Mobile Money in Tanzania – The First Step Towards Financial Inclusion

By

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Abstract:

In recent years the importance of financial inclusion for economic growth has been thoroughly discussed. Particularly, the impact of mobile money in the context of developing economies has risen in prominence. This thesis adds to existing literature by exploring the how mobile money increases financial inclusion by conceptualizing it as a process with relative stages. Different theories have been put forth such as the finance-led growth hypothesis and the growth-led finance hypothesis. They are contradictory as the first believes that a well-developed financial system is the key to attaining economic development. Whereas the latter instead proposes that economic growth is the catalyst for a well-developed financial system. This thesis did not intend to argue whether these theoretical considerations are correct, instead the intention was to identify supply- and demand constraints that remain, particularly for rural residents. Firstly, this was done quantitatively to investigate the determinants and variables that impact financial inclusion. Subsequently, complemented with a qualitative analysis done in the Arusha region in Tanzania with the aim of identifying constraints related to supply, demand, and institutions per the interviewees' own experiences, values, and perceptions. Tanzania is interesting as they have undergone extensive financial reforms and propose that they have been able to massively increase levels of financial inclusion. Consequently, the aim of this thesis was to evaluate to what extent this was true. The results indicate that mobile money uptake has become increasingly relevant for the poor and rich alike. Equally, the conclusion is that for rural residents' the benefits are limited to mostly using mobile money for remittances, whereas regressive fee structures and increased levies has made this process more strenuous.

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Table of Contents

List of Figures

List of Tables

Abbreviations:

FI - Financial Inclusion

FSP - Financial Service Provider

GDP – Gross Domestic Product

OVB – Omitted Variable Bias

OLS – Ordinary Least Square (regressions)

SSA - Sub-Saharan Africa

TSh – Tanzanian Shillings

USD – United States Dollar

1. Introduction

In terms of economic growth, the past half century has been signified by unprecedent increases in income. Whereas the same can be said for economic development, however, it has similarly become clear that the distribution of these gains has been rather unequal (Perkins, Radelet, Lindauer & Block, 2013). As such, it becomes necessary to analyze why many regions of the world has experienced a take-off in terms of economic development and growth and why others have diverged and experienced stagnation. One region of the world that is often brought up to depict this dilemma is Sub-Saharan Africa (SSA), which comparatively has been left behind considering these past five centuries as seen below in *figure 1* (World Bank, 2022).

Figure 1: GDP per Capita (current USD) for Different Regions of the World Between 1971-2020
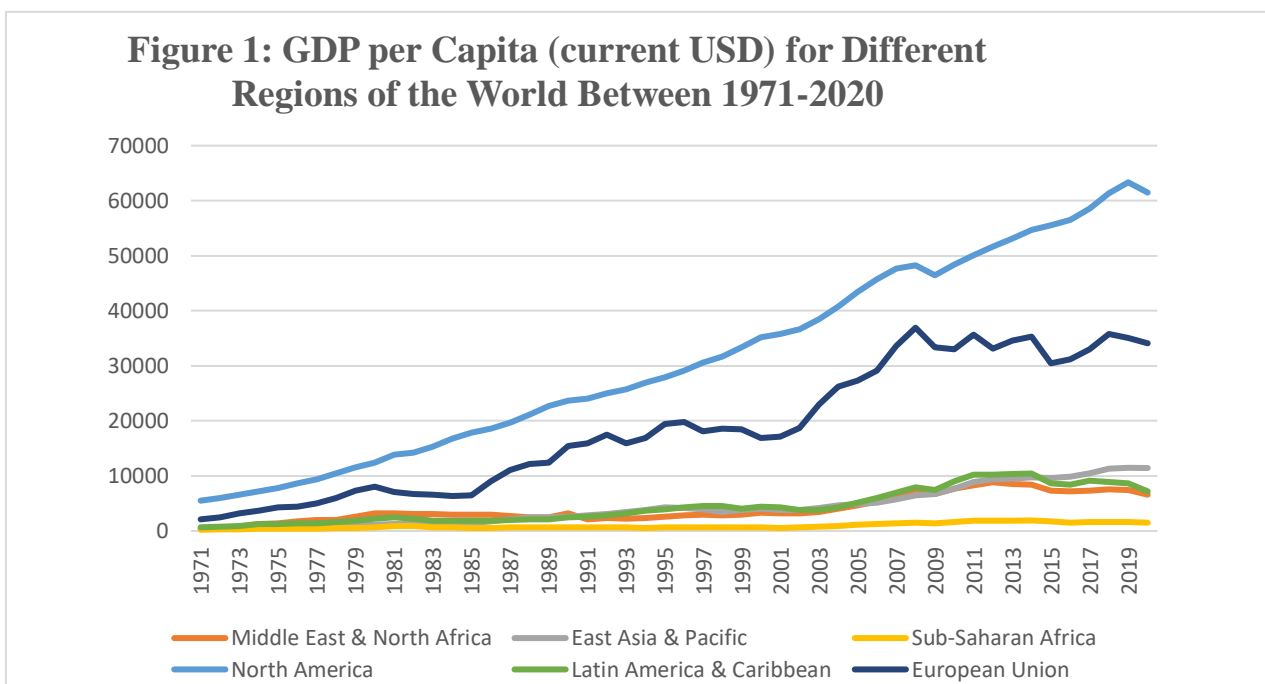
(Based on data taken from the World Bank Database, 2022)

The experience of SSA begs the question of how economic growth is facilitated and the mechanisms behind it, equally how growth can be translated into economic development and how these mechanisms may explain divergent growth patterns. Within the field of economics, this is not a new pursuit and has been done ever since Adam Smith published his prominent work, *An Inquiry into the Nature and Causes of the Wealth of Nations,* in 1776 (Perkins et al., 2013). Nowadays most modern theories on economic growth have come to revolve around the relationship between various factors of production, namely, capital and labor with a country's total economic output (Perkins et al., 2013). Continually, whilst a great deal of other factors often are mentioned to be crucial for growth like education, government institutions, investment, health care, none are mentioned more than *factor accumulation* and

productivity growth as crucial in increasing a country's total output and in essence its total income (Perkins et al., 2013). In short, factor accumulation refers to a country's ability to increase the size of the capital stock and the labor force, whilst the latter instead refers to the output per worker, whilst productivity is thought to increase by either efficiency or technological change (Perkins et al., 2013).

Furthermore, perhaps the most prominent theory on growth was laid out by Robert Solow in 1956, who created the *Solow Growth Model,* which like many other neoclassical growth theories proposes that capital accumulation is quintessential for a country to experience economic growth (Solow, 1956). The process can be summarized into three parts; firstly, new investments help in expanding the total capital stock, whilst these investments are financed by savings, and that these savings are derived from people's current incomes (Solow, 1956). One significant aspect of this process is that there is a functioning process of financial intermediation, which is responsible for the transfer of funds of household savings into productive investments (Allen & Santomero, 1998; Lin, 2015). Furthermore, for the purposes of this thesis, traditional financial institutions will largely be referring to banks, whilst formal financial service providers (FSPs) will be reserved for all financial intermediaries, meaning any type of economic entity which has the aim to collect funds from depositors and subsequently lend the same funds to other borrowers (Burda & Wyplosz, 2017).

This is rather significant, as recent studies suggest that only a mere 22% of the total adult population in the SSA-region own a regular bank account, whilst approximately 80% of the adult population lack access to any type of formal financial service (Adedokun & Aga, 2021). As such, the process of financial intermediation is obstructed due to this lack of access to financial services, consequently, the implications of this means that a majority of the economically active population is *financially excluded*. Whereas financial exclusion has been referred to by some as a type of institutional void, as the availability of banking services is severely limited by a country's deficient financial infrastructure (Economides & Jeziorski, 2017). The opposite being *financial inclusion* (FI) which is proposed to be key in enabling this intermediation process and inherently, economic growth, subsequently, it becomes necessary to define FI (Adedokun & Aga, 2021). For the purposes of this paper FI will be defined as access to convenient, affordable, and sufficient credit, account ownership and other interrelated financial services, which generally is targeted at the poorest segment of a population as they are more likely to be financially excluded (Adedokun & Aga, 2021). One particularly interesting development these past two decades has been the impact of developments within

mobile technology on FI in African countries, particularly in Kenya and Tanzania (Ahmad, Green & Jiang, 2020; Aron, 2018; Donovan, 2012; Jukan & Softic, 2016; Srivastava, 2015).

Within the realm of FI, this technology is often referred to as mobile money (m-money) and mobile banking (Donovan, 2012). The phenomenon has been discussed meticulously amongst researchers and policymakers alike since M-pesa, a mobile money service, was introduced in Kenya in 2008 (Mbogo, 2010). The story of mobile money in Kenya was one of success, as such many other countries are following their lead by implementing mobile money. According to FinScope, Tanzania is one of the countries that have been able to significantly increase their levels of FI because of mobile money (2017). However, bank account uptake is still rather low, and this is particularly true for rural areas, as such, it becomes necessary to examine which constraints that remain and that obstruct widespread financial inclusion and the adoption of financial services.

1.1 Purpose

Therefore, the main purpose of this paper is to investigate the impact that mobile money and mobile banking may have on different outcome variables that depict different levels of FI, for example, formal bank account ownership or insurance coverage. Currently, it is estimated that approximately ¼ of the global population is financially excluded (Jukan & Softic, 2016). This is problematic as issues of financial exclusion are typically more pronounced for the unemployed, poverty-stricken individuals, and is especially persistent in rural areas, this is thought to be the case because of different access barriers to traditional financial institutions, i.e., banks (Mago & Chitokwindo, 2014; Kopala, 2010). Continually, financial exclusion has been linked to risks including theft, due remittances occuring via third parties as such the risk is that the money does not reach the intended recipient (Kopala, 2010). Additionally, individuals incur transportation and opportunity costs, and generally is viewed to be a major driver of poverty (Mago & Chitokwindo, 2014). Therefore, identifying specific constraints to financial inclusion may aid in achieving long-run economic growth, which is a particularly impactful determinant of human welfare (Perkins et al., 2013). Thus, the main research problem being addressed in this thesis relate to the potential low-levels of financial inclusion, as FI has been proposed to be incremental in achieving sustainable economic growth (Adedokun & Aga, 2021). Positively impacting economic growth, output of goods and services, business opportunities, income inequality, poverty alleviation and risks of exploitation by financial institutions (Adedokun & Aga, 2021). Consequently, this thesis will address these issues using two different dimensions of analysis.

The first will focus on quantifying the current levels of financial inclusion to identify how mobile money has impacted formal financial inclusion. By contrast, the second dimension will be explored qualitatively and pertains to evaluating perceptions and experiences of a selected rural population in Arusha towards Tanzania's financial service providers. This is of particular interest as mobile banking has become increasingly important in Tanzania, but also on a global scale, as studies indicate that mobile technology has allowed nearly three billion people to participate in a previously inaccessible financial system (Mago & Chitokwindo, 2014; Abiona & Koppensteiner, 2022). As reports indicate that approximately 55% of Tanzania's population was financially excluded in 2009, this number has been reduced to 28% as of 2017, whereas rural residents are significantly less likely to be included (FSDT, 2017). Therefore, this study aims to bridge a gap in literature regarding the relationship between actual experiences and values towards formal financial institutions so that the remaining share of the population can be financially included. Finally, the aim of involving the qualitative aspects of the study is to explore whether uptake of mobile money services has influenced perceptions of other financial services. Equally, whether these perceptions are limited to only actual users or if it is widespread and extends to the general population that may not use mobile money.

1.2 Research Questions and Sub-Research Questions

Furthermore, based on the previous statements, the research question and sub-research questions that will be addressed in this paper are:

- *R1: What impact has mobile money had in Tanzania and on financial inclusion for rural residents?*
  - *Sub R1: How does uptake of mobile money services depend on individual perceptions, literacy, and demographic factors?*
  - *Sub R2: How has uptake of mobile money services impacted other forms of formal financial inclusion in rural areas?*
  - *Sub R3: Do mobile money users differ from non-users in terms of their perceptions and beliefs of financial services and providers in rural areas?*

1.3 Method & Data

The methodological approach that will be used is an explanatory sequential design, this mixed-method approach implies using both a qualitative and quantitative method (Creswell &

Creswell, 2018). For the qualitative approach, the data collection entails having semi-structured interviews with open-ended questions to answer the abovementioned research questions in the sense that they concern subjective perceptions of financial institutions and m-FSPs. These interviews will be held with the help of an NGO that is active in the Arusha region of Tanzania, that will assist in the transportation to different villages and translation.

The quantitative analysis will use the Financial Sector Deepening Trust (FSDT, 2017) dataset and the CGAP (2016) dataset to model multiple sets of regressions on various outcome variables. Continually, controlling for demographic variables such as age, gender, level of education, urban/rural residency, financial behavior and attitudes. By combining these methods, it will help to establish generalizable patterns and ideas that may not be found without using a mixed-methods approach.

2.   Literature Review

2.1 Background of Tanzania's Financial Development

Firstly, some background is needed on Tanzania's history, after Tanzania's independence in 1961, the country was amongst the poorest in the world and was heavily reliant on subsistence agriculture and a few estate crops with a miniscule industrial base (World Bank, 1981). The country tried to achieve a socialist society, called *Ujaama Socialism,* they focused on developing a rural based agricultural society, whereas government interventions lead to nationalizing commerce and industry (Akinboade, 2000; Kapaya, 2021). Furthermore, financial institutions were largely dysfunctional, and lending was determined by the government rather than via market mechanisms, consequently almost all loans went to the public sector (Akinboade, 2000). However, the decade following 1986 signified a paradigm shift regarding Tanzania's financial policies as the country embarked on a journey towards economic liberalization through the implementation of large scale economic transformation programs (Kapaya, 2021). As *Ujamaa* socialism was left behind, policies including the state-control and ownership of major enterprises ended, and exchange rates became regulated by the market (Kapaya, 2021). Continually, due to problems with public monopolies, persistent fiscal- and trade deficits combined with minimal economic growth, further liberalizations ensued within the financial sector between 1996 and 2017 (Marobhe, 2019). This resulted in market-based regulation and fiscal consolidation which caused extensive periods of high economic growth, relatively stable inflation levels, a trade surplus and importantly for the purposes of

this paper, a competitive banking system that ensured higher flows of credit to the private sector (Robinson, Gaertner & Papageorgiou, 2011; Marobhe, 2019).

Therefore, attempting to enable the mechanisms and pre-requisites that financial intermediation requires, which are necessary to improve financial inclusion as more people are encouraged to engage in the financial system. Conclusively, Tanzania had one of the least developed financial systems in all of Africa in the 1980s. However, after their departure from *Ujaama* socialism they have via financial and economic reforms, large public spending, increased budgetary controls, enjoyed higher levels of monetary freedom and fiscal health, nowadays ranking 10th out of the 47 countries in SSA in terms of economic freedom (Heritage Foundation, 2022).

2.2 Theoretical perspectives
Supply-leading theory vs Financial-led growth hypothesis

As the aim of this paper is to analyze the constraints that remain and that hampers Tanzania's society from achieving widespread financial inclusion, understanding the debate between supply vs demand proponents will be crucial. Starting off, the argument for supply-led growth became popular after Schumpeter (1911) set forth the argument that the financial sector is essential for economic growth. However, the idea itself can be linked back to Bagehot (1873) who proclaimed that the financial sector's development was instrumental for England's industrialization (Odhiambo, 2008). This theory later became known as supply-leading theory or positive causality (Taiwan & Nene, 2016). Specifically, Schumpeter claimed that economic growth is dependent on the development and deepening of the financial sector, as that is where gains are made and thereafter transferred to the real sector, thus, causing economic growth to occur (Schumpeter, 1911). He also proposed that this was evident as the financial sector spurs innovation and productive investments which also causes societies to experience growth. Furthermore, it is believed that deepening the financial sector is essential in increasing growth as it results in the optimal allocation of resources (Adeyeye, Fapetu, Aluko & Migiro, 2015). Furthermore, both McKinnon (1973) and Shaw (1973) hypothesized that a developed financial system ensures reduced transaction- and monitoring costs and similarly asymmetric information, whilst the latter directly improves financial intermediation. This argument follows what prominent institutionalist, North (1991), proposes. As he argues that institutions are crucial for economic development due to interrelated transaction and production costs, whereas institutions are defined as inducing informal and formal constraints that build the foundation of the space on which economic, political, and social interactions are made. Many mention this

be the main benefit of mobile money as it enables reduced transaction and opportunity costs of using traditional financial services, therefore, ensuring that poverty-stricken populations can be financially included (Aron, 2018; McKinnon, 1973; Shaw, 1973). Whereas King and Levine (1993) agreed that a well-developed financial system is a strong determinant of positive economic growth for economies in their coming 10 to 30 years.

The opposing view was proposed by Robinson (1952), who by contrast believed that the development of the financial sector follows economic growth. This theory is often referred to as growth-led finance hypothesis (Adeyeye et al., 2015). Whereas within the context of developing nations, the lack of financial institutions and their poor quality implies an inherent lack of demand for these financial services, whilst this relates to inadequate levels of economic growth (Patrick, 1966). Central to this view is that causality flows from economic growth in the direction to financial development, whereas the process of financial deepening occurs after growth increases demand for financial services (Adeyeye et al., 2015). This is thought to happen gradually as economic development occurs, as when the output of an economy increases, as output increases from a macroeconomic perspective, the rise in productive activities results intrinsically develops the financial sector (Calderón & Liu, 2002; Singh, 1999). This view was supported by Rousseau (1998), who in his study on innovation, intermediation, and financial deepening in the US between 1872-1929 found that the growing demand for loans enabled financial deepening and that the causality came from economic growth.

The lack of any consensus surrounding the relationship between financial development and economic growth depicts the complexity of the topic. While others posit that neither theory is correct by itself nor that causality is unidirectional, one such theory is put forth by Patrick (1966) in his "stage of development" hypothesis. He instead merges the supply-leading and finance-led growth hypotheses and claims that the causal linkages are bi-directional and depend on an economy's current stage of development. Patrick proclaims that in the earlier stages of development the supply-leading theory is true, whereas after an economy expands this impact diminishes, and instead demand-led growth replaces it (Patrick, 1966). Prior to Patrick (1966), Lewis (1955) similarly hypothesized and found evidence that there exists a bi-directional causality between financial development and growth. He claimed that the deepening of the financial sector occurs due to economic growth, but that the financial system must well-developed enough to act as a catalyst for growth, to support all sectors of economic activity.

Whereas others like Easterly (2001; 2008) argues that demand for a service must come prior to supply, utilizing education as an example. The idea being that schooling has become

much more accessible and widespread in many areas of Africa, he disregards the idea that available schooling must translate into economic growth. Instead, he states that as many people are still unaware of the benefits or do not believe that the payoff of becoming educated is sufficient, causes demand to be low. Whilst this could reflect poor quality of education and undeveloped institutions (Easterly, 2008). Therefore, the idea is that awareness of benefits drives demand of services, will in this paper be applied on usage of financial services. By contrast, others propose that supply-side policies are more impactful, as explained by Sachs, McArthur, Schmidt-Traub, Kruk, Bahadur, Faye & McCord (2004). They argue that farmers in SSA are forced to irrigate on land with soil deficient in nutrients, due to fertilizer being unavailable in the region. They claim that importing from an exporter like India is too expensive because of high transport cots, unfavorable geography, and hydrology. Resulting in farmers having grown crops without using fertilizer which has only expedited the loss of nutrients. Thus, low agricultural output and efficiency is inevitable due to a lack of supply due to the constraint of its utilization not being cost effective.

2.3 Previous Studies
Combining Theory on Financial Inclusion and Mobile Money with Empirical Data

In the past decade, a substantial amount of studies regarding mobile money in the context of developing countries, propose that mobile money has significantly improved financial inclusion (Abiona & Koppensteiner, 2022; Demirgüc-Kunt, Klapper, Singer, Ansar & Hess, 2018; African Development Bank, 2013). Furthermore, regarding the mobile market in Tanzania, mobile banking has been proposed to be responsible for expediting this process (Clyde & Co, 2014). One study that highlights the success of m-pesa was done by Suri & Jack (2016), who found that m-pesa had lifted approximately 194,000 Kenyan households (2%) out of poverty. Due to the temporal aspect of the study, one could assume that today, after 6 years, this number is significantly higher. As such the potential benefits of mobile money for the poorest quintiles in a society cannot be understated. Whereas FinScope's Tanzania report (2017) highlight several notable facts to consider. Firstly, the share of people living in rural areas were 66% in 2017, whilst 58% of all Tanzanians live on a mean of 2.84 USD per months, whilst 84% of those come from rural areas (FSDT, 2017). Continually, the report proposes that 65% of the population enjoys formal financial inclusion, however, a clear urban-rural gap remains, and that gap is 85.2% vs 65.1% respectively. Therefore, as Donovan (2012) puts it, financial inclusion is imperative, as being poverty stricken does not simply mean low monthly incomes, but it implies a burden of not having access to the proper instruments that can

potentially lift people out of poverty. Equally so, Demirgüc-Kunt, Beck and Honohan (2008) mention that when considering the issue on a national scale, widespread inaccessibility to finance massively inhibits growth and perpetuates income inequality.

Whereas mobile money is brought up as a means of providing access to the poor without having to completely build new infrastructure, rather the system becomes reliant on mobile network agents (called *Wakala* in Tanzania), network operators, with help from banks and governments (Donovan, 2012). As Aron (2018) puts it, mobile money as a technology is able to leapfrog the weak institutional infrastructure or "institutional voids" as Economides and Jeziorski (2017, pp. 815) put it, similarly the high costs related to using traditional banking methods. Donovan (2012) continually agrees in part with the ideas of Patrick (1966) in tandem with the stages of development hypothesis, as he believes one should consider mobile money and financial inclusion in terms of relative stages. As seen below in *figure 2*, the idea is that depending on where an economy is in terms of stages of infrastructural development different applications of mobile money will be used. In developing countries like Kenya and Tanzania, the level of infrastructure is low, therefore the population will mostly be using mobile money instead of banks due to lower opportunity- and transaction costs. However, as uptake increases and these countries develop, the supply of financial infrastructure will follow and demand for banks will increase and eventually overtake mobile money. Whereas Aron (2018) also believed that FI should be defined as a process with different stages, such as semi-formal inclusion, so the focus is not only on formal banking but also to appreciate mobile money for providing the safe and cost-effective ways to make transfers.

Figure 2: Mobile Money Demand Curves for Economies in Different Stages of Infrastructural Development

Regarding more empirical evidence on FI, Lotto (2018) identified demographic factors like age, education, income, and gender, using a household survey done by TWAWEZA, to having been important determinants of FI in Tanzania. Therefore, this study will control for these variables in the quantitative analysis to isolate the effects of being a rural resident compared to urban. The study equally proposed that men and those that enjoy higher levels of educational attainment and that are older are more likely to be financially included. Other determinants as proposed by Allen, Demirgüc-Kunt, Klapper & Peria (2016) are costs, income, distance to financial institutions and financial literacy, therefore, this will also need to be taken into consideration. In the context of Kenya and Tanzania, Fanta & Mutsonziwa (2021) also highlight financial literacy to be a determinant for FI, this remains true after controlling for demand-side factors, as does Beck and de la Torre (2007). Continually, Ogolo (2016) studied six Middle Eastern and North African countries and found that finance-led growth was true for three, namely, Egypt, Morocco, and Tunisia (Ogola, 2016). As causality is not clear and many different variables are thought to be important, these findings must be taken into consideration in the quantitative and qualitative methodology and analyses.

2.4 Contribution to existing literature

The hope for this thesis is that will contribute to the research of financial inclusion and mobile money. Continually, there are numerous quantitative analyses, as the topic has increased in relevance these past decades (see Ogola, 2016; Fanta & Mutsonziwa, 2021, Allen et al., 2016; Economides & Jeziorski, 2017; Lotto, 2018; Demirgüç-Kunt et al., 2008; Adedokun & Aga, 2021). However, the data sets such as FinScope, Findex, CGAP and household surveys on which these studies rely on, use quantifiable questions. Although necessary for the methods used in these papers, the problem is that answers revolving reasons for using or not using a certain financial service are rather shallow and does not allow for in-depth answers. Therefore, the gap which this paper aims to fill surrounding FI and mobile money in Tanzania relates specifically to how experiences, perceptions, and attitudes impacts usage of traditional financial institutions and mobile money FSPs. Whilst attempting to identify overarching themes with a mixed-methods approach, the hope is that in-depth answers will aid

policy makers and researchers to gain deeper understanding of the factors and constraints that hinders widespread financial inclusion.

3.   Hypothesis

The coming section will present three directional hypotheses drawing from the theoretical framework and the literature presented in section 2 (Creswell & Creswell, 2018). Based on Donovan (2012), the first hypothesis is based on the asssumption that differing levels of infrastructure between urban and rural areas will cause statistically significant differences in multiple dimensions of FI between these two groups as seen in FinScope (2017). Furthermore, based on the fact that gender and education are important determinants of FI, the hypothesis is that men and those highly educated will enjoy higher levels of financial inclusion within this sample (Allen et al., 2016; Lotto, 2018).

> *H_1: There will be statistically significant differences between urban and rural individuals and across genders in uptake of mobile money and bank accounts. These differences will persist after controlling for different dimensions of literacy, schooling, and household characteristics.*

The next hypothesis utilizes the stages of development hypothesis and the ideas of Patrick (1966) and Donovan (2012), as mobile money users are believed to have greater levels of trust and understanding of financial services. Thus, their demand for other FSPs will be higher since these individuals will have taken the first relative step towards complete financial inclusion. Whilst this inclination will be more pronounced as they have "learnt by doing" and will have more positive perceptions, awareness, and overall trust towards financial institutions.

> *H_2: Mobile money users will have higher rates of uptake of other formal financial services such as bank accounts and insurances.*

Based on the paper of Allen et al., (2016) who found that financial literacy is key for financial inclusion and the findings of (FSDT, 2017) that state that numeracy and literacy is a persistent issue in Tanzania. The third hypothesis uses these findings and predicts that the marginal effects of these skills will impact the urban-rural gap in usage of financial services. Equally, in tandem with the ideas set forth by Easterly (2001; 2008), who insists that the awareness of benefits is needed prior to supplying a service, financial literacy and numeracy is

hypothesized to increase demand of formal financial services. Whereas if the urban-rural gap remains pronounced or increases as one moves along the scoring index, this may imply that a lack of supply is the reason. Therefore, displaying the issues brought up by supply proponents (Schumpeter, 1911; Shaw, 1973; McKinnon, 1973) and demand proponents (Robinson, 1952; Rousseau, 1998) alike. Whilst the marginal effects of these are believed to be negative on the urban-rural gap in usage, meaning that the gap decreases for higher scoring respondents.

> H_3: *The marginal effects on uptake of mobile money and bank accounts based on respondents' literacy and numeracy levels will be positive and expand the urban-rural gap.*

4. Data and Methodology

Whereas the coming section will explain the specifics of this mixed-methods approach, which is befitting to evaluate whether the theories are reflected by the quantitative results and evaluating if the data is validated by the responses and overarching themes found in the interviews. The specific core design utilized is referred to as *explanatory sequential design*, which follows the process as shown below in *figure 3* and it means that the methodology has two separate phases (Creswell & Creswell, 2018, pp. 218). The approach entails starting with quantitative data collection and analysis, which thereafter were analyzed prior to starting with the qualitative data collection in the form of interviews. This approach allows for the data to be merged later on and to evaluate the constraints that remain both in terms of supply and demand and is especially advantageous to quantitative results in detail (Ivankova, Creswell & Stick, 2006).

Figure 3: Explanatory Sequential Design (Two-Phase Design)
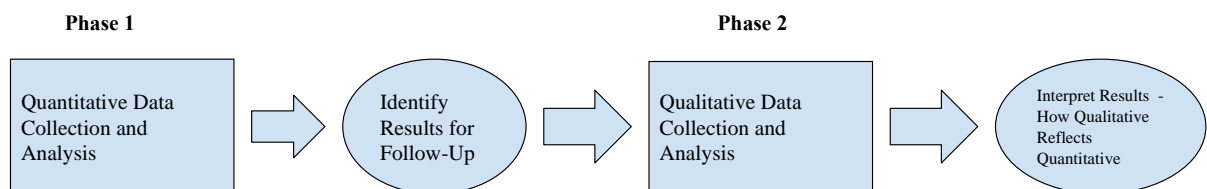
(Taken from Creswell & Creswell, 2018, pp. 218)

For the quantitative analysis, the data used was collected from two different datasets, namely, the FinScope (FSDT, 2017) dataset and the CGAP Smallholder Household Survey

(CGAP, 2016). Firstly, the FinScope Dataset was made by the Financial Sector Deepening trust and the data collection occurred back in 2017 (FSDT, 2021). Regarding its contents, it is a nationwide survey that has an extensive number of questions that revolve around financial behavior in Tanzania, and in total it has 9 459 observations of adults aged 16 and above. Furthermore, this dataset was used to do the sets Ordinary Least Square Regressions (OLS regressions) surrounding questions of financial behavior and literacy to evaluate the impact of these variables on the levels of financial inclusion. Additionally, to measure the impact of mobile money usage on uptake of other formal financial services such as, insurances, pension funds and bank account ownership. Secondly, the CGAP dataset is taken from the World Bank Microdata Library and is from 2016, as collected by the InterMedia Survey institute, which equally is a nationwide survey that is split up into three separate sections and the final section is the one that was used for this paper (CGAP, 2016). Since this section has individual unit level data, contrary to households, to ensure usage of datasets with the same unit of sampling. Nevertheless, the total amount of observations here was 2 795 of adult Tanzanians spread out around the country. The CGAP dataset was mainly used for OLS regressions surrounding questions of mobile money uptake and bank account ownership, i.e., table 1 and 2 in section 5.

4.1 Quantitative Methods

The quantitative analysis will mainly consist of OLS regressions on different types of ownership of financial services such as, mobile money, bank accounts and insurances. Whilst the controls and dependent variables used are based on previous studies. The first table and set of regressions controls for numerous demographic variables like gender, education, awareness, trust as this was shown by Lotto (2018) as important. Furthermore, it includes age and district fixed effects to investigate the specific impact of being a rural resident compared to urban residents in terms of mobile money usage. The question being asked in the FinScope (2017) dataset to establish this is a dichotomous dummy variable that asks whether the person is currently using mobile money, whilst the same is true for bank accounts and insurance coverage. Furthermore, as visualized below, a dummy variable was created to establish whether the respondent lived in rural or urban areas, where urban was coded as 1. Consequently, the coefficient's range will be between 0 to 1, and determining to which extent the sample uses the formal financial services in percentages. Lastly, using the urban dummy variable may act as a proxy for lack of supply, indicating a lack of access and insufficient infrastructure as defined by Donovan (2012). The econometric specification can be understood as:

$$mmacc_i = \alpha + \beta_1 urban_i + e_i$$

The specification measures the likelihood of having a mobile money account, whereas the variables have different meanings. Starting off, α stands for the intercept and the specific mean in mobile money usage in rural areas. Secondly, β is a parameter that is added to depict the mean gap in mobile money usage between urban and rural residents. The last term is e, which stands for the error term and is there to account for any residuals and missed information not encapsulated by the specification which is also the term representing the risk of *Omitted Variable Bias (OVB)* being present (see section 4.3). Additionally, multiple other controls pertaining to demographic information was added, including educational attainment, gender, urban vs rural resident and marital status as many studies have shown these to be statistically significant (Lotto, 2018; Amari & Anis, 2021; Abel, Mutandwa & Le Roux, 2018).

Equally, variables were added such as financial behavior and perceptions of the importance of saving, planning, and investing have been mentioned as important for uptake in several other studies (Perry & Morris, 2005; Annim, Arun & Kostov, 2012; Liang, Wang & Farquhar, 2009). These questions and subsequently responses were scored based on if the respondents agreed or disagreed with the statements. These were coded as either 1 or 0 and adding the sum of these are what lead to the total score per respondent. Furthermore, a dummy variable was added to control for if the respondents had a phone, to add attitudes towards mobile money services. Continually, the last regression models were added to control for age and district fixed effects, whereas respondents were grouped per 5-year thresholds, to minimize the impact of generational differences that may be highly influenced by other factors, such as the growing access to education. Kumar (2005) inspired the controlling of district-specific differences and age-fixed effects was controlled for as other studies have found that it is a significant explanatory variable and impacts financial behavior and cognitive dissonance in general, declining with age (Holland & Rabbit, 1992; Agarwal, Driscoll & Gabaix, 2009; Korniotis & Kumar, 2011; Finke, Howe & Huston, 2017; Gamble, Boyle, Yu & Bennett, 2014). Therefore, the next econometric specification is:

$$mmacc_i = \alpha + \beta_1 urban_i + \beta_2 male_i + \beta_3 aware_i + \sum_{i=1}^{16-20} \theta_1\, age_i + \sum_{i=1}^{Arusha} \theta_2\, district_i + \gamma_1 X + \varepsilon_i$$

The addition of X' stands for a set of control variables, which are not seen in the table of regressions itself. Whilst the last column is another regression model that aims to encapsulate uptake based on income and proxies to control for income, using the FinScope 2017 dataset

(FSDT, 2021). These proxies entails variables measuring a person's ability to save. Whereas controls for financial literacy and numeracy was added as multiple studies have highlighted these to be significant for financial inclusion (Allen et al., 2016; Fanta & Mutsonziwa, 2021; Hasan, Le & Hoque, 2021; Beck and de la Torre, 2007). Similarly, to the previous specification and scoring perceptions, the same methodology was used to score financial situations by coding answers as dummy variables (=1), to create a literacy index. Continually, adding variables to control for demographic characteristics like Lotto (2018), and proxying for income as this has been shown to be substantial in the gap in usage of financial products (Hasan et al., 2021). Consequently, the following specification was used:

$$mmacc_i = \alpha + \gamma_1 urban_i + \gamma_2 male_i + \beta_1 age_i + \beta_2 grade_i + \beta_3 finlit_i + \beta_4 mathlit_i + \beta_5 save_i + \gamma_3 salary_i + \sum_{i=1}^{Arusha} \theta_1 district_i + \eta_1 X^{'} + \varepsilon_i$$

Where, γ_1 is added to have a parameter that measures the impact of the abovementioned dummy variables, whilst β_1 by contrast measures the coefficients of different discrete indices based on respondents' answers to questions on financial literacy, numeracy, as well as the added variable, "*able to save*", mentioned in the section 4.3 (De-Limitations) below as a proxy for income. Furthermore, the same econometric methodology was used for the set of regressions in table 2, whilst the explanatory variables and parameters remain the same, however, the dichotomous dummy variable was replaced with "owns a bank account", visualized as bankacc$_i$. As such, these specifications were as follows:

$$bankacc_i = \alpha + \beta_1 urban_i + \beta_2 male_i + \theta_1 age_i + \theta_2 district_i + \gamma_1 X^{'} + \varepsilon_i$$

$$bankacc_i = \alpha + \gamma_1 urban_i + \gamma_2 male_i + \beta_1 age_i + \beta_2 grade_i + \beta_3 finlit_i + \beta_4 mathlit_i + \beta_5 save_i + \gamma_3 salary_i + \sum \theta_1 district_i + \eta_1 X^{'} + \varepsilon_i$$

Furthermore, regarding the third set of regressions, these instead aim to measure whether mobile money usage increases uptake of other financial services, i.e., bank accounts and insurance coverage. This was done to evaluate whether mobile money increases financial inclusion when conceptualized in terms of relative stages such as Patrick (1966), Donovan (2012) and Aron (2018). The econometric model therefore becomes:

$$y_i = \alpha + \gamma_1 mmacc_i + \gamma_2 urban_i + \gamma_3 male_i + \beta_1 age_i + \beta_2 grade_i + \beta_3 save_i + \gamma_4 salary_i + \sum \theta_1 district_i + \sum \theta_2 district_i + \eta_1 X^{'} + \varepsilon_i$$

As in previous models, the main independent variable is a dichotomous dummy variable, coded as (=1), to see if the respondents use mobile money services, whereas the following control variables are the same to as previous models. The division of columns is as such that 1-3 applies to bank account ownership and 4-6 applies to insurance coverage.

Continually, another set of quantitative estimations were done to measure the marginal effects of both financial literacy and numeracy on bank account ownership and mobile money uptake. The aim of this is to get an understanding of whether the reasons for uptake are based on supply or demand constraints as the linear equation shows the urban-rural ownership gap per similar levels of knowledge. Both numeracy and literacy has been a problem for financial inclusion in Tanzania as it constrains the general population's ability to understand how to use and benefit from financial services (FSDT, 2017). One study that similarly measures how literacy impacts account ownership and intrinsically financial inclusion is done by Hasan et al., (2021), who found that education and income are determinants of bank account ownership. Subsequently, the inspiration for these figures came from a paper done on social democracy and the decline of strikes in Sweden in relation to the share of unionized workers, whilst the methodology is suitable to measure the marginal effects as visualized by a linear relationship of shares (see Molinder, Karlsson & Enflo, 2022, pp. 12). The econometric specification used to establish this linearity can be seen below:

$$acc_i = \alpha + \beta_i urban_i + \beta_2 score_i + \delta(urban_i * score_i) + \varepsilon_i$$

Many of the variables are the same as in previous models, whereas the score variable indicates the parameter that is based on how the respondents fared in questions relating to numeracy and financial literacy. Continually, δ is the newest addition, as it displays an interaction term that used the dichotomous dummy variable of being an urban resident multiplied with the respondents' financial literacy scores or their math scores. This was done to be able to see the marginal effects of numeracy and literacy on the gap in ownership between urban and rural areas holding the same scores constant to depict potential supply constraints.

4.2 Qualitative Methods

The multiple sets of regressions done in the previous section were done to identify statistically significant differences on different outcome variables. The hope being that the qualitative approach will aid in disentangling the mechanisms behind these differences. Therefore, in essence the study will be reliant on qualitative interviews to complement the results of the quantitative analysis as explained by Ivankova et al., (2006) and Creswell & Creswell (2018). Whilst the interviews themselves will be semi-structured interviews, and have open-ended questions revolving around pre-selected topics surrounding FI. The methodology implemented is inspired by the one described by Charmaz (2006). Per Charmaz, one method suitable for identifying overarching themes is founded on deductive reasoning and "saturated

responses". The implication being that once similar responses with the same underlying themes are recurring and no new information relevant to the theoretical considerations of this thesis, the interviewing process will be halted. However, to ensure that this does not happen prematurely, using a semi-structured technique with open-ended questions will aid in this endeavor. As the questions will be directional in a sense, it will allow for making connections between the relationships found in the quantitative data with the interviewees perceived reality. Therefore, the methodology follows a narrative research approach, which implies reconstructing stories of previous experiences (Creswell & Creswell, 2018).

During these interviews, interviewees will be asked about their own experiences, beliefs, perceptions, values, and attitudes towards mobile FSPs as well as other formal financial institutions. The aim with the questions is to deduce how the interviewees' described experiences are connected to overarching themes of each respective institution and intuitively the theories seen in section 2. In other words, these interactions, or lack thereof, serve the purpose of understanding how financial policies pursued by the Tanzanian government played out from the perspective of the populations affected by them. Whereas the explanatory sequential design has two phases. Therefore, it will be crucial to explore the potential differences in the outcome variables of the different set of regressions in the interviews themselves. Thus, the selection of the interviewees will be based on the same demographic characteristics that were added as control variables in the different regressions. Therefore, stratifications will include separation across gender, urban or rural residence, marital status and educational attainment as other studies have found these to be statistically significant (Lotto, 2018; Hasan et al., 2021; Allen et al., 2016; Amari & Anis, 2021; Sanderson et al., 2018; Fanta & Mutsonziwa, 2021). Furthermore, to gain multiple perspectives and varying understandings of themes, interviewees were selected based on different levels of financial service usage, including the ownership of mobile money accounts and bank accounts and those who use neither. This was done to ensure that all relative stages of FI were included in the analysis, in line with the ideas of Aron (2018) and Donovan (2012). These separations are also present in the quantitative analysis as these were used as independent variables. Whereas respondents of the CGAP (2016) and FinScope (2017) datasets were categorized into three separate groups: non-users, mobile money only-users, and both mobile money and bank account-users.

The different locations where interviews were held include Sombetini, Terengero, Mbauda, Ngaramtoni, Uzunguni, Bangata, Unga Limited and Usa River. Furthermore, numerous interviewing techniques were implemented including spontaneous unstructured interviews, meaning conversations thought of as a controlled conversation, where topics

discussed are skewed in the interest of the interviewer (Jamshed, 2014). However, most of the interviews were extensive and semi-structured as described above. In total, twenty-one formal individual interviews were held, two formal group interviews and multiple conversational interviews were held, in sum approximately 50 interviews are the basis for the results seen in the coming sections. Lastly, to aid in transcribing and organizing the results, the transcriptions were color coded using methods described by Stuckey (2015).

4.3 De-Limitations

The first set of limitations are connected to the quantitative approach. One rather significant limitation that should be mentioned regarding the quantitative methods used for this paper is called Omitted Variable Bias (OVB). This is not uncommon for these types of regressions, ordinary least square regressions (OLS regressions), as it means that certain variables may not be included in the regressions done either due to a lack of available variables within the chosen datasets or exclusion of variables based on the assumption that they may not have a significant impact (Angrist & Pischke, 2009). However, to minimize certain risks that come with OVB certain proxies were used to mitigate these factors as much as possible. For example, as income levels per household or individual levels were not available in either the FinScope dataset or the CGAP Smallholder Household Survey datasets, as such a control variable, named "ability to save" was used as a proxy for income. Nevertheless, the OVB limitation cannot be completely disregarded but it is common in many studies which use the same methodology and is not detrimental to the results of the study.

Regarding the qualitative methods used for this paper, there are limitations that are worthwhile to mention. First off, the sample size may not be big enough to provide sufficient representability to be valid for the rest of the population, similarly, Arusha may vary from other cities and locations around the country. However, to mitigate these factors interviews were held with people from both urban and rural areas, within varying demographic characteristics such as age, gender, education level and with people with differing socioeconomic statuses, which in short refers to income levels. Furthermore, another limitation relates to most of the interviewees not speaking English, at least not fluently. To minimize these risks two translators and interpreters were used to minimize any risks that come with the language barrier. Continually, only the most common and widespread responses were subsequently identified as themes that were brought up in the qualitative results sections.

5.0 Results

5.1 Quantitative Results

5.1.1 Regression Results

Table 1: OLS Estimates of Mobile Money Usage on Urban/Rural Gap based on Demographic Factors, Perceptions, Awareness, Literacy, Ability to Save and Employment

	CGAP 16						FinScope 17
	Main	Controls	Trust/awareness	Reduced	Age FE	District FE	Income
(=1) Urban resident	0.240***	0.206***	0.106***	0.0956***	0.101***	0.126***	0.0969***
	[0.0251]	[0.0277]	[0.0235]	[0.0249]	[0.0236]	[0.0421]	[0.0200]
Demographics							
(=1) Male gender		0.0619**	0.0442**	0.0361	0.0432**	0.0632***	0.00914
		[0.0268]	[0.0217]	[0.0230]	[0.0219]	[0.0216]	[0.0125]
Age							-0.00125***
							[0.000406]
Highest grade completed							0.0258***
							[0.00458]
Highest grade attended		0.115***	0.0570***	0.0599***	0.0596***	0.0478***	
		[0.0136]	[0.0121]	[0.0130]	[0.0122]	[0.0122]	
Trust and awareness							
Trust – MM providers			0.0211	0.0236*	0.0217*	0.0235*	
			[0.0132]	[0.0137]	[0.0131]	[0.0131]	
Trust – MM agents			0.0258*	0.0374***	0.0245*	0.0146	
			[0.0134]	[0.0143]	[0.0132]	[0.0132]	
MM awareness			0.0822***	0.159***	0.0801***	0.0701***	
			[0.0107]	[0.00737]	[0.0107]	[0.0108]	
Literacy and Income							
Financial Literacy							0.0331***
							[0.00597]
Math Literacy							0.0248***
							[0.00460]
Ability to save							0.0140***
							[0.00536]
(=1) Earns a salary							0.0159
							[0.0201]
Constant	0.402***	-0.225**	-0.742***	-0.517***	-0.799***	-0.631**	0.156***
	[0.0149]	[0.112]	[0.141]	[0.111]	[0.144]	[0.266]	[0.0466]
Controls							
Demographics	No	Yes	Yes	Yes	Yes	Yes	Yes
Financial behaviour	No	No	Yes	No	Yes	Yes	No
Trust and awareness	No	No	Yes	Yes	Yes	Yes	No
Literacy	No	No	No	No	No	No	Yes
Income proxies	No	No	No	No	No	No	Yes
Fixed effects							
Age	No	No	No	No	Yes	Yes	No
District	No	No	No	No	No	Yes	Yes
Observations	2795	2140	2140	2140	2140	2140	9459
R^2	0.052	0.107	0.401	0.336	0.412	0.497	0.419

Notes: Ordinary Least Squares regression estimates of the gap in the probability of a respondent having a mobile money account, based on various demographic and respondent-specific characteristics. Column (1) depicts a simple difference in means between urban and rural respondents. Column (2) adds controls for demographic variables and also checks for differences between gender schooling. Column (3) adds further controls for mobile money-specific variables, including ownership of a phone, trust and awareness of mobile money providers, while column (4) excludes the financial behaviour variables. Column (5) and column (6) adds age-group fixed effects and district fixed effects respectively. Column (7) adds controls for financial literacy and math literacy, as well as proxy variables for income that measures a respondents ability to save money. Dataset used in regression model 1-6 is the CGAP Smallholder Household Survey 2016 (World Bank, 2016) and the FinScope 2017 dataset (FSDT, 2021) in regression model 7. Standard errors in brackets. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

Starting off, *table 1* as seen above is the first set of OLS-regressions, which analyses the probability of having a mobile money account based on numerous controls. The first column represents the coefficient without having controlled for any of these, whereas the α-constant is 0.402 and the β-coefficient is 0.240. The table uses being an urban resident as a dummy variable (as displayed by =1 in the table). Therefore, the results depicted are the differences in means between urban and rural residents. This indicates that the probability of having a mobile money account in rural areas is 40.2% and in urban areas this likelihood increases by 24%, thus, landing on 64.2%. As displayed by the symbols ***, this is statistically significant at the 1% level, as were all the other coefficients on the same row. In the second column demographic variables are controlled for, as such the coefficient drops to 0.204, i.e., 20.4%. Whilst the gap between genders can is 0.0619, thus, 6.19% while this is statistically significant at the 5% level. Whilst educational attainment is impactful as for every additional step of educational increases the likelihood of ownership by 11.5%.

Continually, for column (3) controls related to financial behavior, trust and awareness of mobile money services are added, whereas a significant drop can be seen as the β-coefficient decreases to 10.6%. Whereas only awareness is deemed notable of the new controls, as it increases probability of usage by 8.22% and is significant at the 1% level. Furthermore, in column (4), controls for behavior are removed, and the β-coefficient's new value is 0.956 or 9.56% showing that awareness is does explain part of this gap. Educational attainment's coefficient has increased from the previous column to a likelihood of 5.99% and is significant at the 1% level. Additionally, trust increases the probability of ownership by 3.74%, also significant at the 1% level.

Continually, for the Age fixed effects column (6), the coefficient is 0.101 or 10.1%, meaning that people of the same age in rural areas compared to urban areas are 10.1% less likely to use mobile money. Whereas mobile money awareness stands out at 8.01%, being significant at the 1% level. Similarly, when controlling for district fixed effects in column (6), the coefficient is high, being 12.6% and significant at the 1% level, whilst mobile money awareness is significant at the 1% level with the coefficient being 7.01%. Lastly, in the FinScope dataset, the regression model found that urban residents were 9.69% more likely to use mobile money, whereas the controls used were gender, age, and educational attainment, however, the impact this had was minute. Further. Controls were added based on financial literacy and numeracy, ability to save (income-proxy) and earning a salary. Financial literacy increased the likelihood of using mobile money by 3.31%, numeracy by 2.48% and the ability

to save by 1.4%, all of these were statistically significant at the 1% level. Lastly, the *R-squared* values were highest in regression model 3, 5, 6 and 7, and the highest is 0.497 for model (6) implying that 49.7% of the variation can be explained by this model.

Table 2: OLS Estimates of Bank Account Ownership on Urban/Rural Gap based on Demographic Factors, Perceptions, Literacy, Ability to Save and Formal Employment

	CGAP 2016						FinScope 17
	Main	Controls	Trust/ awareness	Reduced	Age FE	District FE	Income
(=1) Urban resident	0.150***	0.136***	0.141***	0.140***	0.132***	0.109***	0.0276**
	[0.0174]	[0.0190]	[0.0189]	[0.0189]	[0.0186]	[0.0294]	[0.0140]
Demographics							
(=1) Male gender		0.0395**	0.0363**	0.0370**	0.0266*	0.0325**	0.0295***
		[0.0155]	[0.0153]	[0.0154]	[0.0153]	[0.0154]	[0.00962]
Age							0.00256***
							[0.000281]
Highest grade completed							0.0484***
							[0.00506]
Highest grade attended		0.107***	0.105***	0.105***	0.110***	0.0973***	
		[0.0117]	[0.0113]	[0.0113]	[0.0112]	[0.0116]	
Trust							
Trust – Banks			0.0353***	0.0351***	0.0328***	0.0220**	
			[0.00910]	[0.00923]	[0.00887]	[0.00902]	
Trust – Banks agents			-0.00511	-0.00501	-0.00310	0.00612	
			[0.00917]	[0.00927]	[0.00878]	[0.00878]	
Literacy and Income							
Financial Literacy							0.00175
							[0.00377]
Math Literacy							0.00837**
							0.00354]
Ability to save							0.0159***
							[0.00411]
(=1) Earns a salary							0.294***
							[0.0307]
Constant	0.0445***	-0.360***	-0.389***	-0.481***	-0.410***	-0.389***	
	[0.00562]	[0.0934]	[0.122]	[0.0928]	[0.117]	[0.129]	
Controls							
Demographics	No	Yes	Yes	Yes	Yes	Yes	Yes
Financial behaviour	No	No	Yes	No	Yes	Yes	No
Trust and awareness	No	No	Yes	Yes	Yes	Yes	No
Literacy	No	No	No	No	No	No	Yes
Income proxies	No	No	No	No	No	No	Yes
Fixed effects							
Age	No	No	No	No	Yes	Yes	No
District	No	No	No	No	No	Yes	Yes
Observations	2795	2140	2140	2140	2140	2140	
R^2	0.058	0.144	0.163	0.159	0.189	0.284	

Notes: Ordinary Least Squares regression estimates of the gap in the probability of a respondent having a bank account, based on various demographic and respondent-specific characteristics. Column (1) depicts a simple difference in means between urban and rural respondents. Column (2) adds controls for demographic variables and also checks for differences between gender schooling. Column (3) adds further controls for bank-specific variables, including trust of bank institutions, while column (4) excludes the financial behaviour variables. Column (5) and column (6) adds age-group fixed effects and district fixed effects respectively. Column (7) adds controls for financial literacy and math literacy, as well as proxy variables for income that measures a respondents ability to save money. Dataset used in regression model 1-6 is the CGAP Smallholder Household Survey 2016 (World Bank, 2016) and the FinScope 2017 dataset (FSDT, 2021) in regression model 7. Standard errors in brackets. * p < 0.1, ** p < 0.05, *** p < 0.01.

Secondly, table involves the same set of regressions, whereas the dependent variable has changed to having a bank account. Regarding the results, the α-constant 0.0445 and the β-coefficient is 0.15, meaning the probability of having a bank account as a rural resident is 4.45% and it is 15% higher in urban areas, landing on 19.45%. All of the β-coefficients of being an urban resident are statistically significant at the 1% level. Similarly, with the addition of demographic controls reduced the urban-rural gap to 13.6% and remain relatively unchanged for models 2 to 5. Furthermore, in model (2) educational attainment is more impactful than gender, whilst educational levels increase likelihood of bank account ownership by 10.7%, with a 1% statistical significance, whereas males are 3.95% more likely to have a bank account, statistically significant at the 5% level. Regarding model (3) and (4) the control variables fluctuate slightly but the changes are minute compared to model (2). As such controlling for financial behavior and trust, nor removing controls for behavior has any significant impact on the results. Followed by model (5), where age fixed effects are controlled for causes the coefficient of the urban-rural gap decreases to 0.132. Whereas model (6), which controls for district fixed effects minimizes the gap to 10.9%, and educational attainment reaches its trough compared to other models, as its coefficient has decreased to 0.0973 or a probability of 9.73%, with a 1% statistical significance.

Whilst model (7) uses data from FinScope (2017) and includes demographic variables which are gender, age and educational attainment as well as financial literacy, numeracy, ability to save and whether the respondents earn a salary. Continually, its β-coefficient is 0.0276 with a 5% statistical significance. Meaning that rural residents are 2.76% less likely to have a bank account than urban residents. The most considerable control is earning a salary, which is a dichotomous dummy variable (=1), as it increases the likelihood of having a bank account with 29.4% with a statistical significance of 1%. The model also has controls that are not shown in the table, that control for district fixed effects. Whereas the R-squared value was the highest for this model as 33.6% of the variation can be explained by this model, followed by model (6) of the CGAP (2016) models, which explains 28.4% of the variation.

Table 3: OLS Estimates of Mobile Money Usage on Uptake of Other Formal Financial Services based on Urban/Rural Gap, Gender, Education and Ability to Save

	Bank Account			Insurance Coverage		
	Basic	Income controls	Fixed effects	Basic	Income controls	Fixed effects
Mobile Money	0.0420***	0.0159**	0.00571	0.0625***	0.0483***	0.0435***
	[0.00763]	[0.00776]	[0.00715]	[0.0106]	[0.0108]	[0.0107]
Controls						
Urban	0.0955***	0.0694***	0.0232*	-0.0460***	-0.0609***	-0.0322*
	[0.0126]	[0.0125]	[0.0133]	[0.0120]	[0.0119]	[0.0186]
Male	0.0502***	0.0352***	0.0277***	-0.00700	-0.0157	-0.0351***
	[0.00970]	[0.00948]	[0.00915]	[0.0111]	[0.0109]	[0.0102]
Educational attainment	0.0514***	0.0396***	0.0464***	0.0263***	0.0187***	0.0308***
	[0.00486]	[0.00488]	[0.00486]	[0.00504]	[0.00504]	[0.00502]
Ability to save		0.00686	0.0161***		0.0175***	0.0203***
		[0.00435]	[0.00412]		[0.00448]	[0.00460]
Constant	-0.180***	-0.166***	-0.176***	0.0235	0.000409	-0.188***
	[0.0131]	[0.0157]	[0.0682]	[0.0153]	[0.0181]	[0.0568]
Controls and Fixed Effects						
Income controls	No	Yes	Yes	No	Yes	Yes
Age FE	No	No	Yes	No	No	Yes
District FE	No	No	Yes	No	No	Yes
Observations	9459	9459	9459	9459	9459	9459
R^2	0.183	0.273	0.349	0.026	0.047	0.158

Notes: Ordinary Least Squares regression estimates of the impact of having a mobile money account on conventional forms of financial inclusion. Column (1)–(3) measures the impact on having a bank account while column (4)–(6) measures the impact on having any form of insurance coverage. Column (1) and (4) includes controls for gender and educational attainment, as well as the urban-rural dummy to proxy for differences in supply. Column (2) and (5) adds controls for income by adding various proxy variables measuring a respondents ability to accrue enough money to save, while column (3) and (6) includes age and district fixed effects to control for generational and district specific differences. Dataset used is the FinScope 2017 dataset (FSDT, 2021).

Regarding table 3, the first set of regressions estimates the impact of mobile money usage on bank account ownership (see column 1-3). The specific controls are urban vs rural residency, gender, educational attainment and lastly an index created using the respondents' self-reported ability to save. Starting off, in model (1) having a mobile money account increases the probability of having a bank account with 4.2%, whilst the coefficient is significant at the 1% level. Furthermore, considering the control variables, being an urban resident has the most significant impact, followed by education and thereafter gender. All three are significant at the 1% level, whilst the probabilities are 9.55%, 5.14% and 5.02% respectively. In Model (2), controls for the respondents' ability to save are added. Similarly, to model (1), all demographic controls are significant at the 1% level, whereas being an urban resident remains the most impactful, however, all three have experienced a reduction. The index for being able to save is not statistically significant, whilst the overall probability of bank account ownership decreases to 1.59%, statistically significant at the 5% level. Lastly, in model (3), when controlling for district and age fixed effects the coefficient decreases to 0.00571 or 0.571% and is not

statistically significant on any level. Whilst educational attainment and gender are still statistically significant at 1%, increasing the likelihood of bank account ownership by 4.64% and 2.77% respectively. Continually, the respondents' self-reported ability to save is now significant at the 1% level, and mobile money increases probability of having a bank account by y 1.61%. The last model has the highest R-squared value of these three models and explains 34.9% of the variation.

By contrast, column 4-6 instead treats the impact of using mobile money on insurance coverage and the same controls are used. Firstly, in model (4) the α-constant is 0.0235 and the β-coefficient is 0.0625, meaning that those who do not have mobile money have a 2.35% probability of having an insurance, whereas for those that do, the likelihood increases to 8.6%. Furthermore, urban residents are 4.6% less likely than rural residents to have both insurance and mobile money, education increases this probability by 2.63%. Model (5) adds the control variable ability to save propensity to save, the probability decreases to 4.83%. All three are statistically significant in this model. Being an urban resident decreases has a negative coefficient, and the probability is now -6.09%, whereas education increases the probability of having an insurance by 1.87% for mobile money users, whereas the ability to save has a slightly smaller impact, with a probability of 1.75%, all three are significant at the 1% level.

Lastly, when controlling for age and district fixed effects, the likelihood of insurance coverage based on mobile money ownership has decreased to 4.35% with a 1% level of significance. The gender gap has decreased to a probability of -3.51%, meaning women are more likely to have insurance. Furthermore, education is still the variable that increases the probability of uptake the most, landing on 3.08%, whilst ability to save a slightly smaller impact at a 2.03% increase. All three of these are significant at the 1% level. Lastly, the *r-squared* values were relatively low compared to previous models, with the last regression being most explanatory for as 15.8% of the variation is explained by the model.

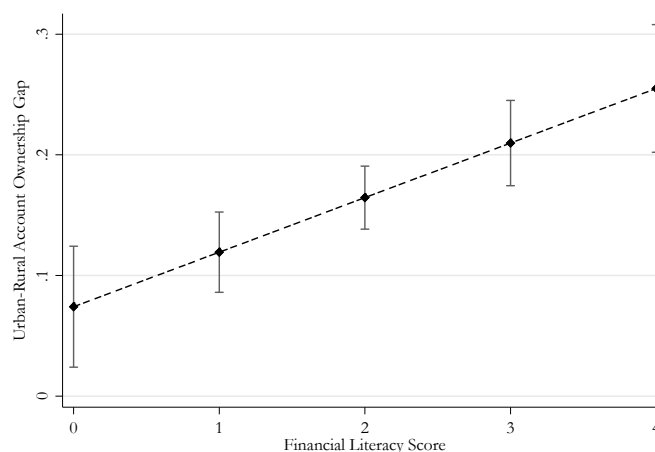### 5.1.2 Marginal Effects of Financial Literacy and Numeracy

The following figures aim to show the marginal effects of math scores and financial literacy questions based on FinScope's (2017) dataset on the Urban-Rural Gap in ownership on either mobile money usage or bank account ownership.

*Figure 4: The Marginal Effects of Financial Literacy Scores on the Urban-Rural Gap in Mobile Money Usage*
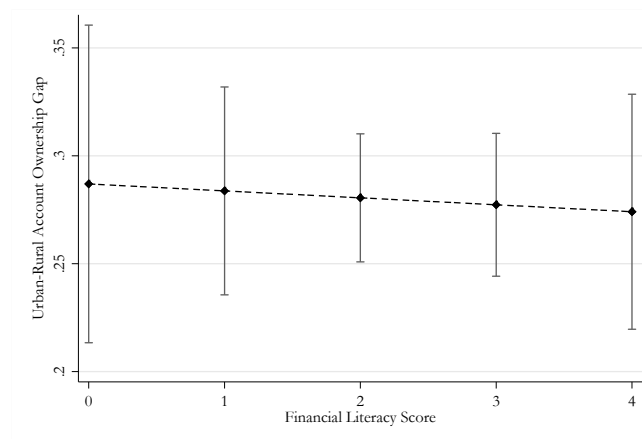
The results show that the marginal effect of being more financially literate on the urban-rural gap in mobile money. The scores are based on data from FinScope (2017). Continually, the marginal effects are slim and there is only a slight improvement in the gap. Starting off at approximately 29% and decreasing to only 27% for those who scored the highest in both urban and rural areas.

Figure 5: The Marginal Effects of Financial Literacy Scores on the Urban-Rural Gap in Bank Account Ownership

By contrast, the marginal effects of financial literacy on the urban-rural Gap in bank account ownership was rather significant by comparison. As the gap increased from 8% to 25%, implying that those living in rural areas with the "full" financial literacy are significantly less likely to own bank accounts compared to their counterparts in urban areas.

Figure 6: The Marginal Effects of Math Scores on the Urban-Rural Gap in Mobile Money Usage
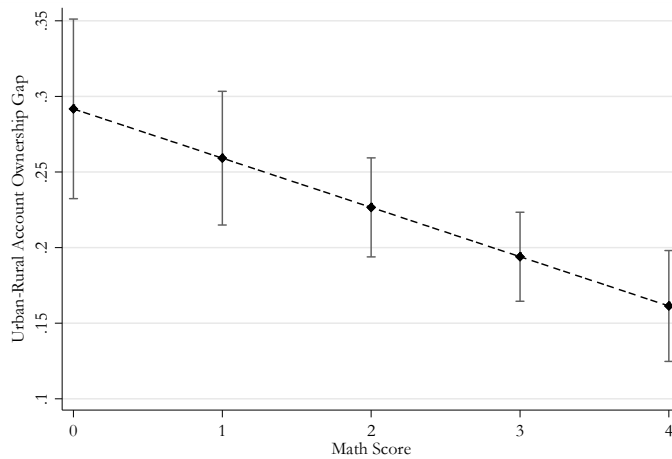
For *figure 6,* the results depict the marginal effects of scoring higher on math-related questions to measure numeracy amongst the respondents. The gap between urban and rural residents is at its highest for those with the lowest levels of numeracy, standing at approximately 29%. However, as one moves gradually along the different scoring points, when the respondents had 4 out of 4 questions answered correctly, the gap in mobile money usage had decreased to only approximately 17%.

Figure 7: The Marginal Effects of Math Scores on the Urban-Rural Gap in Bank Account Ownership
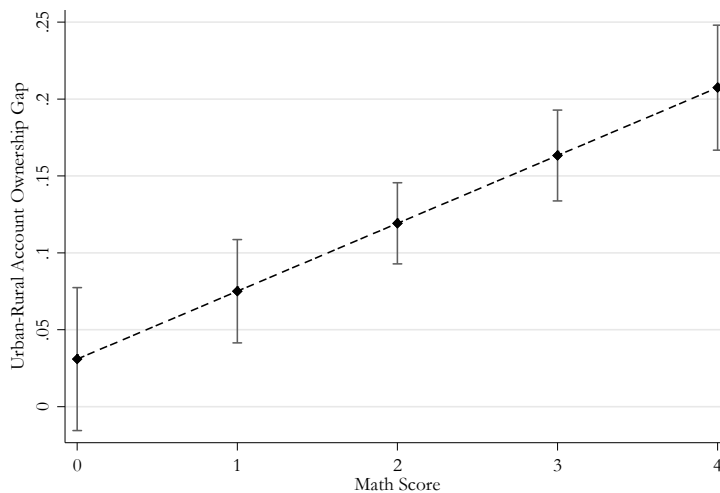
Lastly, *figure 7* similarly displays the marginal effect of different math scores, however, now the impact on the urban-rural gap in bank account ownership is being examined. The gap increases significantly as one moves along the line, with the gap for those scoring 0 out of 4 only being around 3%. Compare those who scored 4 out of 4 in both urban and rural areas, the gap has increased to approximately 20%.

5.2 Qualitative Results

Numerous topics were explored in-depth throughout these interviews, and they pertained to usage of financial services such as bank accounts, mobile money services, insurances, pension funds, investments. Continually, information of the interviewees such as, familial background, occupation, educational attainment, household incomes were also discussed. Lastly, topics relating to the interviewees' financial awareness, literacy, behavior and general attitudes towards financial institutions and the government were discussed. In accordance with the subjects' willingness to share this information, individual names will not be disclosed as many interviews were very personal and honest. Posted below are the major recurring themes that have been summarized and paraphrased.

Executive Decision to Shutdown Community Banks

Starting off, one recurring theme in many interviews relates to institutional constraints and to the fact that of how Magafuli, the former late president revoked the business licenses for various financial institutions such as the Bureau of Exchange and five Tanzanian community banks, as described by Materu (2018). Whilst Meru Community Bank was one of five banks that were shut down. Numerous interviewees claimed to have been negatively impacted by this executive decision, causing many savings groups and communities to lose both group savings and personally savings. Whereas many of these were saving intensively to be able to open-up industry-like businesses. Consequences regarding this varied in terms of trust towards banks, there were those who stated that their trust was likely lost forever, whilst a small share decided to open bank accounts later on. Most of those that did re-open their bank accounts chose to do so with the National Microfinance Bank (NMB) as they were regarded to be a government bank. Due to the fact public sector employees typically receive their salaries there. Therefore, many interviewees believed that having using a government owned bank would be a way to hedge against un-expected foreclosures or other disturbances. Recently, the Bank of Tanzania stated that they will try to refund these savings, however, they will only cover approximately 65% according to the interviewees.

Awareness of Bank Accounts and Mobile Money

Continually, much awareness about bank accounts and ownership relates to the public sector and many different firms in the private sector paying out these salaries to the bank. As FinScope (2017) reported, 96% of all transactions are done in cash. As such, many were required to obtain a bank account to be able to start their formal employment. Herein lies,

another constraint, as many of the interviewees are small-time business owners. Whilst there certainly were some that had bank accounts, most are simply not aware of how much they will earn in a week. Therefore, someone with a stand at a local market will not enjoy any of the benefits that come with being formally employed and are not as incentivized to become financially included. Lastly, it was clear that many had lost their formal employment because of the global pandemic. Comparatively, all interviewees were awareness of mobile money.

High Fees – Deposits, Withdrawals and Monthly Fees

Furthermore, the consensus was that banking fees had decreased slightly these past two years, they were still regarded as too high for a majority of those interviewed, as deductions occur monthly and whenever someone withdraws their money. Many felt that income was a major constraint, whilst many accounts had become dormant because of these monthly deductions. Problematically, many people were not aware of the monthly deductions or general requirements, as such not being educated by bank staff beforehand lead to people losing their savings. Whilst the few banks who came to rural villages with the intentions of marketing and educating the people on the benefits of bank accounts often promised that loans would be provided if they opened an account and that owning bank accounts were free of charge. These promises seldomly materialized and consequently influenced the people's trust and perceptions of banks. Continually, for someone who only has 3,000 TSh profit per day, travelling from the village into town to get to a bank branch to deposit means they must shut down their stand and lose out on business, taking time to travel as well as pay transportation costs that ultimately may equal their daily profit. This reflected the opinions of those who stated that income was the main constraint for bank account ownership.

Poor Incentive Structures amongst Banks

Another inhibition for trust amongst the population was mentioned both by bankers themselves and customers. Relating back to being told that joining banks would lead to many benefits materializing. According to the bankers, the salespeople of banks are incentivized to go out and make these promises as they get performance reviews based on how many people that sign-up via monetary compensation built into the reward-structure. As such, the reality becomes that a bank may have 50 sign-ups for new accounts in a month, whilst another 60 are becoming dormant and inactive. This is the consequence of miseducation as people are not getting all the information required to understand how monthly fees work or that monthly deposits may be a necessity, displaying issues of asymmetric information.

Traditional Lifestyles and a Generational Gap

Furthermore, regarding the Maasai who lived in a traditional sense, who mostly depend only on their own agriculture and cattle. Education and awareness about banks and financial institutions were very low. When asked whether they would like to own a bank account, many said they could only consider it if they received a proper education on the topic. Furthermore, many expressed that there is large gap in education compared to urban areas. Nevertheless, nowadays many parents are being taught by their children about mobile money and bank accounts, depicting a generational gap. As many parents did not attend school, whereas almost all children nowadays must attend school. One parent claimed that for his generation roughly 70% attended primary school, with that number now being up to 90-95%. The children get awareness from teachers who explain the benefits of having a bank account. Therefore, a previous constraint relating to demand is thought to have been the provision of education. As many explained that lack of education and awareness had impacted their ability to trust financial institutions.

Mobile Money is Not Substitutable for Rural Residents and Demand is Inelastic

For mobile money, almost all of those interviewed utilized it, whilst a majority of these only did so in the form of transfers and withdrawals. Continually, it was commonplace rural residents relied on domestic and international remittances, where children would send money either from working in cities like Dar Es Salaam or from overseas. Nevertheless, some used other services like insurance services or microfinance loans. Continually, many of those interviewed said that they did at some point save via mobile money applications, however, this number has dropped heavily after the fees have been raised these past two years. Nevertheless, many still felt that it still outweighed travelling into town to either make transfers, deposits, or withdrawals. Similarly, many of the interviewees explained that the combination of low incomes and raised fees have only made things harder for them, as they believe transportation and opportunity costs related to going into town to a bank are too high. The consensus was that therefore they are still hugely dependent on the remittances of their friends and family, thus, not using mobile money is not possible.

6.0 Discussion

6.1.1 Mobile Money Ownership

Starting off, the first set of regressions done in *table 1* have several implications worthwhile to discuss. The coefficients and the constant as mentioned, point out that the likelihood of having a mobile money account in rural areas is drastically lower than in urban areas, the probability being 40.2% and 64.2% each. When controlling for demographic factors the gap decreases but is still significant. The most significant variables influencing the gap across the different models were awareness of mobile money, educational attainment, and gender, thus, the findings confirm the same ideas as Lotto (2018). One possible explanation for the gap is found in the qualitative interviews, namely that some rural residents adhere to traditional lifestyles depending only on their own production. The Maasai that were interviewed, used cash for daily transactions and in rare cases mobile money for school fees. Whilst their claims that a mistrust towards banks and other financial services is caused by their lack of awareness and education, promoting the ideas of (Easterly, 2001;2008). However, many proclaimed that they only started using mobile money these past two years, thus, the temporal aspect of the CGAP and FSDT dataset may be considerable. The technology may already have permeated the fabrics of society today. Whereas for banks this may be an undergoing process.

Regarding supply constraints, income was a clear constraint and reason for people not using mobile money services, even for those that wished they owned an account. Furthermore, the high-fees and regressive fee structure (see GSMA, 2021) was a recurring issue for many that caused many to stop using these services. *Table 3* indicates that mobile money usage does not impact bank account ownership by a significant amount, especially when controlling for explanatory variables. Rather being male, urban and educated were the determinants. However, notably, mobile money usage did show more promise in increasing insurance usage, furthermore, this effect was skewed to rural residents' favor. This is likely due to the ease interviewees expressed regarding using other m-FSPs, as it is cost-effective and easily accessible. Furthermore, in line with demand proponents like Easterly (2001; 2008) the marginal effects of financial literacy and numeracy illustrate that providing education may increase the demand for a service, as seen as the urban-rural gap decreases in both *figure 4 & 6.* The effect was, however, lower for financial literacy than for numeracy, this could indicate that numeracy is a more impactful determinant than financial literacy. However, based on the findings of the qualitative interviews, this could also be due the data used for the quantitative

analysis stemming from 2017, meaning that this gap has decreased further as the interviews suggest.

6.1.2 Bank Account Ownership

In *table 2* the urban-rural gap in terms of bank account ownership was evaluated, whilst the probability of owning a bank account in rural areas were 4.45%, compared to 19.45% in urban areas. When controlling for gender and educational attainment the gap decreases slightly, however, the difference is minute. Similar to *table 1,* the most impactful variable is education as it for all different regression models increased the probability of having a bank account by approximately 10%. As such the provision of education is believed to be a demand-related constraint applicable on numerous financial services. Furthermore, for the income-based regression-model, earning a salary was hugely influential on bank account ownership. This is in line with what many proclaimed were their original reasons for getting a bank account and how they became aware of banks. As many stated that it was through formal employment especially within the public sector but also for private companies who urged their employees to get them to receive their salaries via banks. Therefore, another constraint relates to a lack of formal employment, whereas this is thought to be an institutional constraint rather than supply and demand. Problematically, this issue was especially prevalent in rural areas as most earn their incomes through small businesses, whereas the income from one day's labor seldomly passed 10,000 TSh. Therefore, when faced with deducing daily profits for traveling to banks, the opportunity costs of shutting down their businesses, paying transaction costs, monthly deductions depict issues akin to supply-led hypothesis proponents (McKinnon, 1973; Shaw, 1973; North, 1991; Aron, 2018). As such, it would be wise for policy makers to aim to reduce these transaction costs, further, as demand for mobile money is deemed to be inelastic, the substitute-effect cannot prevail if costs still outweigh the benefits. Therefore, suggestions include increasing interoperability as this has been stated as a major benefit of mobile money (GSMA, 2016) and to ensure that Tanzania can reach the levels of infrastructural development where collaboration is the norm as per Donovan (2012)

Furthermore, decisions by the government to shutdown numerous community banks set back efforts to financially include many rural residents, as those that were able to overcome widespread perceptions of distrust were negatively impacted after losing their savings. As such the role of the government in changing these perceptions may need to become a priority in conjunction with increasing education and awareness of financial services as this is believed to be a present demand constraint. Positively, the consensus amongst interviewees in rural areas

was that there is a generational gap that has been improving, in fact many of those who had started using bank accounts and other financial services had done so after their children had been educated on the topic in school. Therefore, the goal should be to ensure that proper infrastructural levels exist as this generation become fully economically active. Furthermore, regarding *figure 5* and the marginal effects of financial literacy on the urban-rural gap in ownership, the gap increases significantly, going from 8% to 25%. This is thought to be due to be directly related to a lack supply of bank branches in these rural areas and could likely partially be further hindered by income constraints and transportation- and opportunity costs as supply proponents suggest. Whilst in *figure 7*, the marginal effect of numeracy upon the urban-rural gap in ownership goes from around 3% to 20% for those that scored the highest, which is thought to be explained by the same constraints. However, compared to mobile money which the rural population in the sample all showed comprehension and awareness of, bank awareness was lower in more traditional areas. Similarly, areas that lived more traditionally showed more distrust due to this lack of education, as such the provision of education is likely to improve this. In terms of literature, this could be a combination of supply and demand constraints, as Easterly (2008) states that education of benefits may increase demand. Whereas the lack of sufficient supply of banks in these areas and financial infrastructure outside of cities is thought to exacerbate this effect per the ideas of Donovan (2012) and Sachs et al., (2004) as cost-effective methods are not available or sufficiently beneficial at least.

7.0 Concluding Remarks

To conclude this paper has aimed to evaluate the impact of mobile money on financial inclusion and other outcome variables of a similar nature. Furthermore, a mixed-methods approach was used to attempt to bridge the gap in literature by finding in-depth explanations as to why or why not people may use financial services. These include exploring interviewees' values, experiences, attitudes, perceptions and trust towards financial institutions and service providers. Therefore, the aim set forth was that the quantitative analysis was to act as the foundation by controlling for explanatory variables proposed as determinants in previous literature. Thereafter these would be explored in semi-structured qualitative interviews. Whereas the main objective of doing this was to try to find constraints that inhibit the financial inclusion of rural residents and these constraints have been thought of as either institutional constraints or demand/supply obstacles. Furthermore, the marginal impact of math scores and financial literacy scores were studied, akin to the methods used by (Molinder et al., 2022, pp. 22) to evaluate the impact of these determinants on the urban-rural gap in ownership of financial services. This was done to test which theoretical considerations and explanations that may be particularly useful for policy makers to consider going forward.

The results of the paper showed that there is a clear urban-rural gap in terms of mobile money usage. Whilst the most impactful variables on this gap was educational attainment and being a male (see *table 1)*. The interviews provided two considerations that act as constraints in terms of limiting this gap and increasing financial inclusion in rural areas. Firstly, the issue of increased fees of mobile money these past years, which is regarded as an obstacle to financial inclusion, which is problematic as financial inherently means to to make financial opportunities affordable and accessible for all. Yet the impact is particularly pronounced for rural residents and poverty-stricken individuals, who typically are those relying on remittances the most. Similarly, the fact that mobile service providers typically use regressive fee structures which is considered to accomplish the same as above. As such these directives are deemed contradictive to what many policy makers hopes to facilitate. Similarly, this becomes problematic on a national scale as less savings and funds are directed into the economy and this could be a constraint of macroeconomic proportions. This was also supported by the fact that demand for mobile money in rural areas, per their own explanations was inelastic, making increased fees a problem increasingly problematic. Furthermore, the marginal effects of financial literacy and numeracy on the urban-rural gap in mobile money illustrates the points of Easterly (2001; 2008), that providing education may

help in increasing the demand for a product or service, applied in this case on financial services (see *figure 4 & 6*).

Furthermore, in *table 2* the urban-rural gap in terms of bank account ownership was evaluated. The gap remains, however, with more basic estimates and controls, the gap was 4.45% vs 19.45%. Therefore, one issue that needs to be addressed is bank account ownership and awareness in general. Income levels remain low, and this was consistently reflected in interviews as well, whilst many proclaimed that they wanted to have a bank account but were limited by their own earnings. However, income is deemed especially problematic for rural residents, due to the added dimension of a lack of supply of bank branches in rural areas. This is because of that those that state that they have sufficient income to own a bank account, rather the opportunity costs, both in time and money makes the costs outweigh potential benefits. As such, ensuring that sufficient infrastructure is present could ameliorate the situation. Whereas the marginal effects of math and financial literacy on bank account ownership (see *figure 5 & 7*) depicts that despite the provision of education or knowledge, the gap increases along the index. Therefore, taking into consideration the ideas of the supply-led growth hypothesis (see Schumpeter, 1911; Shaw, 1973: McKinnon, 1973) and of Sachs et al., (2004) there exists a need of increased accessibility, affordability, and convenience to banks in rural areas.

When investigating the impact of mobile money on uptake of other financial services (bank accounts and insurance coverage), the quantitative analysis established that for this sample, it did have positive impact, however, not as much as was expected. Continually, the largest determinant for these models were being an urban resident, educational attainment and thereafter gender. This could be explained by a few things uncovered during the interviews, however, mainly that those who use mobile money in rural areas, use it for daily transactions but mostly for sending and receiving remittances. Whereas there were several interviewees who indicated that they had started using insurances or at least investigated them via their m-money applications. Therefore, the causal explained could be related to similar costs for why mobile money is seen as crucial in increasing financial inclusion, because of the easy accessibility and affordability, relating back to reduced transaction costs many believe to be the goal of FI. Whilst rural residents were more likely to have insurances based on mobile money usage.

Going forward policymakers need to ensure that regulations change for banks, regarding incentive structures and the amount of asymmetric information that sways in the banks favor. As in the long-term it is believed that this may increase trust towards financial

institutions and inherently usage, causing profits to increase for both the state and banks alike. Similarly, to change regressive fee structures which were implemented to encourage bank usage. As the aim of mobile money is to include more people in the financial system, what was a genius invention able to leapfrog deficient infrastructure, is reduced by the fees being highest for those with the smallest amount of income. One way to improve supply at a less costly price is to increase collaboration and interoperability with mobile network providers, thus, prices may be set by the market at competitive prices rather than the state getting involved. Ultimately, the poorest segments of Tanzania's society are those that have suffered from these interventions, whilst measures are viewed as contradictive to the agenda set forth by FinScope Tanzania (2017). To further research on the topic, it would be highly advisable for researchers to continue doing research with the recent data that will become available this year, to be able to understand what levels of financial inclusion in Tanzania are most truthful. Similarly, it is the opinions of this author that the qualitative aspects of this study helped immensely in gathering a valid picture of how things are and that many things would not have been discussed if purely using a quantitative approach. Therefore, other studies may want to consider using mixed methods for this subject or others as perceptions and attitudes deeply impact why we do the things we do.

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