

Mobile Money and Financial Inclusion: Evidence from Lesotho

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ABSTRACT

This study seeks to examine the relationship between mobile money and financial inclusion in Lesotho in order to assess the viability of mobile money as a tool for advancing Lesotho's financial inclusion agenda. The study uses a number of deposit bank accounts as a proxy for financial inclusion (FI) and a dependent variable in three vector autoregression (VAR) bivariate models. Each of the three mobile money variables; number of mobile money registered accounts (MMC), number of agents (MMA) and volumes of mobile money transactions (MMT) are regressed against financial inclusion to investigate the relationship with each.

The results indicate that among the three proxies of mobile money, only two have a relationship with financial inclusion: MMC and MMT. MMA does not show any relationship with financial inclusion. The relationship between FI and MMT is one-way from FI to MMT, which is not important for the purpose of this study. The MMC relationship with FI is the opposite of that of MMT and FI. There is a positive causal relationship from MMC to FI, indicating the positive influence of mobile money accounts of financial inclusion. The paper recommends that the government of Lesotho creates an enabling regulatory environment that supports the adoption and growth of mobile money in order to improve financial inclusion.

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ABBREVIATIONS

ADF:	Augmented Dickey Fuller
AFI:	Alliance for Financial Inclusion
ARDL:	Autoregressive Distributed Lag
ATMs:	Automated Teller Machines
CBL:	Central Bank of Lesotho
DOI:	Diffusion of Innovations
ETL:	Econet Telecom Lesotho
FI:	Financial Inclusion
FNBL:	First National Bank Lesotho
FSDS:	Financial Sector Development Strategy
GDP:	Gross Domestic Product
GoL:	Government of Lesotho
GPFI:	Global Partnership for Financial Inclusion
IRF:	Impulse Response Function
KPSS:	Kwiatkowski–Phillips–Schmidt–Shin
LPB:	Lesotho Post Bank
MAP:	Making Access Possible
MNOs:	Mobile Network Operators
MoFD:	Ministry of Finance and Development
NFIS:	National Financial Inclusion Strategy
NSDP:	National Strategic Development Plan
PIN:	Personal Identification Number
POS:	Point of Sale
PP:	Philips-Perron
SACCOs:	Savings and Credit Cooperatives
SADC:	Southern African Development Community
SLB:	Standard Lesotho Bank
SSA:	Sub-Saharan Africa
VAR:	Vector Autoregression
VCL:	Vodacom Lesotho
VDF:	Variance Decomposition Function

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“Together we made it; we made it even though we had our backs up against the wall!”

CHAPTER 1

INTRODUCTION

1.1 Background

Broadly speaking, financial inclusion entails the provision of accessible financial services at affordable costs to all members of society (Dasgupta, 2009). Financial inclusion aims to reduce financial exclusion, the opposite of financial inclusion. Barriers to financial inclusion include physical presence and, therefore, accessibility of financial institutions, costs of participating in the formal financial sector, the suitability of offered solutions and account opening documents and procedures (Munyegera & Matsumoto, 2018; Naidoo, 2014; Chikalipah, 2017).

Due to the high costs of running a financial institution and the profit objective, financial institutions tend to operate in populated urban areas where there is a sizeable profitable client base to serve. This results in rural people incurring high transport costs to access financial services, a deterrent, in addition to high costs of maintaining a bank account. For instance, in Lesotho, 38 percent of the adult population is banked. In rural areas, only 29.5 percent are banked compared to 57.9 percent in urban areas (Naidoo, 2014). The long distance to financial service providers imposes a high time and transportation cost on the rural users, along with the associated risk of physical cash movement by remittance senders, recipients, and agents such as taxi and bus drivers (Munyegera & Matsumoto, 2018).

Financial inclusion seeks to improve participation in financial services through exploring more accessible, affordable customer-centric alternatives that meet the needs of the underserved. Mobile phones, which, according to Baer, Bounfour, and Housel (2018), are "radically transforming micro-finance in Sub-Saharan Africa," are proving to be instrumental in boosting financial inclusion in Africa. According to the World Bank (2017), Sub-Saharan Africa has the highest mobile money penetration at 21 percent of the adult population in 2017, almost twice the adoption rate in 2014. Kenya is the leader in mobile money, with 73 percent account ownership.

1.1.1 Financial inclusion in Lesotho

Lesotho's financial services sector is dominated by insurance brokers, which make up 54 percent of the 87 licensed financial institutions in Lesotho. There are only four licensed commercial banks Standard Lesotho Bank (SLB), Nedbank Lesotho, First National Bank Lesotho (FNBL) and state-owned Lesotho Postbank (LPB) which has a financial inclusion mandate (Central Bank of Lesotho, 2019). The four licensed commercial banks that make up the banking sector form the most significant part of the financial services sector as the primary distributor of financial services products. Three of these banks, FNB, Nedbank, and SLB are subsidiaries of South African banks. In terms of the bank size as measured by the loan book and customer base, SLB is the largest commercial bank in Lesotho (Sekantsi & Motelle, 2016). These commercial banks provide access to financial services through branch networks and electronic channels such as automated teller machines (ATMs), point of sale terminals (POS), internet banking, and mobile banking.

FNBL launched an additional new channel dubbed Cash Plus Lai Lai in March 2019, intended to foster financial inclusion and bring banking services to the consumers across the country. Lai lai is a mobile banking facility through which FNBL provides withdrawal and deposit services to the consumers using lai lai agents as an alternative service channel. These agents are the bank's cash-heavy clients with high frequency of cash deposits. When a customer deposits or withdraws cash from an agent, the agent's bank account is updated to reflect the transaction. This benefits the agents by reducing the the frequency of traditional cash deposits, saving the agents bank charges. The agents are also paid commissions on their lai lai services. The consumers benefit through increased access to bank cash deposits and withdrawal facilities without visiting the bank branches or ATMs, which are not easily accessible in the rural areas, as Lesotho's banking infrastructure is highly concentrated in the lowlands (Koeshe, 2019). LPB also launched Khetsi in 2019, a mobile banking service with the features of mobile network operator mobile money instead of traditional mobile banking. One does not need to have a bank account to use Khetsi. Its facilities include deposits, withdrawals, money transfers, savings, microloans, and bill payments.

In addition to licensed financial institutions, there are other financial services providers such as formal moneylenders, mobile network operators through mobile money, Shoprite cross-border

money remittance, and savings and credit cooperatives (SACCOs) including Boliba Multipurpose Cooperative, a large financial cooperative.

According to the Lesotho FinScope survey (2011), 81 percent of the adult population is financially included, which is significantly higher than in other countries where FinScope has surveyed. For instance, the Eswatini FinScope (2011), survey recorded 62.5 percent financial inclusion, the Malawi FinScope (2014) survey recorded 51 percent financial inclusion and the Mozambique FinScope (2014) survey reported 39.6 percent financial inclusion. The main driver behind the high level of financial inclusion in Lesotho is the use of insurance funeral cover. Many households with funeral covers do not have bank accounts and do not access banking financial services such as savings, loans and money transfers and payments. Hence, the FinScope survey reported only 38 percent of bank account ownership. According to the Global Findex Database (2017), the account ownership percentage has increased from 38 percent reported by 2011 FinScope survey to 46 percent in 2017.

Financial inclusion in Lesotho is a key policy objective and forms part of the (2012) National Strategic Development Plan (NSDP). The Government of Lesotho (GoL) is committed to continuing to grow and support policies that promote financial inclusion in Lesotho and recognizes financial inclusion as one of the means to poverty alleviation. The commitment to the course is evidenced by the dedicated Inclusive Finance Strategy of Lesotho (2012), driven by the Ministry of Finance and Development (MoFD). The strategy aimed to expand access to credit, savings, and other financial products with the end goal of employment creation, poverty alleviation, improved access to health and education, and reduced risks and vulnerability for the financially excluded population.

The Government continues to make strides to promote financial inclusion, leveraging on the partnerships, and loping in the private sector. In partnership with the Central Bank of Lesotho (CBL), Fin Mark Trust, and the UNDP, the Ministry of Finance has marked 29 November as a financial inclusion day, as a way of emphasising the importance of financial inclusion in the ministry agenda.

1.1.2 Mobile money in Lesotho

Bank-led mobile banking

The difference between mobile money and mobile banking is that for mobile banking, the transaction involves the user and the bank. In contrast, with mobile money, the transactions are between the user and the merchant or third party but without a bank. To initiate a mobile banking transaction, a person should have a bank account (Upadhyay & Jahanyan, 2016). All four licensed commercial banks in Lesotho have mobile banking facilities. Mobile banking allows users to perform transactions such as transfers between accounts, pay bills, to buy airtime, and to check balances on their phones. Mobile banking services for two of the four banks, SLB and FNB Lesotho, have an additional facility that allows users to send money from their bank accounts to third parties. The recipients do not need to have bank accounts. Money is sent to the recipient's mobile phone number, and the recipient then withdraws money using a mobile phone number and a PIN. The SLB facility is called instant money; FNB has an e-wallet. These allow people who are financially excluded from accessing financial services through their mobile phones with no need for a bank account.

Lesotho Post Bank (LPB) launched a mobile banking service with the features of mobile network operator mobile money instead of the traditional mobile banking, named Khetsi. One does not need to have a bank account to own Khetsi. Deposits are made directly to the Khetsi wallet at LPB branches and Khetsi agents. LPB has 16 branches and 35 Khetsi agents in the country. Users can withdraw from Khetsi, send money to registered Khetsi users, buy airtime, pay bills, pay school fees, pay merchants, save individually and as groups, and access Nano loans. LPB introduced this service to improve financial inclusion in Lesotho (Lesotho Post Bank, 2019)

Mobile Network Operator-led mobile money

In countries that have a large unbanked population and a high presence of telecommunication companies (telecoms), there may be a significant role for mobile money to help facilitate financial inclusion (Llewellyn-Jones, 2016). Lesotho has two Mobile Network Operators, Econet Telecom Lesotho (ETL), a subsidiary of Econet Wireless Global, and Vodacom Lesotho (VCL), a subsidiary of Vodacom South Africa. ETL offers mobile money services through its product called Ecocash Sepache-Fono. Ecocash has 278 agents where customers can deposit and withdraw money, and 44 merchants that accept Ecocash as a form of payment. Ecocash allows registered users to send and receive money, save money, buy airtime, pay bills, pay

school fees, pay merchants, pay insurance premiums, pay salaries, and receive money from other countries. Only Econet subscribers can register for Ecocash, and registration is a self-service process using a mobile phone (Econet Telecom Lesotho, 2019).

VCL offers M-Pesa, a mobile money product that originates from Kenya Safaricom (Burns, 2018). M-Pesa is a mobile money service that offers similar services as Ecocash. Users can deposit money into their M-Pesa account and withdraw from the accounts at M-Pesa agents across the country. M-Pesa allows users to send and receive money, save money, receive cross border remittances, pay school fees, pay bills, buy event tickets, buy airtime, pay merchants, and pay salaries.

1.2 Problem statement

According to Maliehe (2018) on the study of demand for mobile money among the rural and low-income population in Lesotho, many people in Lesotho, especially the poor and people in rural areas where it is not commercially viable to open bank branches, are financially excluded. Financial inclusion barriers common in other developing countries are also present in Lesotho. The barriers include the physical presence, which affects accessibility, affordability, inappropriate product design, and account opening documents and procedures (Munyegera & Matsumoto, 2018; Naidoo, 2014; Chikalipah, 2017). The government of Lesotho has prioritized financial inclusion as one of the means through which it can alleviate poverty, anchoring it in the National Strategic Development Plan (NSDP) and Financial Sector Development Strategy (FSDS). Mobile money is one of the tools the government has identified as pivotal in driving financial inclusion in Lesotho (Central Bank of Lesotho, 2018). To assess the progress made towards enhancing financial inclusion through the development of mobile money in Lesotho, it is essential to quantify the effect mobile money has on financial inclusion in order to guide policy development in addressing financial exclusion.

This study seeks to address the following question:

- How effective is mobile money in driving financial inclusion?

1.3 Research Objectives

The primary objective of the research is to assess the role played by mobile money in expanding financial inclusion in Lesotho in line with the Government's key policy to achieve healthy financial inclusion and access in Lesotho.

The study has the following sub-objective:

- To examine the effect of mobile money on financial inclusion in Lesotho;

1.4 Justification of study

Financial inclusion is a key policy objective for the Lesotho Government. While Lesotho is one of the highest financially included countries in Sub-Saharan Africa, the level of inclusion is limited as only 38 percent of the adult population own a bank account, and 81 percent inclusion is mostly through insurance cover and informal financial systems, some of which are exploitative and do not favour the consumer (Ask Afrika, 2011). Barriers to owning a conventional bank account and the need to increase participation in the financial system and reduce social inequalities associated with financial exclusion call for a study on the role mobile money can play in advancing the financial inclusion objective. The existing studies of the relationship between mobile money and financial inclusion in Lesotho do not show the impulse response of financial inclusion rate to the shocks on mobile money variables. The aim of this study is to close that gap. Furthermore, the study uses variance decomposition function to investigate the percentage of financial inclusion forecast error variance that is influenced by financial inclusion itself, and that influenced by mobile money.

1.5 Organization of study

The paper is organized as follows: Chapter 1 gives a brief introduction and background of the study. Chapter 2 covers the literature review on financial inclusion and mobile money. Chapter 3 entails research methodology and design aimed at answering research questions and achieve research objectives. Chapter 4 covers the research results and analysis, and Chapter 5 concludes the paper and makes recommendations.

CHAPTER 2

LITERATURE REVIEW

2.1 Introduction

This section reviews the existing literature on financial inclusion and its relationship with mobile money in developing countries. As mentioned in the introduction, the evolution of mobile money in developing countries has seen previously financially excluded members of the society participating in formal financial systems.

2.2 Theoretical framework

This study is based on Rogers' (1982) Diffusion of Innovations (DOI) theory, used as a theory that explains the adoption of mobile money as a means of financial inclusion.

2.2.1 Diffusion of Innovations Theory

Rogers' (1982) Diffusion of Innovations (DOI) theory explains how a new idea, technology, or product gains momentum and spreads through a group of people or social systems. Rogers(1982) defines diffusion as 'the process by which an innovation is communicated through certain channels over time among the members of a social system', and defines innovation as 'an idea, practice, or object that is perceived as new by an individual or other unit of adoption' (Rogers, 1982). This theory provides a framework through which the use of mobile money as a tool for advancing financial inclusion over time is studied.

2.2.1.1 Diffusion of Innovations and Mobile Money

The DOI theory postulates that the rate of diffusion of innovation depends on the relative advantage, compatibility, complexity, observability, and trialability of innovation (Rogers, 1982). Characteristics of mobile money are discussed below within this scope of diffusion of innovation and how they influence mobile money adoption.

Relative advantage

Rogers (1982) defines the relative advantage as 'the degree to which an innovation is perceived as being better than the idea it supersedes'. According to Rogers (1982), the relative advantage of an innovation, economically or socially, determines the innovation's rate of adoption. Economic relative advantage can be determined by the innovation's ability to provide similar

service as its predecessors at a relatively lower cost. This is the case with mobile money. Fanta, Mutsonziwa, and others (2016a) studied the role of mobile money and financial inclusion in the Southern African Development Community (SADC) area using FinScope surveys. They reported lower cost of mobile money as the second reason for using mobile money. The convenience of mobile money is reported as the leading reason for mobile money usage. Tobbin (2012) suggests that mobile money has to be affordable and convenient to be useful in advancing financial inclusion. Affordability and convenience of mobile provide users with a relative advantage over traditional banking.

Compatibility

‘Compatibility is the degree to which an innovation is perceived as consistent with the existing values, past experiences, and needs of potential adopters’ existing values, past experiences, and needs of potential adopters’ (Rogers, 1982). Rogers suggests that the rate of adoption of an innovation is influenced by the compatibility of the innovation with the believes and values of the society, existing innovations, and the need for that particular innovation. Wamuyu’s(2014) study supports Rogers’ theory. In the study conducted in Kenya, Wamuyu gathered from users of mobile money that mobile money is compatible with their needs to minimise the risk of handling cash. The users also reported that mobile money allows them to send money home in rural areas where there are is no access to banking services, a practice common in their culture.

Complexity

Rogers (1982) suggests the existence of a negative relationship between the complexity of innovation and its rate of adoption. This means that for innovation to be widely adopted, it should be easy to use. According to Rogers (1982), complexity is ‘the degree to which an innovation is perceived as relatively difficult to understand and use’. Johnson, Kiser, and others (2018) suggest that mobile money should be as easy to use as the existing alternative means of payment or easier to drive the adoption. They emphasize that the complexity of the service can be a barrier to adoption.

Trialability

The trialability of innovation reduces its uncertainty to the user and increases the innovation's rate of adoption. A product or an idea is trialable if users can test it in parts, with ease (Rogers, 1982). However, Akturan and Tezcan (2015) found that trialability as a characteristic of innovation does not affect the rate of adoption of mobile banking. The authors suggest that the

banks should focus less on trialability of mobile banking and put more effort into communicating relative advantage and compatibility of mobile banking to potential users.

Observability

Innovation is observable if others can see its results. Innovation diffuses faster if its results are observable (Rogers, 1982). Wamuyu (2014) found that users of mobile money in Kenya observed its usefulness when they successfully sent money to their relatives. From that, they became more confident in mobile money innovation and used mobile money for other types of financial transactions.

There is a clear link between mobile money adoption and diffusion of innovation theory. The characteristics of innovation, as stated by Rogers (1982), have a direct impact on the rate of adoption of mobile money.

2.3 Financial Inclusion

Financial inclusion is defined in many ways, but the common theme in definitions is the inclusion of the poor and underserved members of the community in a formal financial system. Financial inclusion is the opposite of financial exclusion, which Varghese and Viswanathan (2018) define as a lack of access to basic, affordable financial products and services by certain consumers. According to Vijayvargy and Bakhshi(2018) and Menon(2019), financial inclusion is about ensuring equitable access to suitable financial products and services that extend beyond banking products by all members of the society without discrimination, at affordable costs. Sarma and Pais(2011) add that in addition to access, there should be availability and usage of financial system products and services for a financial system to be inclusive.

Menon (2019) identifies indicators of financial inclusion as ownership of a formal account, savings with a formal financial institution, and the usage of formal credit, and suggests that access to insurance and equity products is equally important in achieving a financially inclusive environment. The Global Findex database (2017) defines account ownership as: *"having an individual or jointly owned account either at a financial institution or through a mobile money provider. The first category includes accounts at a bank or another type of formal, regulated financial institution, such as a credit union, a cooperative, or a microfinance institution. The*

second consists of mobile phone-based services, not linked to a financial institution, that are used to pay bills or to send or receive money”.

The popularity of financial inclusion dates back to the early 2000s when the existence of the relationship between financial exclusion and poverty was determined, and financial inclusion was recognised as a tool that can break a circle of poverty. In 2002, the Heads of States and Governments adopted The Monterrey Consensus at the International Conference on Financing for Development. In the consensus, they recognised access to credit and savings as “important for enhancing the social and economic impact of the financial sector” (United Nations, 2002). In September 2005, at the World Summit, the world leaders recognized the importance of financial inclusion, particularly for the poor, in achieving the internationally agreed development goals (United Nations, 2005). Financial inclusion is now a policy priority in many countries, recognized as a vital instrument to accelerate inclusive growth by including the previously excluded population in the financial system (Lokhande, 2011), (Varghese & Viswanathan, 2018). According to the United Nations (2006), the main goals of financial inclusion are: access to affordable financial services for all, well-regulated and managed institutions, sustainable financial systems, and a large number of financial service providers to increase consumers' choice.

The level of financial inclusion differs significantly between developed and developing countries, with developed countries generally being more financially included. According to Demirgüç-Kunt et al. (2017), globally, 69 percent of adults own an account at a financial institution or through a mobile money provider. Of the 69 percent, 64 percent own an account at a financial institution, 3 percent own both an account with a financial institution and mobile money, and 1percent own a mobile money account only. In developed countries, account ownership is at 94 percent, while in developing economies, ownership is at 63 percent, with Sub-Saharan Africa recording 43 percent account ownership (Demirgüç-Kunt et al., 2017).

In line with the recognition of financial inclusion as one of the main pillars of the global development agenda, the Alliance for Financial Inclusion (AFI), founded in 2008 to advance financial inclusion for the most impoverished population, was nominated as one of the implementing partners for the Global Partnership for Financial Inclusion (GPII). GPII is an inclusive platform for implementing the G20 financial inclusion agenda, launched at the G20

Summit in Seoul in 2010. It is open for G20 and non-G20 members and other interested stakeholders (GPFI, 2011).

At the country level, many countries around the world have various initiatives aimed at advancing financial inclusion. For instance, Eswatini, which is a member of AFI since 2013, has a National Financial Inclusion Strategy (NFIS) running from 2017-2022. The strategy is aimed at addressing major access barriers to financial services and transforming the local financial system to suit the needs of the country population (Ministry of Finance, 2017). The financial inclusion of the formally served population in Eswatini has grown from 50 percent in 2011 to 85 percent in 2018. Non-bank formal inclusion constitutes 33 percent of the reported inclusion in 2018, driven mainly by mobile money. Mobile money trust accounts held with banks in Eswatini reported a balance of USD10.4 million in 2018 (FinMark Trust, 2019).

Botswana has collaborated with Making Access Possible (MAP), a ‘multi-country initiative’ that supports the advancement of financial inclusion, to build Botswana Financial Inclusion Roadmap and Strategy 2015 - 2021. FinMark Trust & MAP Botswana (2015) states that the country's financial inclusion goal is to “Improve household welfare, increase economic efficiency and support growth by reducing the percentage of adults who are excluded from 24 percent to 12 percent, and increasing those with access to more than one formal financial product from 46 percent to 57 percent by 2021”. The roadmap and strategy have priority areas to work on to achieve the inclusion goal. These priorities focus on reducing the cost of savings and insurance and improving the financial ecosystem and making it more accessible (FinMark Trust & MAP Botswana, 2015).

Tanzania is on the second financial inclusion framework, the National Financial Framework 2018-2022, implemented through the Financial Inclusion National Council. The first framework achieved a 7 percent uplift on financial inclusion from 58 percent in 2013 to 65 percent in 2017. The second framework is building on the lessons from the first framework and plans to create jobs through financial inclusion (Tanzania National Council for Financial Inclusion, 2017). In Egypt, financial inclusion is the national priority identified as instrumental in achieving sustainable and inclusive development (Government of Egypt, 2015). According to Demirgüç-Kunt and others (2017), Egypt is a cash-based economy with only 33 percent formal account ownership among adults.

2.3.1 Determinants of financial inclusion

At the core, financial inclusion is about ensuring equitable access to suitable financial products and services that extend beyond banking products by all members of the society without discrimination, at affordable costs (Vijayvargy & Bakhshi, 2018; Menon, 2019). Financial inclusion can be measured through access to financial services, barriers to financial services, and usage of financial services (Cámara & Tuesta, 2017). Sarma (2008) proposes variables to include in the comprehensive measurement of financial inclusion, termed Index of Financial Inclusion (IFI), a more encompassing index that looks at several variables together instead of just one. This proposal was motivated by measures of financial inclusion that produce different and opposing indices that differ depending on the variable used as a measure. Measures such as the number of accounts per 1000 adults, number of branches per 100 000 adults and domestic credit as a percentage of gross domestic product (GDP) all yield different rankings when they are used individually to rank countries on financial inclusion. To address this, Sarma proposes the index that comprises three dimensions of banking penetration, which uses accounts ownership, availability that considers access to banking contact points, and usage, which measures deposit and credit.

According to Chikalipah (2017), literacy is one of the critical determinants of financial inclusion in SSA. Chikalipah (2017) posits that low literacy levels in SSA deter people from using financial institution services for lack of knowledge or perception that the services are for the educated. The author suggests that financial institutions should provide services with both English and local languages to cater for people who do not understand English. Governments should also drive literacy programmes to improve literacy levels and reduce barriers to financial inclusion. Adetunji and David-West (2019) concur, suggesting the existence of the relationship between saving patterns and literacy and recommending government intervention to address improve financial literacy as a means to drive the financial inclusion agenda.

Wale and Makina (2017) assert that lack of financial literacy and lower education levels, in general, affect the level of trust in financial institutions among the uneducated, which becomes one of the barriers to financial inclusion. This contradicts with Fungáčová and Weill's (2014) findings on their study of determinants of financial inclusion in China, which found that it is more educated people who tend to have trust concerns with the banking system. Despite the trust concerns suggested by Fungáčová and Weill, bank account ownership and formal saving

tend to be higher among the educated than the uneducated. In uneducated families, bank account tends to be owned by one person and used by other family members. Income level also determines financial inclusion. Poorer people use informal savings and credit than the formal, and often borrow for medical purposes, while wealthier and educated people borrow more for property and investments, and save in formal financial systems.

Gender also determines financial inclusion, especially in Africa, where, in more impoverished families, only a man in the family owns a bank account, and women save and borrow informally. This behavioural pattern is attributable to financial inclusion barriers such as documentation required to open a bank account, costs of owning the account, distance travelled to access banking facilities, especially in the rural areas, lack of knowledge and understanding of the financial products and non-availability of suitable products for the financially excluded (Zins & Weill, 2016; Naidoo, 2014; Chikalipah, 2017).

Bozkurt, Karakus, and Yildiz (2018) summarize these determinants of financial inclusion by classifying them into three major categories of social factors, banking factors, and political factors. According to the authors, social factors such as education levels, rate of unemployment, income distribution, and gender equality influence the country's level of financial inclusion of the citizens. Deposit interest rates are also crucial in influencing the level of savings with banks. Higher deposit rates attract more savings into the financial system and improve the financial inclusion index. The authors further emphasize the importance of political stability as a determinant of financial inclusion. Political instability discourages potential savers from saving their money with the banks in fear of potential losses.

2.3.2 Benefits of Financial Inclusion

Financial inclusion benefits both the disadvantaged individuals and national economies at large. According to Zins and Weill (2016), financially included individual owns an account at a formal financial institution, which allows them to use payment services, contract insurance, borrow and save formally. This alleviates poverty for the previously excluded and improves national economic development. In their study of financial development and economic growth, De Gregorio and Guidotti (1995) found that financial development, which financial inclusion aims to achieve, leads to economic growth that varies across countries and over time. Financial

inclusion reduces the growth of predatory informal lending and reduces the cost of capital by improving the efficiency of the allocation of productive resources (Sarma & Pais, 2011).

Electronic transacting and audit trail associated with financial inclusion improve transparency, with the potential to reduce corruption. For instance, India observed a reduction of 47 percent (2.8 percentage points) in untraceable losses on pension payment funds after switching from cash to electronic payments. A large number of savers as a financial system becomes more inclusive reduces bank dependence on wholesale funding and increases the size and stability of the bank deposit book, improving deposit stickiness and reducing volatility during a financial crisis (Demirgüç-Kunt et al., 2017; Yoshino & Morgan, 2018). The ability to save with formal financial institutions also enables individuals to improve management of personal finances and smooth consumption, saving more during periods of high income and using savings on low days (Demirgüç-Kunt & Klapper, 2013).

2.4 Mobile Money

The adoption of mobile money thrives on the penetration of mobile phone ownership. According to Chauhan (2015), the affordability of mobile phones has made them accessible to more segments of the population, including the poor people, which has led to other developmental innovations that address poverty and exclusion, such as mobile money. GSMA (2018) reports that in 2017, there were 5 billion mobile subscribers globally, achieving a global subscriber penetration rate of 66 percent. This penetration compared against penetration rate of 85 percent in Europe and 44 percent in Sub-Saharan Africa (SSA).

Despite higher mobile phone ownership in developed countries, the share of mobile money accounts is quite low when compared to the share of developing economies. For instance, 45.6 percent of the 866 million registered mobile money customers reported in 2018 are in Sub-Saharan Africa, while the share of Europe and Central Asia is only 1.4 percent (GSMA, 2019). This is consistent with Fanta, Mutsonziwa and others' (2016b) assertion that mobile money adoption is lower in developed countries where bank account ownership is high, backed by Demirgüç-Kunt and others (2017), who reported 94 percent account ownership in developed countries, compared to 63 percent in developing economies. The definition of mobile money

used for this study is adopted from Demirgüç-Kunt and others (2015), limiting mobile money to “services that can be used without an account at a financial institution.”

According to Aker and Mbiti (2010), mobile money has emerged in many developing countries since 2005 and usually has capabilities to transmit airtime, pay bills, and transfer money between individuals. Mobile money ecosystems continue to grow and now offer other financial services such as savings and credit. To date, there are 272 mobile money deployments in 90 countries, with 866 million registered customers (GSMA, 2019). The popularity of mobile money in Africa is mostly attributed to M-Pesa, the leading mobile money system that started in Kenya in 2007, launched by Safaricom (Burns, 2018). Through mobile money, Kenya is one of the most financially included countries among developing economies, with 82 percent account ownership (Demirgüç-Kunt et al., 2017). According to *The Economist*(2015), around 25 percent of Kenya's gross national product flows through M-Pesa, and more than two-thirds of the adult population use it.

2.5 Empirical Literature: Mobile Money and Financial Inclusion

The last five years have seen growth in literature on mobile money and financial inclusion, with most studies focusing on M-Pesa success in Kenya. Cobla and Osei-Assibey (2018) and Llewellyn-Jones (2016) posit that penetration of mobile money has driven financial inclusion of the unbanked in Sub-Saharan Africa, to which Tobbin (2012) concurs, and further adds that mobile money has to be affordable and convenient to be useful in advancing financial inclusion. According to Tobbin(2011), the key objective of mobile money is "bringing financial services to the unbanked". In the study of the mobile money ecosystem using Kenya based mobile money, M-Pesa by Safaricom, as a case study, Tobbin posits that the ecosystem of mobile money is made up of various stakeholders, whom all have roles to play to advance mobile money adoption. The key players are consumers, mobile network operators (MNOs), partner banks, agents, merchants, regulators, and competitors. He suggests that the players should understand their roles, individually and as part of the ecosystem, to achieve mobile money efficiencies.

Among the key players, Burns (2018) singles the regulator as the most pivotal, arguing that the successful penetration of mobile money largely depends on the enabling regulatory

environment. Burns studied the prevailing country-specific dynamics at the time of mobile money launch in Kenya and in Nigeria to investigate why mobile money is a huge success in Kenya and a failure in Nigeria. Successful adoption of mobile money in Kenya has driven the country's financial inclusion to one of the best in the SSA, achieving account ownership of 82percent among the adult population. In contrast, account ownership in Nigeria is less than half of the account ownership in Kenya at 40 percent(Demirgüç-Kunt et al., 2017).

According to Burns (2018), just as in Kenya, Nigeria had a dominant telecom provider, high urban population density, a substantial market for financial remittance, and deep mobile phone penetration. The key difference was the regulatory environment. In Kenya, mobile money deployment was market-led, and the government embraced the laissez-faire regulatory approach, providing an enabling environment that allowed mobile money to grow with speed. Nigeria, on the other hand, put in place strict regulations on mobile money, hindering both service providers and consumers from participating in the service with ease. Donovan (2012) emphasizes that while the regulatory environment should be enabling, it should protect the interests of the consumers. Zimbabwe is one of the countries that have created an enabling regulatory environment by relaxing Know Your Customer (KYC) requirements on mobile money, lowering barriers for the financially excluded to participate. To protect the consumers, the policy stipulates that money in mobile money trust accounts should always be equal to or greater than mobile money in circulation. The adoption of mobile money in Zimbabwe has thus been successful (Bara, 2013).

While Burns (2018) focuses more on country dynamics, Peruta (2018) and Heyer and Mas (2009) investigate broader determinants of mobile money adoption. According to Peruta (2018), the adoption of Mobile money depends on the country's banking infrastructure, relatively inclusive banking system, financial education, awareness of mobile money services, and general knowledge and experience of financial services. Peruta's assertion is substantiated by generally lower mobile money adoption in countries with a low-banked population. The need for the banking infrastructure brings about the question of the viability of mobile money in bringing the poorest of the poor who are excluded by the traditional banking into the financial system. Donovan (2012) suggests that these people are least likely to benefit from mobile money due to lack of access to mobile phones, inability to afford transaction costs, and lack of financial knowledge or knowledge to use mobile money technology.

Heyer and Mas (2009) further unpack the environmental factors influencing the adoption of mobile money and conclude that both demand and supply factors are critical for successful adoption. For service providers, mobile money services provision should yield financial returns. For consumers, the services should be provided at affordable costs for the poor to participate. The authors suggest that large transaction volumes are critical to achieving financial returns for investors at low costs for consumers. The high cost of owning a bank account is one of the key barriers to financial inclusion that mobile money aims to address. Other barriers to financial inclusion are illiteracy, accessibility of bank branches, inappropriate product design and account opening documents and procedures (Chikalipah, 2017; Munyegera & Matsumoto, 2018; Naidoo, 2014; Chikalipah, 2017).

Adaba, Ayoung, and Abbott (2019) analyse the contribution of mobile money to development and wellbeing using data from the Upper East Region located in the Northeast of Ghana, the area significantly financially excluded (Aker & Wilson, 2013). The study was constructed through structured interviews using representatives from mobile money users, agents, and MTN, the MNO. The study found the increasing adoption of mobile money in the region, giving the poor access to financial services. The authors postulate that the findings suggest that governments can use mobile money to achieve financial inclusion goals by creating an enabling environment that supports the growth of mobile money. The enabling environment should be complemented with a secure infrastructure that minimizes fraud and enhances user trust of mobile money services, especially among the poor who have little or no knowledge of financial systems (Chauhan, 2015).

Evans (2018) studied the relationship between mobile phones, internet, and financial inclusion across 44 African countries and found a positive relationship between mobile phones, internet, and financial inclusion, meaning that diffusion of mobile phone innovation and increasing internet usage increase financial inclusion. The study factored in macroeconomic factors, which also showed a positive relationship with financial inclusion except for interest rate and regulatory quality, which reported a negative relationship. Evans suggests that financial inclusion policies should focus on diffusing mobile phones across the continent. The author further suggests the use of mobile phones to address physical access and transaction costs barriers of financial inclusion associated with costly brick and mortar traditional banking branches that are often located in the cities and not in rural areas. There is also an emphasis on

the importance of an enabling regulatory environment and effective monetary policies that support the adoption and growth of mobile money for financial inclusion.

Convenience and lower costs of mobile money influence spending behaviour. Cobla and Osei-Assibey (2018) studied this phenomenon, unpacking the effect of mobile money on spending behaviour using the university of Ghana students as a case. The authors built the study on primary data collected through questionnaires administered to a sample of 550 students, split equally between males and females. The study found that, on average, students who use mobile money actively spend 20 Ghana Cedis more than those who do not use mobile money. These findings are in sync with Roberts (1998), who found that easier access to money increases spending behaviour among consumers. The authors attributed the increase in spending behaviour to increased access to money provided to mobile money. They caution that users of mobile should use the convenience of mobile money to their advantage and watch against potential unnecessary spending brought by convenience.

Several studies support the existence of the relationship between mobile money and financial inclusion. Sekantsi and Motelle (2016) and Tsemame (2015) studied this relationship using evidence from Lesotho. Sekantsi and Motelle found the existence of short-run and long-run relationship between mobile money and financial inclusion. Tsemame (2015) further explored the success of mobile money in advancing financial inclusion in Lesotho. He studied the benefits the mobile money users enjoy and the challenges they face using the solution, focusing on different demographic groups. The study was conducted through questionnaires using a sample of 140 mobile money users in Lesotho. The author found that the users of mobile money were mostly in the age group of 22 to 30 years old, followed by the age group of 31 to 40 years. According to Tsemame (2015), the most significant challenge mobile money users face in Lesotho is agents' liquidity, which results in frequent unavailability of deposits and withdrawal services from agents. Despite the challenges users face, mobile money innovation continues to diffuse in Lesotho.

(Maliehe, 2018) conducted a study of determinants of mobile money among the poor and rural populations in Lesotho, commissioned under "Lesotho Scaling Inclusion through Mobile Money (SIMM) Project Led." The purpose of the study was to understand factors that influence the use or non-use of mobile money among the poor and rural communities to identify necessary interventions that can boost the adoption. The study was conducted in four districts taken to

represent the ecological zones in Lesotho; Maseru central, Maseru Highlands, Butha-Buthe, Quthing, and Thaba-Tseka. Maliehe recorded agents liquidity as one of the critical challenges users face, similar to Tsemame's (2015) findings. According to Maliehe, these are some of the mobile money challenges and constraints faced by rural and low-income populations in Lesotho: few agents, agents' liquidity, mobile money transaction limits, lack of mobile money knowledge, low literacy levels, access to mobile phones, weak network coverage and trust in the mobile money technology.

Mobile Layaway, a mobile money-saving scheme offered by KickStart, a non-profit organization in Kenya, is a classic case of mobile money success in advancing financial inclusion. Omwansa et al. (2013) studied the success of Mobile Layaway in scaling up financial inclusion. According to Omwansa et al. (2013), Money Layaway allows poor rural farmers in Kenya to use Mpesa to save for irrigation equipment. The initial investment package includes a pump, hosepipe, seed, and fertilizer, and costs in the price range from USD65 to USD185. Farmers can make transfers of any amount at a small fee to their Money Layaway at their preferred frequency. The authors found that farmers who used Money Layaway to buy the equipment took on average 2.5 months to pay, compared to farmers who did not use the mobile money facility who took 12 months on average. According to (Omwansa et al., 2013), poor farmers who would otherwise not be able to buy the equipment can purchase the irrigation equipment through the saving scheme and generate more returns through farming, reducing poverty levels, and improving the farmers' lives.

Whisker and Lokanan (2019) warn that mobile money has exposure to anti-money laundering and terrorist financing threats, worsened by an otherwise considered advantage of remote mobile money account opening, which enables anonymity for money launders. The authors acknowledge the significant role of mobile money as a cash alternative in advancing financial inclusion and recommend that key money laundering threats inherent in mobile money are identified, and strong risk-mitigating controls are put in place. However, while mobile money may pose money laundering and terrorist financing threats, controls in the form of low daily transactions limit on mobile money limit the risk (Kobor, 2013). Kobor compares the risk of cash transactions with mobile money transactions, highlighting that the risk is higher on cash transactions where there are no controls, and there is no monitoring, unlike on mobile money where there are controls, and there are visibility and traceability of financial transactions.

2.6 Summary of Literature Review

The chapter offers insight into mobile money as a tool for advancing the financial inclusion agenda, assessed through the lens of Roger's Diffusion of Innovations (DOI) theory. Mobile money has to possess Roger's characteristics of innovation to be widely accepted as an alternative payment solution. Affordability, convenience, ease of use, and accessibility of mobile money have enabled it to diffuse among the poor and financially excluded as a means to include them in the formal financial system. As a result, financial inclusion has improved significantly in countries where mobile money is widely adopted, particularly in Sub-Saharan Africa. This is particularly the case where the regulatory environment is enabling for mobile money, making it relatively easier to own and use than a bank account, while also putting regulations in place to protect consumers and minimize money laundering and terrorist financing risks.

Many studies have looked at the determinants of financial inclusion and benefits thereof. Literacy, income, and accessibility of financial services are the common determinants. Financial inclusion allows consumers to save money securely for rainy days, avoid risks associated with cash handling and borrow for emergencies and businesses. Studies show that people at the bottom of the food chain borrow mostly for medical and other emergencies, while the middle income group borrows for property acquisition and investments. On the relationship between mobile money and financial inclusion, there are limited studies that have explored the relationship, hence the knowledge gap and need for studies on the area. Sekantsi and Motelle (2016) studied this relationship using evidence from Lesotho. Sekantsi and Motelle found the existence of short-run and long-run relationship between mobile money and financial inclusion. This study built on the study of Sekantsi and Motelle, adding in the body of knowledge the impulse response functions and variance decomposition.

CHAPTER 3

METHODOLOGY

3.1 Introduction

Research methodology provides the scope, tools, and procedures that researchers use to conduct their study and to address research questions or hypotheses (Jonker & Pennink, 2010)(Rudestam & Newton, 2015). This chapter details how the study was conducted to investigate the relationship between mobile money and financial inclusion in Lesotho and to assess if indeed mobile money is a tool at the government's disposal to advance financial inclusion in Lesotho. This chapter is divided into four major components: research approach and design, data period, source and frequency, analytical framework, and estimation approach.

3.2 Data types, Scope and Sources

The study used secondary data from the Central Bank of Lesotho to answer the research question. The data were categorised into two main categories of banking data, used as a proxy for financial inclusion and mobile money data, used as independent variables. Secondary data is existing data held by other researchers or institutions collected for research or other purposes (Rudestam & Newton, 2015). The Central Bank of Lesotho collects banking data and mobile money data through periodic submissions by local banks and mobile network operators for supervision and other regulatory purposes. Secondary data is easier to collect, cheaper, and time-saving. For a longitudinal study, it may be the only available source of data at the researcher's disposal to achieve the research objectives. It, however, has limitations, that the researcher took note of for this study. In particular, the researcher has no control over the quality of the secondary data (Saunders, Lewis, & Thornhill, 2016). The ease of access to banking data and mobile money data over the chosen study period influenced the choice of secondary data source over a primary source.

The study examines the relationship between mobile money and financial inclusion using the number of commercial bank deposits accounts and mobile money data. The study used monthly data from January 2014 to September 2019. According to Sekantsi and Motelle (2016), a comprehensive mobile money data in Lesotho started to be collected in July 2013, the month M-Pesa was introduced. The period of data for this study is chosen to capture the mobile money

evolution from the early stages and over time. Over this period, mobile money services in Lesotho evolved from basic deposits, withdrawals and peer-to-peer transfers to bill payments, merchant payments, and events ticket sales platform. Monthly frequency of data allowed for enough sample size to study the relationship. According to Sharpe (2001), a sample size of 30 is often large enough to allow for a sampling distribution mean that is close to a normal distribution. The larger the sample size, the better. The chosen period and frequency allow for a sample size of 60.

3.3 Analytical Framework

3.3.1 Model Specifications

Regression analysis will be applied to test the relationship between mobile money and financial inclusion in Lesotho. Financial inclusion has been defined as the inclusion of the poor and underserved members of the community in formal financial system. Menon (2019) identifies indicators of financial inclusion as ownership of a formal account, savings with a formal financial institution, and the usage of formal credit, and suggests that access to insurance and equity products is equally important in achieving a financially inclusive environment. However, given the limitations associated with data availability, this study confines the financial inclusion indicator to ownership of a formal bank account. According to Sarma (2008), the number of bank accounts (per 1000 adults) is the most commonly used measure of financial inclusion. Consequently, the study estimates the following regression equations;

$$FI_t = \alpha + \beta_i MM_{it} + \varepsilon_t \quad (1)$$

where FI_t represents financial inclusion measured using the number of bank accounts per 1000 adult population and MM_{it} denotes mobile money, and i denotes the relevant proxy. In order to measure the concept of mobile money, the study uses the following proxies, and denote mobile money registered accounts (MMC_{1t}), mobile money agents (MMA_{2t}) and mobile money transactions (MMT_{3t}). Although mobile money is a broader concept, data limitations do not permit the study to go beyond the three proxies (See Table 2 for detailed descriptions of variables).

Table 1: Description of variables

	Description	Measurement	Source of data
FI_t	Financial Inclusion proxy	Number of bank accounts (per 1000 adults)	CBL
MMC_{1t}	Mobile money registered customers	Number of M-Pesa and EcoCash registered customers (per 1000 adults)	CBL
MMA_{2t}	Mobile money registered agents	Number of M-Pesa and EcoCash registered agents	CBL
MMT_{3t}	Mobile money transactions volume	Number of M-Pesa and EcoCash monthly transactions (per 1000 adults)	CBL

Source: Author

3.3.2 Expected Relationship between Financial Inclusion and Mobile Money

The proliferation of mobile telephony in Lesotho provides a platform for potential amelioration of financial inclusion in the country. Mobile phone usage has penetrated to far-flung areas of the country where terrain and population density has rendered provision of financial services to frontier locations and villages in the highlands of the country through traditional channels especially brick and mortar branches, very expensive. Consequently, the country can leverage on the mobile phone network to expand the outreach of financial products and services to unserved and/or underserved segments. Moreover, unlike conventional bank accounts, mobile money has features such as ease of opening a mobile money account, lower costs of mobile money transactions, and easy accessibility to mobile money services, which can improve both access and usage of mobile money products and services. As a result, the study expects a positive relationship between financial inclusion and the three proxies of mobile money, that is, a unit increase in any of the proxies of mobile money (mobile money customers, agents and transaction volumes) is expected to result in an increase in financial inclusion. This expectation is in line with the pattern emerging from the literature because, for example, Cobla and Osei-Assibey (2018) and Llewellyn-Jones (2016) also find a positive relationship between financial inclusion and mobile money.

3.4 Estimation approach

3.4.1 Unit Root Test

Given that the study utilises time series data to investigate the relationship between financial inclusion and mobile money, it is important to apply unit root tests to understand the time series

properties of the data used. This is done to avoid the problem of spurious regression. To this end, the study employs three commonly used unit root tests, namely: the Augmented Dickey Fuller (ADF), Philips-Perron (PP) test and Kwiatkowski–Phillips–Schmidt–Shin (KPSS) test in line with the approach followed by (Hondroyannis & Papapetrou, 2001). The final decision on whether a given series has a unit root or not¹ is based on a simple majority, that is, if two tests point to a unit root the outcome of the third test is considered superfluous if it suggests the contrary.

3.4.2 Cointegration Analysis

After testing for stationarity, the next step is to test the data for cointegration. Cointegration tests examine the existence of the long-run relationship between variables that are integrated of the same order i.e. $I(d)$ (Nkoro & Uko, 2016). The study uses Autoregressive Distributed Lag (ARDL) approach to test for the existence of a long-run relationship between time series variables, namely; financial inclusion and the three mobile money proxies. The choice of ARDL over the other tests lies in its ability to handle mixed order of integration. In the ARDL bounds test approach, the null hypothesis is that variables are not cointegrated. The tests fail to reject the null hypothesis of no cointegration if the computed F-statistic is below the lower bound critical value $I(0)$ and lower than the upper bound value $I(1)$.

3.4.3 Vector Autoregression (VAR)

Following the long-run cointegration tests, Vector Autoregression (VAR) models are employed to test the existence of the short-run relationship between mobile money variables and financial inclusion. According to Gujarati (2003), the key advantages of VAR model lie in its simplicity and no need to classify variables into endogenous and exogenous. The author states that, although simple and useful for forecasting, the VAR model is less useful for policy analysis. The choice of lag length is another challenge.

After estimating the VAR model, diagnostic tests of serial correlation, normality and stability are tested using Lagrange-multiplier test, Jarque-Bera test and Eigenvalue stability condition tests to validate the usefulness and reliability of model in forecasting.

¹A series that becomes stationary by differencing is said to be integrated i.e. possesses a unit root. A time series yt is integrated of order d , $I(d)$ if its d th difference is stationary, that is, the series has d unit roots.

3.4.4 Impulse response, variance decomposition and causality analysis

Impulse response function (IRF) analyses the response of a variable to an impulse or shock to another variable in the VAR model. That is, a percentage increase or decrease in a response variable as a result of one standard deviation shock on explanatory variable. Variance decomposition function (VDF) provides further analysis of the forecast error variance in terms of the percentage influence by own variable and influences by other exogenous variables. After the diagnostic tests of the VAR model, the variables in the model, mobile money and financial inclusion, are further analysed by IRF to assess how a shock in financial inclusion affects mobile money over time and vice versa. VDF provides further analysis of the VAR coefficients, showing the percentage of financial inclusion forecast error variance influenced by financial inclusion, and the influence by mobile money. The same analysis is carried out on mobile money as dependent variable and financial inclusion as an explanatory variable.

As part of the analysis, a Granger Causality test is also carried out to establish the existence of short-run causal relationship between mobile money and financial inclusion, and the direction of the causality. The tests are concluded by assessing the response of financial inclusion to a shock on mobile money variables and vice-versa using impulse response function and variance decomposition.

4. Data Limitations

Some of the limitations of this study include the following:

- The study limits financial inclusion index to bank accounts. The definition of financial inclusion is broader and encompasses access channels such as bank branches and ATMs and access other financial services such as credit.
- Lesotho mobile money includes mobile money offered by commercial banks, such as Khetsi by Lesotho Post Bank which offers savings and micro-loans facilities. This study limits mobile money to mobile network operators' mobile money, Mpesa and Ecocash.

CHAPTER 4

PRESENTATION AND DISCUSSION OF RESULTS

4.1 Introduction

This chapter discusses the empirical results of the study following employment of the analytical tools explained in detail in chapter three. It reports outcomes of the descriptive statistics measures of central tendency, time series tests such as unit root and cointegration tests as well as bivariate regressions between financial inclusion and mobile money variables. The findings indicate that there is no long-run but only the short-run relationship between mobile money and financial inclusion.

4.2 Properties of the Data

4.2.1 Descriptive Statistics

Table 2 shows the summary statistics of the study. The log-transformed monthly variables show that a number of mobile money transactions has the highest standard deviation among the explanatory variables. This is expected because diffusion of mobile money innovation results in both adoptions by new users and an increase in usage by existing users; hence the transaction volumes report higher volatility. The average number of transactions per customer varies from month to month. Comparison between mobile money registered accounts and the dependent variable, number of bank deposit accounts, show higher growth in mobile money accounts, as shown by higher mean and maximum variable in mobile money accounts despite almost similar minimum in both variables. Both variables are upward trending. In addition, all the variables are skewed towards the left, as shown by the negative skewness for all variables. Mobile money registered account kurtosis of 3.086 shows that the distribution is spread like a normal distribution, while transaction volumes have a higher peak, and bank accounts and agents have a flatter peak below the normal distribution peak of 3.

Table 2: Descriptive Statistics

Variable	N	Mean	Min	Max	S.D	Kurtosis	Skewness
MMC	69	6.923	6.163	7.327	0.294	3.086	-0.962
MMA	69	1.621	0.519	2.395	0.564	1.623	-0.247
MMT	69	7.660	4.992	8.679	0.918	3.689	-1.147
FI	69	6.358	6.162	6.531	0.117	1.865	-0.255

Notes: MMC=Mobile money registered customers; MMA=Mobile money registered agents; MMT=Mobile money transactions volume; FI=Financial Inclusions

4.2.2 Unit Root Tests

Table 3 reports unit root test results examined using ADF and PP tests. When the two tests are applied to level data, both of them fail to reject the null hypothesis of a unit root on all the variables except mobile money transaction volumes. The results are consistent for all levels of statistical significance, that is, 1, 5 and 10 percent. Therefore, mobile money transactions volume is stationary at levels, that is, $I(0)$ while the other three variables are non-stationary at levels.

Table 3: Unit root tests at levels

ADF test		I(0)					
	t-stat I(0)	CV 1%		CV 5%		CV 10%	
MMC	-2.59	-4.113	FTR	-3.483	FTR	-3.17	FTR
MMA	-2.205	-4.113	FTR	-3.483	FTR	-3.17	FTR
MMT	-6.122	-4.113	Reject	-3.483	Reject	-3.17	Reject
FI	-1.949	-4.113	FTR	-3.483	FTR	-3.17	FTR
PP test		I(0)					
	t-stat I(0)	CV 1%		CV 5%		CV 10%	
MMC	-2.649	-4.11	FTR	-3.482	FTR	-3.169	FTR
MMA	-2.928	-4.11	FTR	-3.482	FTR	-3.169	FTR
MMT	-5.734	-4.11	Reject	-3.482	Reject	-3.169	Reject
FI	-1.469	-4.11	FTR	-3.482	FTR	-3.169	FTR

Notes: MMC=Mobile money registered accounts; MMA=Mobile money registered agents; MMT=Mobile money transactions volume; FI=Financial Inclusions; Decision: FTR (Fail to Reject)=Unit Root, Reject=No Unit Root

As a result, the rest of the variables are first-differenced, and the resulting series is passed through the same tests. The outcome for the ADF test is rejection of the null hypothesis for all mobile money proxies at 1, 5, and 10 percent level of statistical significance (see Table 4). On the contrary, the dependent variable, number of bank accounts, is stationary only at 10 percent level of statistical significance. Interestingly, the outcome for the PP test reinforces the ADF results for all variables. However, with respect to the dependent variable, the PP test finds

evidence for stationarity at 1, 5, and 10 percent levels of statistical significance. Given that the results for the two tests are consistent, there is no need to carry out the third test, namely, the KPSS test.

Table 4: Unit Root Test Results at First-Differences

ADF test		I(1)					
	t-stat I(1)	CV 1%		CV 5%		CV 10%	
MMC	-6.38	-4.115	Reject	-3.484	Reject	-3.17	Reject
MMA	-6.11	-4.115	Reject	-3.484	Reject	-3.17	Reject
MMT	-5.306	-4.115	Reject	-3.484	Reject	-3.17	Reject
FI	-3.312	-4.115	FTR	-3.484	FTR	-3.17	Reject

PP test		I(1)					
	t-stat I(1)	CV 1%		CV 5%		CV 10%	
MMC	-7.719	-4.113	Reject	-3.483	Reject	-3.17	Reject
MMA	-10.166	-4.113	Reject	-3.483	Reject	-3.17	Reject
MMT	-8.929	-4.113	Reject	-3.483	Reject	-3.17	Reject
FI	-3.871	-4.113	FTR	-3.483	Reject	-3.17	Reject

Notes: MMC=Mobile money registered accounts; MMA=Mobile money registered agents; MMT=Mobile money transactions volume; FI=Financial Inclusions; Decision: FTR (Fail to Reject)=Unit Root, Reject =No Unit Root

4.3 Relationship between Financial Inclusion and Mobile Money

4.3.1 Correlation Results

Table 5 displays the correlation matrix for pair-wise correlation coefficients between the four variables, the three proxies of mobile money and the number of bank accounts. The results show that there is a high positive correlation between various combinations of the explanatory variables (MMC, MMA and MMT). This means as the number of registered mobile money accounts increases, the number of mobile money agents and the number of mobile money transactions also increase. Similarly, the number of accounts grows with the number of agents, although the study does not establish the causality between the two explanatory variables. Furthermore, as registered customers and access points grow, the number of transactions also grows. This high correlation between the explanatory variables implies that if all three or any two of these variables are included in one multivariate model, it will give rise to the problem of multicollinearity. In order to address the problem, the dependent variable is regressed separately on each explanatory variable, which results in three models. Model 1 employs MMC as explanatory variables without MMA and MMT; Model 2 employs MMA as explanatory

variables without MMC and MMT, and Model 3 employs MMT as explanatory variables without MMC and MMA.

Table 5: Correlation Matrix

	MMC	MMA	MMT	FI
MMC	1.0000			
MMA	0.9270	1.0000		
MMT	0.9684	0.9361	1.0000	
FI	0.9149	0.9670	0.9392	1.0000

Notes: MMC=Mobile money registered customers; MMA=Mobile money registered agents; MMT=Mobile money transactions volume; FI=Financial Inclusions

4.3.2 Cointegration Analysis

The cointegration results on Table 6 below show that there is no cointegration between financial inclusion and mobile money variables across all the three models. The study could, therefore, not estimate long- and short-run regressions on the variables, leading to short-run vector autoregression (VAR) tests.

Table 6: Bounds Test Results

		CV 1%		CV 5%		CV 10%	
F-Statistic		I(0)	I(1)	I(0)	I(1)	I(0)	I(1)
		6.84	7.84	4.94	5.73	4.04	4.78
Model 1	3.989	FTR		FTR		FTR	
Model 2	0.816	FTR		FTR		FTR	
Model 3	3.323	FTR		FTR		FTR	

4.3.4 Vector Autoregression

In all the three VAR models, financial inclusion strongly influences itself at a 1 percent significant level. The coefficients are uniform across the three models, positive at 1.6 on average on one-period-lag and negative on two-lagged period. The positive coefficients mean that the one period lag realization of financial inclusion is associated with 160 percent increase in financial inclusion on average, and one additional lag to two lags has an opposite influence of 60 percent decrease in financial inclusion on average, *ceteris paribus*. LMMA and LMMT both report insignificant relationships with financial inclusion. The coefficients of the lagged values of both LMMA and LMMT have p-values above 60 percent. Only LMMC show a relationship with financial inclusion, although also very weak at 10 percent significant level. LMMC and FI have a positive coefficient of 2.3 percent at two-period lag, meaning that the

two-lagged period realization of mobile money accounts is associated with 2.3 percent increase in financial inclusion. These VAR results are consistent with the results of impulse response and variance decomposition functions (see Figure 3 and Table 10). The findings of the study when using mobile money registered accounts as a proxy support the findings of Sekantsi and Motelle (2016), who found the existence of a positive relationship between mobile money and financial inclusion in Lesotho.

Table 7: Vector Autoregression Results

	<i>Coef.</i>	<i>SE</i>	<i>p-value</i>	<i>Coef.</i>	<i>SE</i>	<i>p-value</i>
Model 1		LFI			LMMC	
LFI (-1)	1.579***	0.098	0.000	-0.016	0.013	0.202
LFI (-2)	-0.600***	0.095	0.000	0.023*	0.012	0.062
LMMC (-1)	0.204	0.947	0.83	0.951***	0.124	0.000
LMMC (-2)	-0.088	0.92	0.924	-0.04	0.119	0.734
Model 2		LFI			LMMA	
LFI (-1)	1.594***	0.095	0.000	0.003	0.007	0.618
LFI (-2)	-0.625***	0.095	0.000	0.002	0.007	0.739
LMMA (-1)	-0.788	1.684	0.64	0.702***	0.12	0.000
LMMA (-2)	1.291	1.674	0.441	0.174	0.118	0.142
Model 3		LFI			LMMT	
LFI (-1)	1.547***	0.100	0.000	0.003	0.007	0.645
LFI (-2)	-0.576***	0.096	0.000	0.000	0.006	0.947
LMMT (-1)	2.493	1.663	0.134	0.533	0.11	0.000
LMMT (-2)	-1.618	1.598	0.311	0.273***	0.099	0.006

Notes: L=Natural Logarithm; MMC=Mobile money registered customers; MMA=Mobile money registered agents; MMT=Mobile money transactions volume; FI=Financial Inclusions. *** and * denote significance at 1% and 10% respectively.

4.3.4a VAR Model Diagnostics

The models were diagnosed for serial correlation, normality and stability using Lagrange-multiplier test for autocorrelation, Jarque-Bera test for normality and Eigenvalue stability condition test. The results are presented in Table 8. The tests fail to reject the null hypothesis of no autocorrelation, providing assurance that there is no serial correlation in the three VAR models at lag order 2, validating the usefulness and reliability of the VAR models in forecasting. The models are also all stable, as shown by Eigenvalue stability condition tests which show that all the Eigenvalues lie inside the unit circles. These two tests validate the usefulness of the models in forecasting reliably. The normality tests, however, show that the natural log numbers

of the mobile money variables and the overall models are not normally distributed. Because the other two conditions of no autocorrelation and stability are met, the models can be reliably used.

Table 8: VAR Model Diagnostics

Lagrange-multiplier test for autocorrelation					
		Prob > chi2			
Lag	df	Model 1	Model 2	Model 3	
1	4	0.649	0.913	0.033**	
2	4	0.675	0.779	0.831	
Jarque-Bera test for normality					
		Prob > chi2		Prob > chi2	
LFI	0.066	LFI	0.133	LFI	0.178
LMMC	0.000***	LMMA	0.000***	LMMT	0.000***
ALL	0.000***	ALL	0.000***	ALL	0.001***
Eigenvalue stability condition					
Model 1		Model 2		Model 3	
Eigenvalue	Modulus	Eigenvalue	Modulus	Eigenvalue	Modulus
0.976	0.976	0.988	0.988	0.972	0.972
0.855	0.855	0.752 + .098i	0.758	0.806	0.806
0.650	0.650	0.752 + .098i	0.758	0.623	0.623
0.048	0.048	-0.196	0.196	-0.321	0.321

Notes: L=Natural Logarithm; MMC=Mobile money registered customers; MMA=Mobile money registered agents; MMT=Mobile money transactions volume; FI=Financial Inclusions. *** and ** denote significance at 1% and 5% respectively

4.3.4b Impulse Response and Variance Decomposition Functions

Figures 1.1 to 1.3 show the impulse responses of the three models of FI and MMC, FI and MMA and FI and FI and MMT. In the short run, financial inclusion does not respond to a standard deviation shock on mobile money registered accounts. However, in the long run (6 to 8 months), financial inclusion responds positively but marginally to a shock on mobile money accounts. This finding supports the VAR results and in line with the findings Sekantsi and Motelle (2016) on the positive relationship between mobile money and financial inclusion. On the contrary, financial inclusion shows an almost similar response to shocks on mobile money agents and transaction volumes. Both variables do not trigger a response on financial inclusion in the short run, and the long run response is almost non-existent. On the other hand, mobile money agents and transaction volumes exhibit a positive response to a shock on financial inclusion in the long-run.

Figure 1.1 FI and MMC IRF

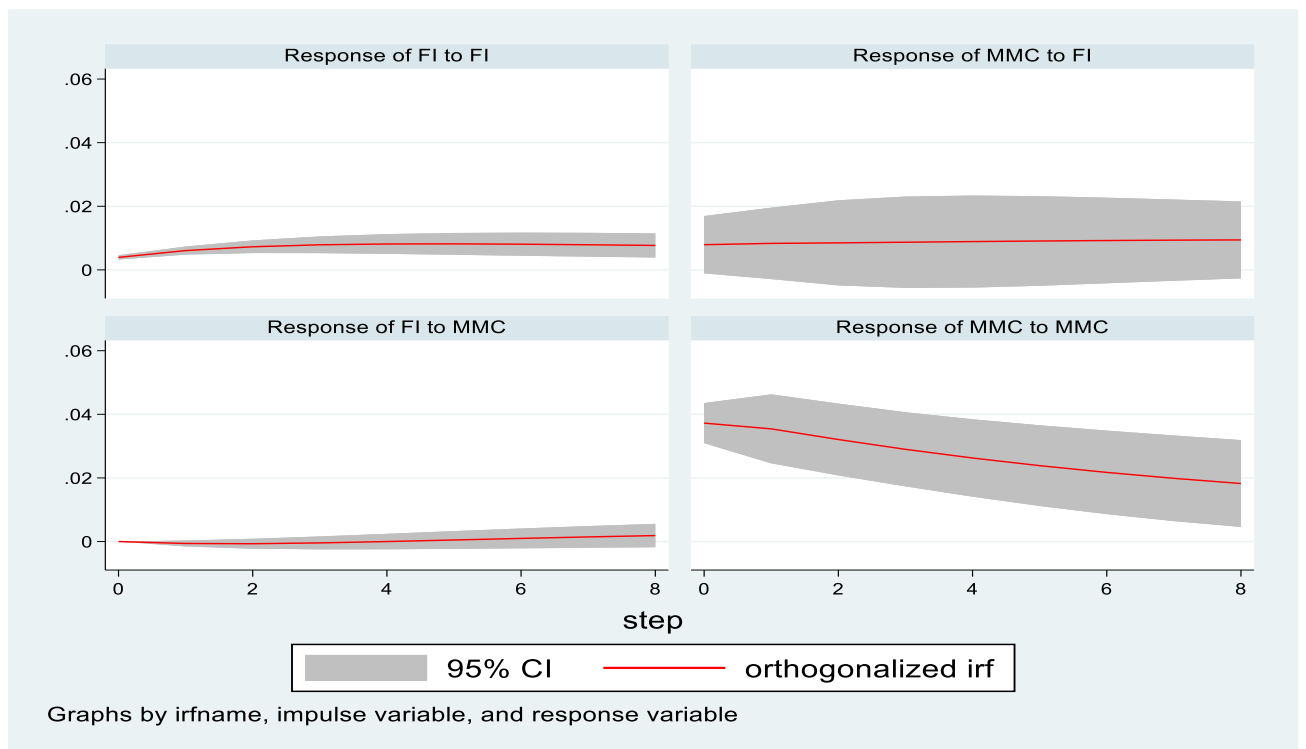


Figure 1.2 FI and MMA IRF

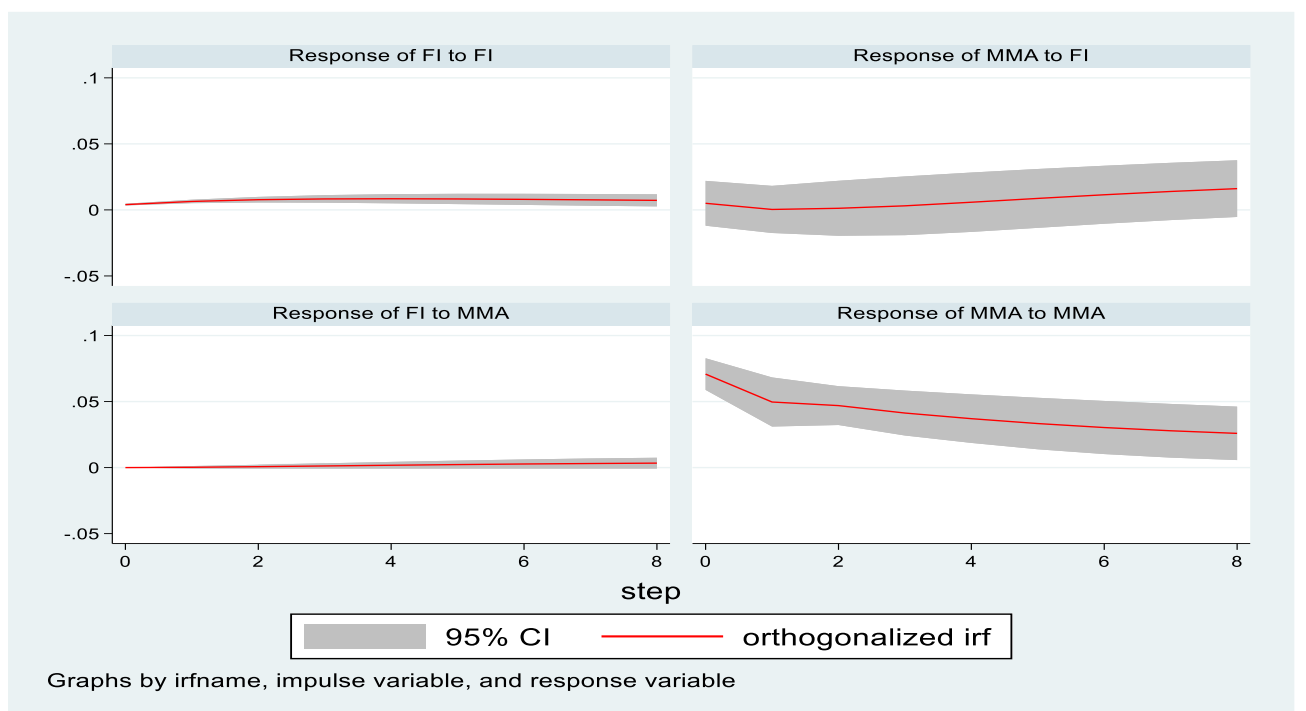
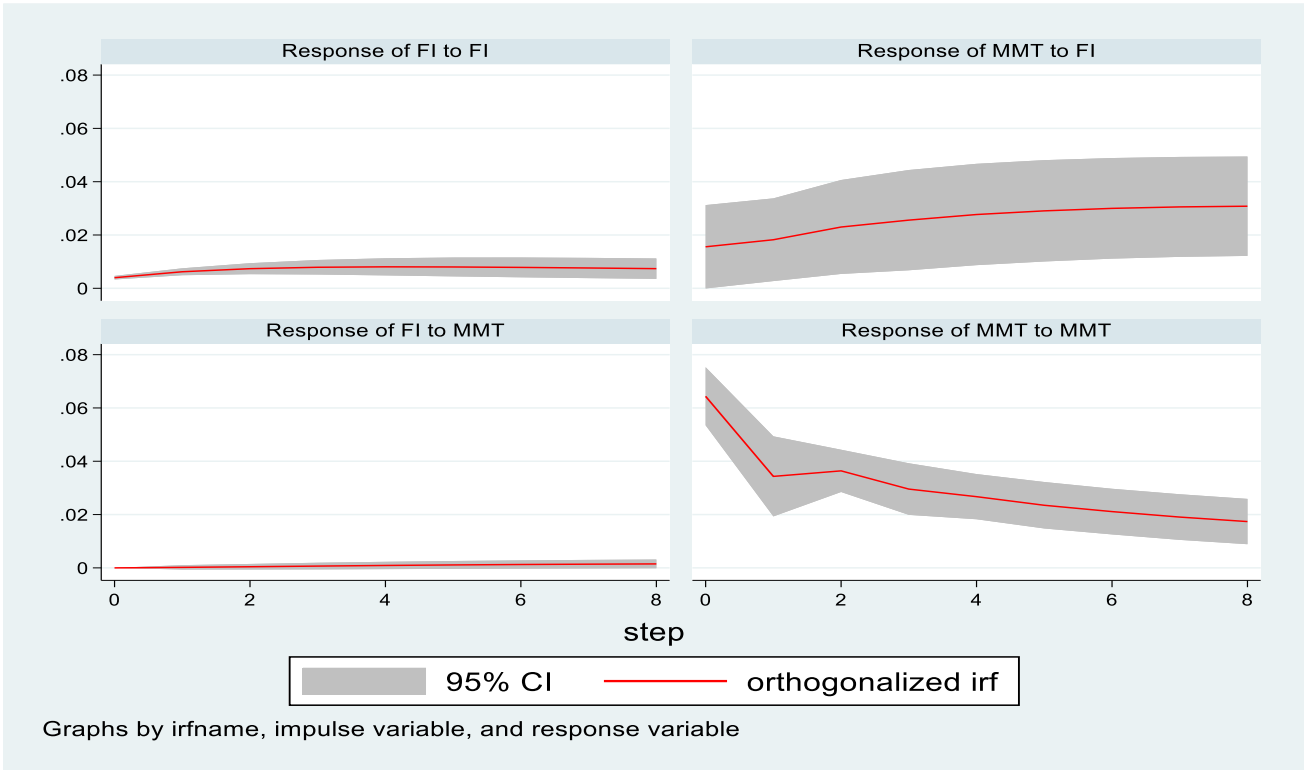


Figure 1.3 FI and MMT IRF



Financial inclusion is strongly endogenous, as shown by the variance decomposition results on Table 9. In all the periods from 1 to 8, 99 to 100 percent of the forecast error variances on financial inclusion are explained by the variable itself. The other models exhibit similar behaviour. Mobile money agents have the highest influence of the three variables of financial inclusion at 5.8 percent. This means that only 5.8 percent of the forecast error variance in financial inclusion is explained by mobile money agents. Mobile money variables are therefore strongly exogenous against financial inclusion. While mobile money has a weak influence on financial inclusion forecast, financial inclusion reports a strong influence on mobile money transaction volumes. The influence of financial inclusion on mobile money transactions volume forecast error variances increases overtime. In period 8, for instance, 35.2 percent of the forecast error variance of transactions volume is influenced by financial inclusion variable. Here, financial inclusion is least exogenous.

Table 9: Forecast Error Variance Decomposition

Period	Model 1				Model 2				Model 3			
	VD of LFI		VD of LMMC		VD of LFI		VD of LMMA		VD of LFI		VD of LMMT	
	LFI	LMMC	LMMC	LFI	LFI	LMMA	LMMA	LFI	LFI	LMMT	LMMT	LFI
1	1.000	0.000	0.957	0.043	1.000	0.000	0.995	0.005	1.000	0.000	0.945	0.055
2	0.993	0.007	0.952	0.048	0.999	0.001	0.997	0.003	0.999	0.001	0.903	0.097
3	0.992	0.008	0.947	0.053	0.995	0.005	0.997	0.003	0.998	0.002	0.858	0.142
4	0.994	0.006	0.942	0.058	0.989	0.011	0.997	0.003	0.996	0.004	0.811	0.189
5	0.996	0.004	0.935	0.065	0.980	0.020	0.995	0.005	0.994	0.006	0.765	0.235
6	0.996	0.004	0.929	0.071	0.969	0.031	0.990	0.010	0.991	0.009	0.723	0.277
7	0.994	0.006	0.922	0.078	0.956	0.044	0.982	0.018	0.988	0.012	0.684	0.316
8	0.990	0.010	0.915	0.085	0.942	0.058	0.971	0.029	0.985	0.015	0.648	0.352

Notes: VD = Forecast Error Variance Decomposition

4.3.4c Granger Causality Tests

The causal relationship between mobile money and financial inclusion is tested using Granger causality Wald tests. In these tests, the null hypothesis is that there is no short-run causality between the dependent variable, financial inclusion, and mobile money explanatory variables. Table 10 shows the causality test results. The test results show causality between financial inclusion and mobile money accounts and between financial inclusion and transaction volumes. The tests, however, fail to reject the null hypothesis of no causality between financial inclusion and mobile money. The unidirectional relationship is reported from financial inclusion to mobile money transactional volumes at 1 percent significance level, which means financial inclusion causes mobile money transaction volumes in the short-run. Financial inclusion and mobile money accounts also report a unidirectional causality from mobile money to financial inclusion at 10 percent significance level. It can, therefore, be concluded from these tests that there is a causal relationship between mobile money and financial inclusion, and that mobile money accounts cause financial inclusion.

Table 10: Granger causality Wald tests

Dependent	Explanatory	Prob > chi2	Decision
LFI	LMMC	0.064*	LMMC granger-causes LFI
LMMC	LFI	0.531	No causality
LFI	LMMA	0.29	No causality
LMMA	LFI	0.198	No causality
LFI	LMMT	0.158	No causality
LMMT	LFI	0.001***	LFI granger-causes LMMT

Notes: L=Natural Logarithm; MMC=Mobile money registered customers; MMA=Mobile money registered agents; MMT=Mobile money transactions volume; FI=Financial Inclusions. *** and * denotes significance at 1% and 10% respectively.

CHAPTER 5

CONCLUSION AND RECOMMENDATIONS

5.1 Introduction

This chapter covers the summary of the study, the key findings, and recommendations for policy and further research. The study sought to examine the effect of mobile money on financial inclusion in Lesotho.

5.2 Summary and Conclusion

The purpose of this study was to examine the impact of mobile money on financial inclusion in Lesotho, seeking to find if mobile money is a useful tool for the Government to drive its financial inclusion agenda. The study used three bivariate models, regressing three mobile money variables, mobile money registered accounts, mobile money agents and mobile money transaction volumes against financial inclusion to find the relationship of mobile money with each variable. First, the study tested for long-run relationships between financial inclusion and mobile money variables using ARDL bounds tests. The results failed to reject the null hypothesis of no cointegration between the dependent variable and explanatory variables, leading to the use of VAR to test for the existence of the short-run relationships.

The study tested for the relationships using VAR models, IRF and VDF and Granger causality tests. The results show that financial inclusion is strongly endogenous, that is, its most significant influence is itself. This is clearly demonstrated by the high coefficients of financial inclusion with its past realizations. With mobile money, the three models give differing results. The tests show no relationship between financial inclusion and mobile money agents. About transaction volumes, the study shows the existence of a unidirectional short-run causal relationship from financial inclusion to transaction volumes, meaning that financial inclusion granger causes mobile money transaction volumes. The test results that aligned with the expectations are on the relationship between financial inclusion and mobile money accounts. The results show the positive relationship between mobile money and financial inclusion; that is, mobile money contributes positively to financial inclusion.

5.3. Policy Recommendations

As Burns (2018) asserts, one of the determinants of the successful adoption of mobile money is the enabling regulatory environment that supports penetration and use of mobile money. As the study shows, mobile money contributes positively to financial inclusion, a Government policy objective in Lesotho. It is therefore recommended that the regulators enact mobile policies that address the barriers of owning a bank account such as strict KYC requirements while also managing the money laundering risks. It is a regulatory requirement that users of mobile money provide proof of residence in the form of a Chief's letter or water bill in the user's name in order to upgrade a mobile money account and enjoy higher limits that allow users to pay bills and still have an allowance to send money home. Most of these people capable of sending money home leave their homes in other districts to work or study in Maseru and stay in rented places where it is challenging to get a Chief's letter. They also do not have water bills in their names, and this poses a barrier to the full adoption of mobile money.

5.4. Limitations and Avenues for Future Studies

The study limited the index of financial inclusion to bank accounts, which limited the effectiveness of the index in measuring the relationship with mobile money. Future studies could use a more comprehensive financial inclusion index that encompasses other components of financial inclusion such as access channels and loans and customer deposits and build on this study, still in the area of variance decomposition and impulse response of financial inclusion to mobile money shocks.

REFERENCES

- Adaba, G. B., Ayoun, D. A., & Abbott, P. (2019). Exploring the contribution of mobile money to well-being from a capability perspective. *E J Info Sys Dev Countries*, 85(e12079), 1–11. <https://doi.org/10.1002/isd2.12079>
- Adetunji, O. M., & David-west, O. (2019). The relative impact of income and financial literacy on financial inclusion in Nigeria. *Journal OfInternational Development*, 31(February), 312–335. <https://doi.org/10.1002/jid.3407>
- Aker, J. C., & Mbiti, I. M. (2010). Mobile phones and economic development in Africa. *The Journal of Economic Perspectives*, 24(3), 207–232.
- Aker, J. C., & Wilson, K. (2013). *Can mobile money be used to promote savings? Evidence from Northern Ghana* (No. 2012–003).
- Akturan, U., & Tezcan, N. (2015). The effects Of Innovation Characteristics On Mobile Banking Adoption. *10th Global Conference on Business & Economics*, (July). <https://doi.org/10.13140/RG.2.1.4970.6083>
- Baer, W., Bounfour, A., & Housel, T. J. (2018). *An econophysics non-monetized theory of value: The case of micro-finance in Sub-Saharan Africa*. <https://doi.org/10.1108/JIC-01-2017-0001>
- Bara, A. (2013). Mobile money for financial inclusion: Policy and regulatory perspective in Zimbabwe. *African Journal of Science, Technology, Innovation and Development*, 5(5), 345–354. <https://doi.org/10.1080/20421338.2013.829287>
- Bozkurt, I., Karakus, R., & Yildiz, M. (2018). Spatial determinants of financial inclusion over time. *Journal OfInternational Development*, 1504(June), 1474–1504. <https://doi.org/10.1002/jid.3376>
- Burns, S. (2018). M-Pesa and the ‘Market-Led’ approach to financial inclusion. *Economic Affairs*, 38(3), 406–421. <https://doi.org/10.1111/ecaf.12321>
- Cámara, N., & Tuesta, D. (2017). Measuring financial inclusion: a multidimensional index. In *Bank for international settlements* (No. 14/26). Retrieved from <https://www.bis.org/ifc/publ/ifcb47p.pdf>
- Central Bank of Lesotho. (2018). Keynote address by the Hounorable Minister of Finance at the financial inclusion day. Retrieved from Central Bank of Lesotho website: https://www.centralbank.org.ls/images/Public_Awareness/Speeches/FINANCIAL_INCLUSION_DAY_SPEECH.pdf
- Central Bank of Lesotho. (2019). *List of licensed financial institutions*. Maseru.
- Chauhan, S. (2015). Acceptance of mobile money by poor citizens of India: integrating trust into the technology acceptance model. *Info*, 17(3), 58–68. <https://doi.org/10.1108/info-02-2015-0018>
- Chikalipah, S. (2017). What determines financial inclusion in Sub-Saharan Africa? *African Journal of Economic and Management Studies*, 8(1), 8–18. <https://doi.org/10.1108/AJEMS-01-2016-0007>
- Cobla, G. M., & Osei-assibey, E. (2018). Mobile money adoption and spending behaviour : the case of students in Ghana. *International Journal of Social Economics*, 45(1), 29–42. <https://doi.org/10.1108/IJSE-11-2016-0302>
- Dasgupta, R. (2009). Two approaches to financial inclusion. *Economic and Political Weekly*, 44(26), 41–44.
- De Gregorio, J., & Guidotti, P. E. (1995). Financial development and economic growth. *World Development*, 23(3), 433–448. [https://doi.org/10.1016/0305-750X\(94\)00132-I](https://doi.org/10.1016/0305-750X(94)00132-I)
- Demirgüç-kunt, A., & Klapper, L. (2013). Measuring financial inclusion: Explaining variation in use of financial services across and within countries. *Brookings Institution Press*, (Spring 2013), 279–321.

- Demirgüç-Kunt, A., Klapper, L., Singer, D., Ansar, S., & Hess, J. (2017). *The global index database: Measuring financial inclusion and the fintech revolution*. Retrieved from <https://globalindex.worldbank.org/>
- Demirguc-Kunt, A., Klapper, L., Singer, D., & Oudheusden, P. Van. (2015). *The global index database 2014: Measuring financial inclusion around the world*.
- Donovan, K. (2012). Mobile money for financial inclusion. *Information and Communications for Development*, 61–74.
- Econet Telecom Lesotho. (2019). EcoCash Spache-Fono. Retrieved August 28, 2019, from https://www.etl.co.ls/index.php?option=com_content&view=article&id=26&catid=25&Itemid=102
- Evans, O. (2018). Connecting the poor: the internet, mobile phones and financial inclusion in Africa. *Digital Policy, Regulation and Governance*, 20(6), 568–581. <https://doi.org/10.1108/DPRG-04-2018-0018>
- Fanta, A. B., Mutsonziwa, K., Goosen, R., Emanuel, M., & Kettles, N. (2016a). *The role of mobile money in financial inclusion in the SADC region: Evidence using FinScope surveys*. Retrieved from <https://www.finmark.org.za/wp-content/uploads/2016/12/mobile-money-and-financial-inclusion-in-sadc.pdf>
- Fanta, A. B., Mutsonziwa, K., Goosen, R., Emanuel, M., & Kettles, N. (2016b). *The role of mobile money in financial inclusion in the SADC region: Evidence using FinScope Surveys*. Retrieved from <https://www.finmark.org.za/wp-content/uploads/2016/12/mobile-money-and-financial-inclusion-in-sadc.pdf>
- FinMark Trust. (2011). *FinScope Consumer Survey Swaziland 2011*. Retrieved from http://www.finmark.org.za/wp-content/uploads/2016/02/FSRep_Swaziland_13_09_20124.pdf
- FinMark Trust. (2019). *Measuring Progress 2019 - Financial Inclusion in SADC*.
- FinMark Trust & MAP Botswana. (2015). *Botswana Financial inclusion roadmap and strategy 2015 - 2021*.
- FinScope. (2014). *FinScope Consumer Survey Malawi 2014*. Retrieved from <http://www.finance.gov.mw/fspu/index.php/studies-reports-fspu/completed-studies/53-2014-finscope-malawi-consumer-survey/file>
- FinScope. (2011). *FinScope Consumer Survey Lesotho 2011*. Retrieved from http://www.finmark.org.za/wp-content/uploads/2016/02/RepFSLESOTHO_FNL_2012.pdf
- FinScope, & Finmark Trust. (2014). *Finscope consumer survey Mozambique 2014*. <https://doi.org/10.1177/0363546510365530>
- Fungáčová, Z., & Weill, L. (2014). *Understanding financial inclusion in China*. Government of Egypt. (2015). *Sustainable development strategy - Egypt's vision 2030*.
- Government of Lesotho. (2012). *Inclusive finance strategy of Lesotho (2012 / 13-2016 / 17)*. Maseru.
- Government of Lesotho. (2012). *National Strategic Development Plan 2012/13 – 2016/17*.
- GPFI. (2011). Global Partnership for Financial Inclusion. Retrieved June 10, 2019, from <https://www.gpfi.org/about-gpfi>
- GSMA. (2018). The Mobile Economy. In *GSMA Intelligence*. <https://doi.org/10.5121/ijcsit.2015.7409>
- GSMA. (2019). *State of the industry report on mobile money*. Retrieved from www.gsma.com/mobilemoney
- Gujarati, D. (2003). *Basic Econometrics* (4th ed.). McGraw-Hill/Irwin.
- Heyer, A., & Mas, I. (2009). Seeking fertile grounds for mobile money. *GSMA: Mobile Money for the Unbanked*, (September), 1–22.
- Hondroyannis, G., & Papapetrou, E. (2001). An Investigation of the Public Deficits and

- Government Spending Relationship: Evidence for Greece. *Springer*, 107(1), 169–182.
Retrieved from <https://www.jstor.org/stable/30026261> relationship : Evidence for Greece
- Johnson, V. L., Kiser, A., Washington, R., & Torres, R. (2018). Limitations to the rapid adoption of M-payment services: Understanding the impact of privacy risk on M-Payment services. *Computers in Human Behavior*, 79, 111–122.
<https://doi.org/10.1016/j.chb.2017.10.035>
- Jonker, J., & Pennink, B. (2010). *The essence of research methodology*.
<https://doi.org/10.1007/978-3-540-71659-4>
- Kobor, E. S. (2013). The role of Anti-Money Laundering law in mobile money systems in developing countries. *Washington Journal of Law, Technology & Arts*, 8(3).
- Koeshe, N. (2019, March 19). FNB launches agency banking solution. *Lesotho Times*. Retrieved from <http://lestimes.com/fnb-launches-agency-banking-solution/>
- Lesotho Post Bank. (2019). LPB Wallet. Retrieved August 28, 2019, from <https://www.lpb.co.ls/#>
- Llewellyn-Jones, L. (2016). Mobile Money: Part of the African financial inclusion solution? *Economic Affairs*, 36(2), 212–216. <https://doi.org/10.1111/ecaf.12177>
- Lokhande, M. A. (2011). Financial inclusion: Options for micro, small and medium enterprises. *Synergy*, IX(II), 39–51.
- Maliehe, S. M. (2018). *Demand for mobile money among the rural and low-income population in Lesotho*. Maseru.
- Menon, P. (2019). Financial inclusion, banking the unbanked: Concepts, issues, and policies for India. *J Public Affairs*, 1–5. <https://doi.org/10.1002/pa.1911>
- Ministry of Finance. (2017). *National financial inclusion strategy for Swaziland 2017-2022*. (October). Retrieved from <https://www.afiglobal.org/sites/default/files/publications/2018-01/Swaziland National Financial Inclusion Strategy 2017 -2022.pdf>
- Munyegera, G. K. for financial access: M. money and the financial behavior of rural households in U., & Matsumoto, T. (2018). ICT for financial access: Mobile money and the financial behavior of rural households in Uganda. *Review of Development Economics*, 22(1), 45–66. <https://doi.org/10.1111/rode.12327>
- Naidoo, K. (2014). *Making Access Possible*. Retrieved from <https://uncdf-cdn.azureedge.net/media-manager/54053?sv=2016-05-31&sr=b&sig=Lp96keAntyRIFOCpqcucnvoLXptMkwdHwqxUh8SFkM0%3D&se=2018-07-16T20%3A55%3A38Z&sp=r>
- Nkoro, E., & Uko, A. K. (2016). Autoregressive Distributed Lag (ARDL) cointegration technique: application and interpretation. *Journal of Statistical and Econometric Methods*, 5(4), 63–91.
- Omwansa, T. K., Waema, T. M., Chen, C., & Sullivan, N. P. (2013). The mobile phone as the tool to redefine savings for the poor: Evidence from Kenya. *African Journal of Science, Technology, Innovation and Development*, 5(5), 355–361.
<https://doi.org/10.1080/20421338.2013.829295>
- Peruta, M. Della. (2018). Adoption of mobile money and financial inclusion: a macroeconomic approach through cluster analysis. *Economics of Innovation and New Technology*, 27(2), 154–173. <https://doi.org/10.1080/10438599.2017.1322234>
- Roberts, J. A. (1998). Compulsive buying among college students : An investigation of Its antecedents, consequences, and implications for Public Policy. *Journal of Consumer Affairs*, 32(2), 295–319.
- Rogers, E. M. (1982). *Diffusion of innovations* (Third). New York: The Free Press.
- Rudestam, K. E., & Newton, R. R. (2015). *Surviving Your Dissertation* (Fourth). SAGE Publications, Inc.

- Sarma, M. (2008). *Index of Financial Inclusion* (No. 215).
- Sarma, M., & Pais, J. (2011). Financial inclusion and development. *Journal of International Development*, 23(1), 613–628. <https://doi.org/10.1002/jid>
- Saunders, M., Lewis, P., & Thornhill, A. (2016). *Research Methods for Business Students* (Seventh). Pearson Education Limited.
- Sekantsi, L. P., & Motelle, S. I. (2016). *The financial inclusion conundrum in Lesotho: Is mobile money the missing piece in the puzzle?* (No. 02/16). Retrieved from https://www.centralbank.org.ls/images/Publications/Research/Papers/Working/THE_FINANCIAL_INCLUSION_CONUNDRUM_IN_LESOTHO.pdf
- Sharpe, N. R. (2001). Statistics for Management and Economics. In *The American Statistician* (Vol. 55). <https://doi.org/10.1198/tas.2001.s125>
- T.S. (2015, March 2). Why does Kenya lead the world in mobile money? *The Economist*. Retrieved from <https://www.economist.com/the-economist-explains/2015/03/02/why-does-kenya-lead-the-world-in-mobile-money>
- Tanzania National Council for Financial Inclusion. (2017). *National financial inclusion framework 2018-2022*. Retrieved from [https://www.afi-global.org/sites/default/files/publications/2017-12/NFIF 2018-2022.pdf](https://www.afi-global.org/sites/default/files/publications/2017-12/NFIF%2018-2022.pdf)
- Tobbin, P. (2011). Understanding the mobile money ecosystem: Roles, structure and strategies. *Proceedings - 2011 10th International Conference on Mobile Business, ICMB 2011*, 185–194. <https://doi.org/10.1109/ICMB.2011.19>
- Tobbin, P. (2012). Towards a model of adoption in mobile banking by the unbanked : a qualitative study. *Info*, 14(5), 74–88. <https://doi.org/10.1108/14636691211256313>
- Tsemame, A. (2015). *The Impact of mobile money on financial inclusion in Lesotho*. University of the Free State.
- United Nations. (2002). *Monterrey consensus on financing for development*.
- United Nations. (2005). *Resolution adopted by the General Assembly on 16 September 2005*.
- United Nations. (2006). *Building inclusive financial sectors for development*. New York.
- Upadhyay, P., & Jahanyan, S. (2016). Analyzing user perspective on the factors affecting use intention of mobile based transfer payment. *Emerald Group Publishing Limited*, 26(1), 38–46. <https://doi.org/10.1108/IntR-05-2014-0143>
- Varghese, G., & Viswanathan, L. (2018). Normative perspectives on financial inclusion: Facts beyond statistics. *Institute for Financial Management and Research*, 1–5. <https://doi.org/10.1002/pa.1829>
- Vijayvargy, L., & Bakhshi, P. (2018). Financial literacy and financial inclusion in Rajasthan, India: An empirical study. *The IUP Journal of Applied Finance*, 24(3).
- Wale, L. E., & Makina, D. (2017). Account ownership and use of financial services among individuals: Evidence from selected Sub-Saharan African economies. *African Journal of Economic and Management Studies*, 8(1), 19–35. <https://doi.org/10.1108/AJEMS-03-2017-146>
- Wamuyu, P. K. (2014). The role of contextual factors in the uptake and continuance of mobile money usage in Kenya. *Electronic Journal of Information Systems in Developing Countries*, 64(1), 1–19. <https://doi.org/10.1002/j.1681-4835.2014.tb00457.x>
- Whisker, J., & Lokanan, M. E. (2019). Anti-money laundering and counter-terrorist financing threats posed by mobile money. *Journal of Money Laundering Control*, 22(1), 158–172. <https://doi.org/10.1108/JMLC-10-2017-0061>
- Yoshino, N., & Morgan, P. J. (2018). Financial inclusion, financial stability and income inequality: introduction. *The Singapore Economic Review*, 63(1), 1–7. <https://doi.org/10.1142/S0217590818020022>
- Zins, A., & Weill, L. (2016). The determinants of financial inclusion in Africa. *Review of Development Finance*, 6(1), 46–57. <https://doi.org/10.1016/j.rdf.2016.05.001>

