{\beta_0+\beta_1 X_1+\beta_2 X_2+\ldots+\beta_p X_p}} \qquad \text{(i)}$$

This formula then outputs the probabilities of outcome events given the covariate values of the independent variables $X_1, X_2, \ldots X_p$, and

$$\text{logit}[\pi(X)] = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \ldots + \beta_p X_p \qquad \text{(ii)}$$

(Brewer & Kubn, 2010).

Where: $\pi(X)$ is the likelihood that a respondent is financially included (1= yes, 0 = no) and X_1, $X_2 \ldots X_{22}$ are the binary independent variables listed in Table 3. For both country's MVA models, financially included (1 = yes) was selected by SPSS as a constant dummy variable. Financially included was the event which the SPSS MVA model predicted the odds. SPSS takes out financially included (0 = no) to focus purely on analyzing how the independent variables impact the likelihood of being financially included. SPSS regards being financially included as the "success" outcome and is therefore in line with the research objective of this study.

The above formulas show that multivariate logistic regression is very similar to a standard multivariable linear regression model, once SPSS transforms the dichotomous outcome using logit transformation. The logit transformation changes the range of $\pi(X)$from 0 to 1 to $-\infty$ to $+\infty$, which is typical for linear regression. Unique to multivariate logistic regression, the above equations are for mean probabilities, and every single data point will have an error term. In analyzing the results, we assume that the error has a mean of zero, and it follows binomial distribution with a mean of $\pi(X)$, and a variance of $\pi(X)(1-\pi)$). Next, the description of all the variables used in the MVA models will be provided.

3.3.3 Description of Variables

The independent variables used in the MVA regression models were chosen in an attempt to gain a more holistic understanding of how mobile money effects financial inclusion. To do this, the previously discussed studies were incorporated into the variable selection process. Studies such as Kim (2021) and Ouma et al. (2017) were first considered as they analyze savings, and the other core financial behaviors one must conduct to be considered financially included. That led to the selection of sent or received, saved, credit, and insurance. Next, the more general focused studies like Bede Uzoma et al., (2020), and Ghosh (2016) were taken into consideration. Their general focus on digital financial services and mobile technologies and their impact on financial inclusion led to the selection of some more broad variables such as phone ownership, access to mobile money, SMS frequency, proximity to a mobile money agent, etc. These variables gave the model the capability to look at mobile money's general effect on financial inclusion. To add a narrow

focus, studies like Jack and Suri (2016) and Kim (2021) were used in the independent variable selection process. These authors' studies looked at how mobile money has impacted certain demographic groups, and their work led to the selection of variables such as rural male or female, rural poor, poverty, and literacy. Choosing these variables helped to incorporate demographic issues that relate to mobile money and financial inclusion that have been discussed at length throughout this study. The independent variable selection processes helped this study create a well-rounded model that took a holistic and unique approach to analyzing mobile money's effect on financial inclusion. Next, each variable will be briefly discussed, and the Financial Inclusion Insights interview questions will be provided as well.

3.3.4 Dependent Variable

Financially Included (variable 1): This is the only dependent variable this study took into consideration in the MVA regression models for Kenya and Tanzania. The focus of this study is to analyze mobile money's effect on financial inclusion, and therefore only having this singular dependent variable made sense. Financial Inclusion Insights categorized a respondent as financially included 1 = yes, 0 = no after analyzing the respondent's answers to all survey questions. Financial Inclusion Insights considers a respondent financially included if they have an account in their name with a full-service financial institution and they have used it within the last 90-days.

3.3.5 Explanatory Independent Variables

Own phone (variable 2): As mentioned previously in this study, phone ownership and the ability to send and receive SMS messages are key factors influencing an individual's readiness to adopt mobile money. However, because a user can access non-digital financial services, this variable was deemed important to see how much of an effect owning a phone had on financial inclusion in both countries.

Sent/Received (variable 3): Sending and receiving money through a mobile money account is the most widespread use of the technology in SSA. This study wanted to determine the effect this behavior had on financial inclusion. Respondents were asked if they had in the last 90-days sent or received money from family members, friends, workmates, or other acquaintances.

Saved (variable 4): As many studies have shown, saving is one of the four key financial behaviors one must do to be considered financially included. Similar to the previous variable, saving through a mobile money account was added to determine if it had an effect on financial inclusion. Respondents were asked if in the last 90-days they had saved money for any reason.

Credit (variable 5): Access to credit is another one of the four key financial products one must have to be considered financially included. As it is a more advanced mobile money behavior, it was anticipated that it would have a large effect on a respondent being financially included. Respondents were asked if in the last 90-days they had taken a loan or made payments on a loan through their mobile money account.

Insurance (variable 6): Access to insurance is another core financial product one must have to be considered financially included. Similar to mobile credit, a respondent with access to mobile insurance was anticipated to be an advanced user who was financially included. Nonetheless, this study wanted to see the effect having a mobile money insurance account had on the likelihood of a user being financially included. Respondents were asked if in the last 90-days if they had made insurance payments or received claims on insurance through their mobile money account.

Active MM (variable 7): This study has made it clear that mobile money has been the main driver of improving financial inclusion in both Tanzania and Kenya. However, it has also been highlighted that in many cases a user may not use mobile money for everything, and one can rely on informal financial services to meet their other financial needs as well. Due to this issue, this variable was included to analyze the true impact of mobile money use on financial inclusion in Kenya and Tanzania. Respondents were asked if they had used mobile money in the past 90-days with their own account.

Access MM (variable 8): Building off of the previous description, a user might not have a mobile money account in their name, but they might have access to someone else's. This behavior was discussed previously in this study, and many prior research studies ignore this factor. A user could use someone else's mobile money account to send and receive money from family but rely on informal financial services for the rest of their needs. Most studies would regard this type of user as financially excluded; this study aimed to not make this same mistake. Respondents were asked if they have access to a mobile money account that is not their own.

Rural Poor (variable 9): This variable is used as a control to analyze the effect that being from a rural area and making less than $2.50 per day has on financial inclusion. Both citizens of Kenya and Tanzania live in areas that are are predominately rural and poor (Tanzania more so), so this was considered a key control variable. Additionally, many studies highlight the disadvantages in becoming financially included from a rural and poor area. This study analyzed if being rural and poor actually impacted financial inclusion.

Literacy (variable 10): Low literacy rates are widespread through SSA and some studies highlight its effect on financial inclusion. This study wanted to control for literacy to see its impact on financial inclusion. Respondents were given a basic reading and writing quiz and surveyors determined if the responded was literate.

Rural Male or Female (variables 11-12): Studies like Kim (2021) highlight the uphill battle most women face in becoming financially included in comparison to men throughout SSA. This study wanted to control for gender to determine if this was true in Kenya and Tanzania.

Proximity to Agent (variable 13): As previously, mobile money agents play a crucial part in the mobile money ecosystem. Users rely on them to access cash and other financial transactions. This study wanted to control for agent distance to see if it had an impact on the likelihood a user would be financially included. Respondents were asked if they lived under 1 kilometer from their mobile money agent.

SMS Frequency (variable 14): SMS frequency is a key proxy for a user to adopt mobile money. This study wanted to confirm or deny this widely regarded proxy and controlled for SMS frequency. Respondents were asked if they had sent of received an SMS in the past week.

Financial Literacy (variable 15): A key issue in financial inclusion throughout SSA is financial literacy. In many cases, people simply do not understand how to perform basic financial transactions, or they struggle to understand basic financial concepts like interest rates, credit, budgeting, etc. This study set out to control for financial literacy, to see its effect on increasing the likelihood that a respondent would be financially included. Similar to the literacy quiz, respondents were asked a few short basic financial questions to determine if they had basic levels of financial literacy.

Non-User MM (variable 16): mobile money is the primary driver of financial inclusion in SSA, but one can also use traditional banking services, or informal financial services to be financially included. This variable also helps to address the issue of someone accessing another person's mobile money account and relying on informal financial services to be financially included. This variable was chosen to see the real effect mobile money has on a respondent being financially included. Respondents were asked if they use mobile money, yes or no.

Poverty (Variable 17): Because both countries have high levels of poverty, this study wanted to control for respondents making less than $2.50 per day to determine poverty's effect on financial inclusion. A respondent was considered to be living in poverty if they made less than $2.50 per day.

Age (variables 18-22): The study controlled for five age groups starting at 15 years of age and increasing by 9 years until the last age group, which was 55+. This study wanted to control for age to establish if it had an effect on financial inclusion. Younger people in this day and age tend to be more technologically literate than older generations, and this could have an impact on a respondent's ability to use mobile money services.

Table 5: Regression Variables

	Variable	Question/ Criteria	Values	Data Type
Dependent Variable				
1	**Financially Included**	**Respondent has an account in their name with a full-service financial institution.**	**1= Yes, 0 = No**	**Binary**
Independent Variables: Mobile Money indicators				
2	Own Phone	Do you personally own a mobile phone?	1= Yes, 0 = No	Binary
3	Sent/Received	Which of the following activities have you ever done using a mobile money account? Sent money to, or received money from, family members, friends, workmates or other acquaintances.	1= Yes, 0 = No	Binary
4	Saved	Which of the following activities have you ever done using a mobile money account? Saved money for any reason.	1= Yes, 0 = No	Binary
5	Credit	Which of the following activities have you ever done using a mobile money account? Took a loan or made payments on a loan.	1= Yes, 0 = No	Binary
6	Insurance	Which of the following activities have you ever done using a mobile money account? Made insurance payments or received claims on insurance.	1= Yes, 0 = No	Binary
7	Active MM	Respondent has used MM in the past 90 days with their account.	1= Yes, 0 = No	Binary
8	Access MM	Respondent has access to a MM account that is not their own.	1= Yes, 0 = No	Binary
Control Variables				
9	Rural Poor	Respondent is from a rural area below $2.50 per day.	1= Yes, 0 = No	Binary
10	Literacy	Respondent passed basic literacy test.	1= Yes, 0 = No	Binary
11	Rural Female	Respondent is a female from a rural area.	1= Yes, 0 = No	Binary
12	Rural Male	Respondent is a male from a rural area.	1= Yes, 0 = No	Binary
13	Proximity to MM Agent	Respondent is less than 1 km from MM agent.	1= Yes, 0 = No	Binary
14	SMS Frequency	Respondent has sent/received an SMS in the past 7 days.	1= Yes, 0 = No	Binary
15	Financial Literacy	Respondent passed basic financial literacy test.	1= Yes, 0 = No	Binary
16	Non-User MM	Respondent did not use MM.	1= Yes, 0 = No	Binary
17	Poverty	Respondent below $2.5 per day.	1 = Yes, 0 = No	Binary
18	Young (15-24)	Respondent's age is between 15-24.	1 = Yes, 0 = No	Binary
19	Adult (25-34)	Respondent's age is between 25-34.	1 = Yes, 0 = No	Binary
20	Adult (35-44)	Respondent's age is between 35-44.	1 = Yes, 0 = No	Binary
21	Adult (45-54)	Respondent's age is between 45-54.	1 = Yes, 0 = No	Binary
22	Adult (55+)	Respondent is older than 55.	1 = Yes, 0 = No	Binary

3.4 Estimation Approach

The multivariable logistic regression modeling (MVA) was used due to the binary nature of the dependent variable (financially included 1 = yes, 0 = no) as well as the independent variables. Additionally, the backward stepwise elimination approach was employed in the estimation of the regression models which helps to eliminate insignificant variables from the regression and leads to the strongest model. This elimination technique includes independent variables that have p-values less than or equal to 0.05, and it removes those with p-values greater than 0.10. The variables with p-values less than 0.05 in univariable analysis were then included in the multivariable model (IBM Corporation, Armonk NY).

Out of the initial 21 variables specified in the regression models for the two countries, seven (7) variables (Own Phone; SMS Frequency; Poverty; Rural Male; Non-user MM; Literacy and Rural Female) were maintained for the final regression analysis for Tanzania while nine (9) variables (Own Phone; Access MM; Young, 15-24 years of age; Adult, 25-34 years of age; Sent/Received SMS; Saved; Credit; Insurance; Rural Poor) were also maintained for the final regression analysis for Kenya. These variables will be the only ones discussed in chapter four because they are the only ones that will be included in the final MVA regression models for both countries. All analyses were done using SPSS 25.0 (IBM Corporation, Armonk NY) and all tests were two-sided.

Interpreting the OR Ratio: The strength of the included independent variables can be seen by looking at the odds ratio (OR) which shows the strength of association between each variable and being financially included. For example, if the independent variable phone ownership has an OR of 5 in an MVA model, that means a respondent is five times more likely to be financially included then a respondent who does not own a phone. Another key concept to understand is how to interpret odds ratios below one. Variables with ORs of less than one mean that the variable was seen to decrease the likelihood a respondent was financially included. As will be seen with variable 16 in the Tanzanian MVA, the OR for the variable was 0.069. This shows that not using mobile money decreased a respondent's likelihood of being financially included by roughly 93% (1 – 0.069 = 0.931). It also shows that if a user did use mobile money, they would be 14.5 times more likely to

be financially included (1 /. 0.069 = 14.49). Now that a basic understanding of how to interpret the OR ratio has been provided, the MVA results for both countries will now be discussed.

3.5 Limitations

The limitations to the chosen methodology are described below:

- Variables outside of the ones chosen may have an effect on financial inclusion. Since they are not included in the analysis, this is a limitation of the models used.
- These various regression models are not entirely accurate, and they do not explain all the variation in the dependent variable (financially included). This will be seen in the discussion of the R-square values, which are a measure of the fit of the model.
- The sampling technique used for choosing respondents in both countries may not be a fully accurate representation of the demographics of both countries. Financial Inclusion Insights made a strong effort to randomly interview respondents from various regions in both countries, but there is always the risk the chosen respondents in the sample do not accurately represent the entire population. Without interviewing the entire country, 3,000 randomly selected respondents seemed to be in line with the current data on mobile money and financial inclusion levels.
- The data used is from 2017, which impacts the credibility of the findings. Mobile technology is a high-growth industry, and much can change over a few years. The entire mobile money landscape has likely changed in both countries, and how it effects financial inclusion has likely changed as well.

3.5 Conclusion

This chapter provided a thorough overview of the research methodology chosen for this study. The data from Financial Inclusion Insights was discussed, the regression technique and formulas were presented, an explanation of every variable was given, and lastly the limitations of the chosen methodology were provided. The next chapter will discuss the MVA regression model results for both Kenya and Tanzania to see how mobile money effects financial inclusion in both countries.

4. Chapter Four

Discussion of Findings

4.1 Introduction

This chapter will discuss the results from the statistical analysis described in the previous chapter. It will look the MVA regression models for both Kenya and Tanzania to see mobile money's effect on financial inclusion. To do this, this chapter will be broken into four sections. Section two will provide basic descriptive statistics for all variables for both countries. Section three will present the MVA regression model findings and the most impactful variables on financial inclusion in both countries. Section four will discuss the validity of the findings, and where future researchers could improve. Lastly, section five will provide a conclusion to the chapter.

4.2 Descriptive Statistics

Because of the binary nature of the variables, the descriptive statistics that can be provided are limited. Outputs such as standard deviation, minimum, maximum, etc. do not apply to binary values. The SPSS output for both countries provides data on the individuals that are financially included and shows how independent variables relate to financial inclusion. The complete list of variables and the descriptive statistics for both countries will now be provided. For the sake of time only the most relevant variables will be discussed. The chosen variables will be reviewed to see how they impact financial inclusion and how they relate to the theoretical and empirical literature that has been discussed in this study.

Table 6: Tanzania Descriptive Statistics

Descriptive Statistics: Tanzania								
Financially Included		No			Yes			
		Count	**Row N %**	**Column N %**	**Count**	**Row N %**	**Column N %**	**P**
(2) Own Phone	No	944	84.5	69.4	173	15.5	10.2	<0.001
	Yes	417	21.4	30.6	1528	78.6	89.8	
(3) Sent/Received	No	825	47.1	60.7	928	52.9	54.6	0.001
	Yes	535	40.9	39.3	772	59.1	45.4	
(4) Saved	No	1128	45.6	82.9	1347	54.4	79.2	0.01
	Yes	232	39.7	17.1	353	60.3	20.8	
(5) Credit	No	1316	45	96.8	1607	55	94.5	0.003
	Yes	44	32.1	3.2	93	67.9	5.5	
(6) Insurance	No	1351	44.5	99.3	1688	55.5	99.3	0.883
	Yes	9	42.9	0.7	12	57.1	0.7	
(7) Active MM	No	866	47.9	63.7	942	52.1	55.4	<0.001
	Yes	494	39.5	36.3	758	60.5	44.6	
(8) Access MM	No	584	49.4	42.9	597	50.6	35.1	<0.001
	Yes	776	41.3	57.1	1103	58.7	64.9	
(9) Rural Poor	No	477	37.8	35.1	785	62.2	46.2	<0.001
	Yes	883	49.1	64.9	915	50.9	53.8	
(10) Literacy	No	303	49.4	22.3	310	50.6	18.2	0.005
	Yes	1057	43.2	77.7	1390	56.8	81.8	
(11) Rural Female	No	748	41.5	55	1054	58.5	62	<0.001
	Yes	612	48.6	45	646	51.4	38	
(12) Rural Male	No	943	41.9	69.3	1305	58.1	76.8	<0.001
	Yes	417	51.4	30.7	395	48.6	23.2	
(13) Close to Agent	No	422	48.7	31	444	51.3	26.1	0.003
	Yes	938	42.8	69	1256	57.2	73.9	
(14) SMS Frequency	No	689	50	50.7	689	50	40.5	<0.001
	Yes	671	39.9	49.3	1011	60.1	59.5	
(15) Financial Literacy	No	1085	45.2	79.8	1315	54.8	77.4	0.105
	Yes	275	41.7	20.2	385	58.3	22.6	
(16) Non-User MM	No	358	19	26.3	1523	81	89.5	<0.001
	Yes	1003	84.9	73.7	178	15.1	10.5	
(17) Poverty	No	160	23.9	11.8	510	76.1	30	<0.001
	Yes	1201	50.2	88.2	1191	49.8	70	
(18) Young (15-24)	No	1006	44.6	74	1249	55.4	73.5	0.755
	Yes	354	44	26	451	56	26.5	
(19) Adult (25-34)	No	1006	44.6	74	1249	55.4	73.5	0.755
	Yes	354	44	26	451	56	26.5	
(20) Adult (35-44)	No	1093	44.1	80.4	1384	55.9	81.4	0.465
	Yes	267	45.8	19.6	316	54.2	18.6	
(21) Adult (45-54)	No	1182	44.1	86.9	1498	55.9	88.1	0.315
	Yes	178	46.8	13.1	202	53.2	11.9	
(22) Old (55 +)	No	1183	44.8	87	1460	55.2	85.9	0.377
	Yes	177	42.4	13	240	57.6	14.1	

Source: Output from the analysis research data (Tanzania).

Phone Ownership (variable 2): The data on phone ownership amongst financially included respondents in Tanzania supports the current body of research that suggests phone ownership is a key proxy for financial inclusion in SSA. Table 6 shows that 89.8% of financially included respondents owned a phone, which undoubtedly shows that phone ownership is a proxy for financial inclusion. Strengthening this finding is the fact that 69.4% of respondents that were financially excluded, did not own a phone. These findings suggest that mobile phone ownership can lead a respondent to use mobile money services and be financially included. Additionally, they also support Gosh's (2016) findings on the correlation between mobile phone penetration and financial inclusion throughout SSA.

Sent or Received (variable 3): The data on sent or received mobile money go against what was anticipated. 54.6% of financially included respondents had not sent or received money through a mobile money account in the past 90 days. This finding helps to confirm Mori's (2019) findings which suggested financially included respondents either rely on informal financial services, or traditional financial services to meet their other financial needs.

Saved (variable 4): Similar to the previous variable, the data on saving through a mobile money account went against what was anticipated. Only 20.8% of financially included respondents had saved money through a mobile money savings account. This finding reinforces the "under the mattress" savings behavior that has been previously discussed. Additionally, this finding could also support the fact that not many people have money in Tanzania to save. In 2017, 77% of the adult population in Tanzania lived below the poverty level of $2.50 (Financial Inclusion Insights, 2018b). This goes against Ouma et al. (2017) who found that digital financial services increase the likelihood that an individual would save for any reason.

Active MM and Access MM (variables 7 and 8): What the data shows for mobile money use and mobile money access goes against what was theorized for Tanzania. Only 44.6% of financially included respondents were active users, and 64.9% had access to mobile money. Although these results do show that financially included respondents use or have access to mobile money, they do not overwhelmingly show that mobile money is the driving force for financial inclusion.

Nonetheless, these findings do help to confirm Chu's (2018) findings that suggested the key mobile financial inclusion factors are accessibility, availability, and affordability. These findings support the factors of accessibility and availability in leading to financial inclusion in Tanzania. Additionally, they support Karpowicz (2014) who found that the determinants of financial inclusion can be grouped into depth, efficiency, and access. These findings support Kapowicz's access category.

Rural Variables (variables 9, 11-13): The data shows that 50.9% of rural and poor respondents were financially included, and that 53.8% of all respondents were considered to be rural and poor. What is significant about the rural variable results is that more rural females were seen to be financially included compared to men. The data shows that rural females account for 38% of all financially included respondents compared to 23.2% amongst rural males. These results go against many gender-related financial inclusion studies that suggest women are behind in comparison to men in financial inclusion such as Kim (2021) study. Lastly, proximity to a mobile money agent (variable 13) was seen to be influential in a respondent being financially included. 73.95% of financially included respondents stated they were under 1 kilometer to the nearest agent. This reinforces the importance of the agent network and its impact on financial inclusion. Additionally, it is in line with Ozili's (2018) study, which stated digital financial services have been influential in extending financial services to vulnerable groups that were previously excluded by traditional financial services.

Poverty (variable 17): Poverty was not seen to have much of an impact on a respondent being financially included. Of the financially included respondents, 70% of them were considered to be living in poverty. This is slightly below the 77% of the entire population that has been estimated to be living in poverty. These findings go against what Chikalipah (2017) found which suggested high levels of poverty, poor infrastructure, high transaction costs, lack of KYC documentation, illiteracy, etc. to be some widespread factors that limited financial inclusion throughout SSA. These include high levels of poverty, poor infrastructure, high transaction costs, lack of KYC documentation, regulation, illiteracy, etc. that are widespread throughout SSA.

Financial Literacy (variable 15): Financial literacy was not seen to have an impact on financial inclusion. Of the respondents that were financially included, 77.4% of them were financially illiterate. This goes to show that in Tanzania, financial literacy has a minimal effect on financial inclusion. These findings heavily contradict the Financial Inclusion Framework (NFIF) which the Government of Tanzania launched in 2014. The Framework focuses on improving financial literacy in the hopes that it would improve financial inclusion levels in Tanzania, however, this finding suggests that financial literacy may have a lesser impact than anticipated.

Non-User (variable 16): The data on this variable confirms the impact mobile money use has on financial inclusion. Only 10.5% of respondents that were financially included did not use mobile money. Meaning that 89.5% of financially included respondents were mobile money users.

Table 7: Kenya Descriptive Statistics

Descriptive Statistics: Kenya								
		No			Yes			
		Count	**Row N %**	**Column N %**	**Count**	**Row N %**	**Column N %**	**P**
(2) Own Phone	No	449	72.3	58.5	172	27.7	7.3	<0.001
	Yes	319	12.7	41.5	2189	87.3	92.7	
(3) Sent/Received	No	501	48.8	65.2	525	51.2	22.2	<0.001
	Yes	267	12.7	34.8	1836	87.3	77.8	
(4) Saved	No	613	36.1	79.8	1087	63.9	46	<0.001
	Yes	155	10.8	20.2	1274	89.2	54	
(5) Credit	No	747	28.1	97.3	1908	71.9	80.8	<0.001
	Yes	21	4.4	2.7	453	95.6	19.2	
(6) Insurance	No	766	25.4	99.7	2250	74.6	95.3	<0.001
	Yes	2	1.8	0.3	111	98.2	4.7	
(7) Active MM	No	768	80.3	100	188	19.7	8	<0.001
	Yes	0	0	0	2173	100	92	
(8) Access MM	No	350	85.6	45.6	59	14.4	2.5	<0.001
	Yes	418	15.4	54.4	2302	84.6	97.5	
(9) Rural Poor	No	456	19.2	59.4	1914	80.8	81.1	<0.001
	Yes	312	41.1	40.6	447	58.9	18.9	
(10) Literacy	No	291	34.6	37.9	549	65.4	23.3	<0.001
	Yes	477	20.8	62.1	1812	79.2	76.7	
(11) Rural Female	No	403	20.9	52.5	1524	79.1	64.5	<0.001
	Yes	365	30.4	47.5	837	69.6	35.5	
(12) Rural Male	No	595	24.7	77.5	1815	75.3	76.9	0.731
	Yes	173	24.1	22.5	546	75.9	23.1	
(13) Close to Agent	No	252	39.4	32.8	388	60.6	16.4	<0.001
	Yes	516	20.7	67.2	1973	79.3	83.6	
(14) SMS Frequency	No	419	47.9	54.6	456	52.1	19.3	<0.001
	Yes	349	15.5	45.4	1905	84.5	80.7	
(15) Financial Literacy	No	601	26.2	78.3	1691	73.8	71.6	<0.001
	Yes	167	20	21.7	670	80	28.4	
(16) Non-User MM	No	418	15.4	54.4	2302	84.6	97.5	<0.001
	Yes	350	85.6	45.6	59	14.4	2.5	
(17) Poverty	No	416	18.6	54.2	1824	81.4	77.3	<0.001
	Yes	352	39.6	45.8	537	60.4	22.7	
(18) Young (15-24)	No	355	15.7	46.2	1900	84.3	80.5	<0.001
	Yes	413	47.3	53.8	461	52.7	19.5	
(19) Adult (25-34)	No	611	27.9	79.6	1576	72.1	66.8	<0.001
	Yes	157	16.7	20.4	785	83.3	33.2	
(20) Adult (35-44)	No	692	26.9	90.1	1880	73.1	79.6	<0.001
	Yes	76	13.6	9.9	481	86.4	20.4	
(21) Adult (45-54)	No	728	25.9	94.8	2086	74.1	88.4	<0.001
	Yes	40	12.7	5.2	275	87.3	11.6	
(22) Old (55 +)	No	768	24.5	100	2361	75.5	100	*
	Yes	0	0	0	0	0	0	

Source: Output from the analysis research data (Kenya).

Phone Ownership (variable 2): The data overwhelmingly shows that owning a phone is a key factor for an individual being financially included in Kenya. Of the financially included respondents, 92.7% of them owned a phone. Of those that were considered financially excluded, 72.3% of them did not own a phone. This finding, like Tanzania, supports Gosh's (2016) finding that phone ownership is directly correlated to financial inclusion.

Sent or Received (variable 3): Similar to phone ownership, the data clearly shows that sending or receiving money has an impact on being financially included. Of the respondents that were financially included, 77.8% of them had sent or received money in the past week through a mobile money account. This confirms that this basic task does lead a user to perform other financial transactions to be considered financially included. Additionally, this finding supports the GSMA (2019) and Financial Inclusion Insights (2018b) studies which state that SMS frequency is a key proxy to being financially included through mobile financial services.

Saved (variable 4): Similar to the results seen in Tanzania, the mobile money savings data went against what was anticipated. Of the financially included respondents, only 54% of them stated they had used a mobile money savings account in the past 90-days. This reinforces the fact that 30.1% of the adult population still relies on informal financial services in Kenya (Central Bank of Kenya, 2016).

Active MM and Access MM (variables 7 and 8): The data on active mobile money use and access to mobile money amongst financially included respondents makes it abundantly clear that mobile money use has a positive impact on financial inclusion. Of the financially included respondents, 92% of them were active mobile money users, and 97.5% had access to mobile money. These findings support Kithinji's (2017) study on technology diffusions impact on financial inclusion in Kenya. Kithinji found that digital financial services had a significant positive effect on financial inclusion in Kenya from 2012 to 2016, with the most significant statistical relationship being between mobile banking and financial inclusion. The Kenyan descriptive statistics support these findings.

Rural Variables (variables 9, 11-13): The data shows that only 18.9% of financially included respondents were considered to be rural poor. This supports what has been previously discussed in this study, that mobile money products tend to cater towards the wealthier demographic. Additionally, Kenya was seen to have more rural women financially included in comparison to men. This is in line with the Tanzanian data as well. Of the financially included respondents, 35.5% were female compared to 23.1% male. This goes against what Kim (2021) found in her study on financial inclusion amongst poor women in Nairobi. In fact, these findings support the GSMA's 2019 study that suggested mobile money has helped women in SSA to no longer have to get permission from their husbands and are now able to access and conduct financial transactions on their own. It is important to note that these findings are in rural areas which suggests more studies are needed to better understand where women are the most behind men in financial inclusion.

Financial Literacy (variable 15): The data on financial literacy shows that it does have a meaningful impact on financial inclusion in Kenya. Of the financially included respondents, only 28.4% were considered to be financially literate by Financial Inclusion Insights. This goes against much of the current understanding on how to improve financial inclusion in SSA. There has been a heavy focus in recent years on improving financial literacy in the hopes that it will improve financial inclusion, but similar to Tanzania this data shows it has a minimal impact on being financially included.

Non-User MM (variable 16): Similar to the results found in Tanzania, the data on non-users clearly shows mobile money's impact on financial inclusion in Kenya. Of the financially included respondents, only 2.5% were non-users of mobile money. Meaning that 97.5% of financially included individuals were mobile money users. This reinforces the widely known impact that mobile money has on financial inclusion, and it shows that mobile money is a key driver of financial inclusion in Kenya.

4.3 Discussion of MVA Regression Results

This section discusses the MVA regression results for Tanzania and Kenya to examine the effect of mobile money on financial inclusion. The significant variables were discussed and strength of the models will be shown. As mentioned in chapter three, backward stepwise elimination was used

in the MVA regression modeling and all tests were two-sided. This elimination technique includes independent variables that had p-values less than or equal to 0.05, and it removes those with p-values greater than 0.10. Variables with p-values less than 0.05 in univariate analysis are then included in the multivariable model. This ensures that only the variables which have the most significant impact on increasing the likelihood a respondent will be financially included are discussed.

4.3.1 Regression Results: Tanzania

The results of the regression analysis on the effect of mobile money on financial inclusion in Tanzania is presented in Table 8. The MVA logistic regression to study mobile money's effect on financial inclusion was statistically significant with χ^2 of 1,961.7, p < .005. Additionally, the model explained 63.4% (Nagelkerke R^2) of the variance in financial inclusion and it correctly classified 55.6% of respondents as financially included.

The average Nagelkerke R^2 was mainly because the model only included independent variables related to mobile money. As many respondents use financial services outside of mobile money to become financially included, the model will never be able to fully explain the variance in financial inclusion. Incorporating other non-mobile money related variables in future research could help to improve the strength and predictability of the MVA model. Additionally, the model lacks validity due to the fact it uses data from 2017. As mentioned before, more recent survey data is needed to accurately research mobile money's effect on financial inclusion in Tanzania.

Nonetheless, the MVA logistic regression model was the right choice for this study. This type of model helps to look at the likelihood of events occurring, and therefore it was the modeling technique chosen. The MVA helped this study look at various independent variables related to MM and determine how they impacted the likelihood of financial inclusion.

Table 8: Tanzania Regression Output

	B	S.E	Wald	DF	Sig.	Exp(B) or OR
(2) Own Phone	2.516	0.116	467.218	1	0.000	12.382 ***
(14) SMS Frequency	0.324	0.118	7.572	1	0.005	1.382 ***
(17) Poverty	-0.430	0.140	9.428	1	0.002	0.650 ***
(12) Rural Male	-0.448	0.143	9.847	1	0.002	0.639 ***
(16) Non-User MM	-2.676	0.114	552.48	1	0.000	0.06 ***
(10) Literacy	-0.224	0.145	2.82	1	0.093	0.783 *
(11) Rural Female	-0.253	0.134	3.575	1	0.059	0.777 *
Constant	0.214	0.203	1.110	1	0.292	1.239
Cox & Snell R Square	0.473					
Nagelkerke R Square	0.634					
Overall Percentage Correct	55.6					
Log likelihood χ^2	1,961.7					
Prob>χ^2	0.0000					
Observations	3,062					

Note: *** and * denote significance at 1% and 10% respectively. Source: Output from the analysis research data (Tanzania).

From Table 8, the coefficient of *Non-User MM (variable 16)* is observed to be negative and significant at 1% which indicates that non-users of mobile money have lower likelihood of being financially included. Based on the estimated OR, non-usage of mobile money decreased a respondent's likelihood of being financially included by roughly 93% (1 – 0.069 = 0.931). It also showed that if a respondent did use mobile money, they would be 14.5 times more likely to be financially included (1 /. 0.069 = 14.49). These findings support what was discussed in the descriptive statistics in Table 6, and they also support the widely accepted finding that digital financial services are key drivers of financial inclusion (Jack & Suri 2016; Ghosh 2016; Tchamyou et al., 2019, Gosavi 2018).

The coefficient of *Own Phone (variable 2)* in Table 8 is observed to be positive and significant at 1% which shows that respondents who owned a phone had a higher likelihood of being financially included. Looking at the estimated OR, Own Phone had an OR of 12.382, which shows that respondents who owned a phone were 12.382 times more likely to be financially included than a respondent who did not. These findings support studies similar to Ghosh (2016) which show the positive correlation between mobile phone penetration and financial inclusion throughout SSA. Phone ownership is a clear proxy for financial inclusion in Tanzania.

The coefficient *SMS Frequency (variable 14)* in Table 8 is observed to be positive and significant at 1%, which shows that respondents who had sent or received a text in the past week were more likely to be financially included. The estimated OR for SMS frequency was 1.382, which means a respondent who had sent or received an SMS message in the past week was 1.382 times more likely to be financially included than a respondent who had not. Similar to the previous variable, this confirms the key role phone ownership plays in being financially included and it supports the GSMA (2019) and Financial Inclusion Insights (2018b) studies which state that SMS frequency is a key proxy to being financially included through mobile financial services.

The coefficient *Poverty (variable 17)* in Table 8 is observed to be negative and significant at 1%, which suggests that being in poverty decreased a respondent's chances of being financially included. Based on the estimated OR, poverty decreased a respondent's likelihood of being financially included by 35% (1- 0.65). Additionally, the estimated OR ratio also shows us that being above the poverty line in Tanzania increased the likelihood that a respondent was financially included by 1.53 times (1 / 0.650). These findings confirm the uphill battle citizens below the poverty line face in being financially included. Data from the Financial Inclusion Insights (2018b) made it clear that the cost of mobile financial products and not having any money are two of the top reasons for why respondents do not use mobile financial products. Through regression analysis this study has made it clear that poverty is among one of the top reasons for being financially excluded.

The coefficient *Rural Male (variable 12)* in Table 8 is observed to be negative and significant at 1%, which shows that a male respondent living in a rural area had a lower likelihood of being financially included compared to females living in a rural area. The estimated OR for Rural Male was 0.639, which means that rural males were seen to be 36% (1 – 0.639) less likely to be financially included in comparison to rural females. Additionally, the descriptive statistics (Table 4) showed that 38% of all financially included respondents were female compared to 23.2% male.

The coefficient *Literacy* (*variable 10)* in Table 8 is observed to be positive and insignificant at 1%, which shows that literacy did not influence the likelihood a respondent would be financially

included in Tanzania. This finding goes against a lot of the work that has been done on financial inclusion throughout SSA. Specifically, this finding goes against Chikalipah (2017) who found illiteracy to be a major hindrance to financial inclusion throughout SSA. The reason behind this has not been studied, and more work is needed to better understand why literacy has a minimal impact on financial inclusion in Tanzania.

The coefficient *Rural Female (variable 11)* in Table 8 is seen to be insignificant at 1%. As previously discussed, the regression results made it clear that rural male respondents were at a disadvantage in becoming financially included compared to rural women in Tanzania. These findings go against what Kim (2021) found in her study on women in Nigeria. Her study suggests that women face an uphill battle in becoming financially included in comparison to men in SSA, but the regression results for Tanzania prove this to not be the case. More gender related financial inclusion studies are needed on a country-by-country basis to better understand gender disparities throughout SSA.

4.3.2 Regression Results: Kenya

This section will use Table 9 to discuss the results from the Kenya MVA logistic regression. The MVA logistic regression for Kenya to study mobile money's effect on financial inclusion was statistically significant with χ^2 of 2,702.58, $p < .005$. Additionally, the model explained 86.1% (Nagelkerke R^2) of the variance in financial inclusion and it correctly classified 75.5% of respondents as financially included.

Similar to the issues discussed regarding the Tanzania MVA, this model will never be entirely accurate in predicting financial inclusion because it excludes independent variables not related to mobile money. This model is also similar to Tanzania because it uses the same outdated 2017 survey data, which limits the validity of the findings.

Despite these issues, this MVA logistic regression was the right choice for this study. This modeling technique helps to show the probability of certain events occurring. Since this study set out to analyze the effect of mobile money on financial inclusion, this modeling technique made

sense. The MVA helped this study look at various independent variables related to mobile money and determine how they impacted the likelihood of financial inclusion.

Table 9: Kenya Regression Output

	B	S.E	Wald	DF	Sig.	Exp(B) or OR
(2) Own Phone	1.049	0.195	28.870	1	0.000	2.856 ***
(8) Access MM	0.878	0.260	11.391	1	0.001	2.407 ***
(18) Young (15-24)	-2.140	0.236	82.406	1	0.000	0.118 ***
(19) Adult (25-34)	-7.430	0.227	10.697	1	0.001	0.475 ***
(3) Sent/Received	0.247	0.251	0.968	1	0.325	1.28
(4) Saved	0.199	0.247	0.651	1	0.420	1.221
(5) Credit	-0.254	0.567	0.2	1	0.654	0.776
(6) Insurance	0.820	1.211	0.459	1	0.498	2.271
(9) Rural Poor	-0.240	0.201	1.425	1	0.233	0.787
Constant	-1.784	0.260	47.040	1	0.000	0.168 ***
Cox & Snell R Square	0.578					
Nagelkerke R Square	0.861					
Overall Percentage Correct	75.5					
Log likelihood χ^2	2,702.58					
Prob>χ^2	0.0000					
Observations	3,129					

Note: *** denotes significance at 1%. Source: Output from the analysis research data regression (Kenya).

The Coefficient *Own Phone (variable 2)* in Table 9 to is observed to be positive and significant at 1%, which indicates that a respondent who owned a phone was more likely to be financially included than a respondent who did not own a phone. The estimated OR for Own Phone was 2.856, which means a respondent who owned a phone was seen to be 2.856 times more likely to be financially included than a respondent who did not own a phone. Similar to Tanzania, these findings also support Ghosh (2016) which show the positive correlation between mobile phone penetration and financial inclusion throughout SSA. Similar to Tanzania, the regression data confirms that phone ownership is a key proxy for financial inclusion in Kenya.

The coefficient *Access MM (variable 8)* from Table 9 was seen to be positive and significant at 1%, which suggests that a respondent who had access to a mobile money account was more likely

to be financially included than a respondent who did not. Taking a look at the estimated OR for Access MM, the variable had a value of 2.407, which implies a respondent that had access to mobile money was 2.407 times more likely to be financially included than a respondent who did not have access. Similar to the above variable, this finding helps to confirm the idea that mobile money is a driver of financial inclusion in SSA. Additionally, they support many studies that have been previously discussed in this study. These findings help to conform Chu's (2018) work which suggested the key mobile financial inclusion factors are accessibility, availability, and affordability. The regression data helps to confirm the accessibility and availability factors leading to financial inclusion in Kenya. Lastly, the regression results also support Karpowicz (2014) who found in his study that the determinants of financial inclusion can be grouped into depth, efficiency, and access. The regression findings support Kapowicz's access category.

The coefficient *Age Group (variables 18 & 19)* from Table 9 was seen to be negative and significant at 1%, which suggests that young respondents (15-34) had a harder time becoming financially included compared to older respondents. The OR ratios for ages 15-24 and 24-34 had OR ratios of 0.118 and 0.475, respectively. This means that 15-24-year-olds were 88.2% (1 – 0.118) less likely to be financially included than an older respondent and 25–34-year olds were 52.5% (1 – 0.475) less likely. This is an area that needs to be investigated more, but the reason behind this could be due to the fact that financial services tend to cater to the wealthier demographic in Kenya. As younger people typically have lower amounts of wealth in comparison to adults, this could be a potential explanation. Additionally, younger people in Kenya may not have as much of a need for sending or receiving money, credit, insurance, or savings. These are merely theories, and more research is needed to get to the bottom of this issue.

The coefficient *Sent / Received (variables 3)* from Table 9 was seen to be insignificant at 1%, which shows that sending or receiving money through a mobile phone in the past week is not a proxy for financial inclusion in Kenya. There is limited work surrounding this finding, and more analysis is needed to better understand why sending or receiving frequency does not increase a respondent's likelihood of becoming financially included in Kenya. Perhaps it is because mobile money behavior is more advanced than other countries and users are relying on smartphones rather

than basic cell phones to complete transactions. However, these are merely speculations, and more work is needed on this topic.

The Coefficient *Saved (variable 4)* from Table 9 was observed to be insignificant at 1%, which shows that saving money through a mobile phone did not increase the likelihood of a respondent being financially included. This finding goes against the widely accepted fact that using savings is a core financial behavior one must do to be financially included. Additionally, this finding goes against Ouma et al. (2017), who found that mobile financial services significantly impacted the level of savings, showing that those who use mobile financial services are more likely to save than those who do not. In Kenya, saving through a mobile phone does not increase one's likelihood of being financially included and more work is needed to better understand savings behavior amongst Kenyans.

The coefficient *Credit (variable 5)* from Table 9 was seen to be insignificant at 1%, which shows that using mobile credit did not increase the likelihood of a respondent being financially included. As mentioned before, mobile credit is still in its infancy throughout Kenya and SSA in general. Additionally, using mobile credit is considered one of the most advanced financial behaviors a user can perform, and those who do use mobile credit are likely already financially included. As mobile credit adoption grows, this variable is likely to have a larger influence on financial inclusion in Kenya.

The coefficient *Insurance (variable 6)* from Table 9 was found to be insignificant at 1%, which shows that using mobile insurance products did not increase a respondent's chances of being financially included. Similar to mobile credit, mobile insurance is still very early in its life cycle. The users of mobile insurance are likely advanced users, which is most likely the reason why it was seen to have an insignificant impact on a user being financially included.

The coefficient *Rural Poor (variable 9)* from Table 9 was seen to be insignificant at 1%, which shows that being poor from a rural area did not have an impact on a respondent being financially included. There is limited work regarding this finding, but this could potentially be explained by the fact that much of Kenya's population is poor and live-in rural areas. This is a base line, and

this study confirms that being poor from a rural area has no impact on a respondent being financially included.

4.4 Comparison of Tanzania and Kenya

The results from the MVA logistic regressions for both countries provided several similarities and differences. The most important similarities were that owning a phone (variable 2), using mobile money (variable 16), and having access to mobile money (variable 8) were seen to increase respondent's chances of being financially included. These findings support the basis of this study and clearly show that mobile money has a positive effect on financial inclusion. Digging deeper into these results, phone ownership had a greater impact on increasing financial inclusion in Tanzania. If a respondent owned a phone, they were seen to be 12.382 times more likely to be financially included than a respondent who did not own a phone. On the other hand, phone ownership only increased a respondent's chances of being financially included by 2.856 times in Kenya.

Some of the main differences from the models were not anticipated. For one, poverty was seen to decrease a respondent's likelihood of being financially included by 35% in Tanzania, however it was seen to be insignificant in Kenya. Additionally, SMS frequency was seen to be increase a respondent's likelihood of being financially included by 1.382 times and the same variable was seen to be insignificant in Kenya. These two variables were anticipated to be similar across both countries when this study was designed, and the data clearly tells a different story.

Lastly, Kenya had more insignificant variables, which was not expected. These included saving (variable 4), credit (variable 5), poverty (variable 9), and SMS frequency (variable 3). Based on the literature review surrounding this topic, it was expected that these variables would have a more significant impact on financial inclusion. Some of these variables such as SMS frequency (variable 3) and poverty (variable 4) were seen to have more of an impact on financial inclusion in Tanzania. These insignificant variables show that there is more research to be done on what variables have an impact on financial inclusion in Kenya.

4.5 Conclusion

This chapter provided descriptive statistics and discussed MVA logistic regression models for both countries. Mobile money and phone ownership were proven to have an effect on financial inclusion in both countries but were seen to have a larger effect in Tanzania. Both models were significant, however Kenya's was seen to be a more accurate model in predicting respondent's financial inclusion. The findings in this chapter helped to confirm several recent and relevant studies, but also went against the current body of research as well. Lastly, this study provided several areas for future research such as rural gender disparities in financial inclusion, and it also suggested that perhaps it is time to redefine the criteria for financial inclusion amongst the younger age groups. The next chapter will be the final chapter and will provide conclusions and recommendations.

5. Chapter Five

Conclusions & Recommendations

5.1 Introduction

This chapter will serve to summarize all of the lessons learned on mobile money's effect on financial inclusion from the study and will provide recommendations on how to improve mobile money and increase financial inclusion in Tanzania and Kenya.

5.2 Summary of the Study

This study set out to examine how mobile money affects financial inclusion in Tanzania and Kenya. The study provided a literature review which highlighted the most recent and relevant work on the topic, and it made note of the current gaps in the body of research. This section also presented the study's theoretical framework which suggests mobile money: (i) improves access to credit and deposits; (ii) increases the efficiency of credit allocation; (iii) facilitates financial transfers.

Following the literature review section, the study set out to test mobile money's impact on financial inclusion in Tanzania and Kenya. To do this, MVA logistic regression modeling was chosen as the modeling technique to analyze the relationship in both countries. To investigate how mobile money effected financial inclusion, the study sourced data from Financial Inclusion Insights (FII) Tracker Survey data set from 2017. The data consisted of roughly 3,000 respondents in both Kenya and Tanzania. The sample population (respondents) were chosen using random sampling. From this data, twenty-two independent binary variables were chosen. Some of these related directly to mobile money, and others were control variables related to the topic. The dependent variable was financially included (1 = yes, 0 = no). SPSS MVA logistic regression models were run which outputted descriptive statistics as well.

5.3 Conclusions

Evidence from this study shows that phone ownership and using mobile money are two of the greatest factors that increase the likelihood of someone being financially included in Kenya and Tanzania. The MVA logistic regression models made it clear these variables have a positive influence on financial inclusion in both countries, but it was seen that they had a larger impact in Tanzania. If a respondent owned a phone in Tanzania, they were 12.382 times more likely to be financially included than a respondent who did not own a phone. Comparatively, owning a phone in Kenya only increased a respondent's chances of being financially included by 2.856 times. The same differences can be seen with the impact that mobile money usage had in both countries. In Tanzania it was shown that a respondent was 93% less likely to be financially included if they did not use mobile money. In Kenya, active mobile money use was deemed to have a minimal impact on increasing a respondent's chances of being financially included. However, accessing someone else's mobile account was seen to increase a respondent's chances of being financially included by 2.407 times, which still shows the important role mobile money plays on increasing financial inclusion in the country. These results clearly show that mobile money and phone ownership have a positive effect on financial inclusion on both countries.

Many of the findings in this study went against the current body of research. Most noteworthy, the data on gender disparities in rural financial inclusion were discovered to be the complete opposite of what many studies have stated to be true in SSA. The data clearly showed higher levels of financial inclusion amongst rural women compared to men in 2017. This finding highlighted a need for future gender specific studies on rural financial inclusion. Additionally, this study presented the idea that a new financially included criteria is needed for the younger population. The data from Kenya showed that respondents between the ages of 15 – 34 were at a disadvantage compared to the older population in becoming financially included. More work is needed in this area to determine if this is the case, or if young people are struggling to become financially included in Kenya.

5.4 Policy Recommendations

This study clearly showed that mobile money has a positive impact on financial inclusion in both Tanzania and Kenya. Therefore, both countries need to continue to work on improving phone ownership (variable 2), mobile money use (variable 16), and mobile money access (variable 8). These three variables were seen to have a positive impact on financial inclusion, and policy should be focused on improving these three variables in both countries. Most importantly, policy makers in both countries need to ensure that mobile money innovation is not hindered by over regulation. In the future mobile money products will become more advanced and both countries need to make sure that regulation keeps up with innovation to ensure that mobile money use and access are not constrained. A great lesson for policy makers to keep in mind in the future is how in the beginning of M-Pesa's rapid growth, the Kenyan government worked closely with the private and public sectors to make sure government policy was not getting in the way of its citizens becoming financially included. As mobile money continues to evolve, policy makers must ensure that regulation does not hinder mobile phone ownership, mobile money access or mobile money use.

This study also highlighted a need for both countries to revamp how they look at financial inclusion amongst the younger population (ages 15-34). It was seen in Kenya that the young age groups (variables 18 & 19) had lower levels of financial inclusion in comparison to the older age groups. As mentioned previously, this could be attributable to financial services catering towards the wealthy in Kenya or younger people having lower levels of wealth in comparison to older respondents. Regardless, many younger people get categorized as "not financially included" in Kenya when in reality they could be in a great spot financially given their age. Policy makers in both countries can learn from this finding and recognize that it doesn't make sense to compare an 18-year-old high school student to a middle-aged adult. Lawmakers need to learn more about what it means to be financially included in each age group and then create policy that is tailored to each age groups financial inclusion challenges.

5.5 Avenues for the Future

For how vital of a topic mobile money and financial inclusion is, the research in the space is lacking. Take for example the Financial Inclusion Insights (FII) tracker which this study got all of its data from. This survey has not been conducted in any SSA country since 2017. It is incredibly challenging to get an idea of what is hindering mobile money's effect on financial inclusion without getting consistent yearly survey data from citizens. Consistent data collection throughout SSA is needed for any research in the future.

As mentioned before, more work is needed on gender disparities in rural financial inclusion. Digital financial services have changed how women access financial products, and the current body of research is lacking in this area. There is a great deal of room for more studies to be conducted using in-person surveys. This is the best way to get on-the-ground information on how women and men are accessing financial products, and it can help the public and private sector learn how to better meet those needs.

After analyzing the Financial Inclusion Insights (FII) tracker respondent results over several years, it is evident that the mobile money products and services still do not meet the needs of the overall population in both countries. This is arguably the most important avenue for future study. Tanzania has a larger percentage of people living below the $2.50 per day benchmark than Kenya, but both countries are predominately rural and poor. Consistently, respondents in both countries cited not having enough money to use mobile money products and the available products did not meet their needs. Many of the products were seen to be tailored to the wealthier demographic in both countries, which makes up a small portion of the populations. In both countries there is a high level of phone ownership, and an overall readiness to adopt mobile money products and increase financial inclusion. The private, educational, and public sector need to devote many more resources to finding a way to offer useful and affordable mobile money products to the majority of the population. Until then, financial inclusion will remain a significant issue in both countries, more so in Tanzania.

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