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# **Mobile Money in Tanzania – A Panacea for Financial Inclusion?**

by

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## ***Abstract***

*Despite developments in economic growth theory, the importance of savings and investment has remained consistent.*

*It intrinsically connects to the importance of functioning financial intermediation and high levels of financial inclusion. While Sub-Saharan Africa still lags, Tanzania has during the last decade seen a rapid rise in mobile money services. This paper attempts to answer the potential of this technology in improving financial inclusion, by investigating the usage patterns of it, as well as how it eases in reducing existing constraints of improving the level of formal financial inclusion. Theory suggests that both supply factors, e.g., access, and demand factors, e.g., literacy, are potential constraints. Using multivariate regressions and qualitative interviews, these constraints help in explaining the current situation. The result show that while mobile money provides financial services to poorer individuals previously unattainable including small-scale loans, savings, and remittances, it should not be viewed as a panacea for conventional forms of financial inclusion. Supply of bank services, income, and literacy are important factors in explaining low levels of bank account ownership, while demand factors also play a role, with uptake gaps falling considerably after controlling for awareness. No causal link appears to exist between mobile money and formal financial inclusion. These constraints point to the importance of a provision of education among older generations, better access to modern infrastructure enabling access to bank branches, and better access to formal employment.*

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## **List of Abbreviations**

OVB: Omitted Variable Bias

OLS: Ordinary Least Squares

FSDT: Financial Sector Deepening Trust

FSP: Financial Service Provider

SSA: Sub-Saharan Africa

TSH: Tanzanian Shilling

GDP: Gross Domestic Product

ATM: Automatic Teller Machine

FE: Fixed Effects

MM: Mobile Money

FI: Financial Inclusion

# 1. Introduction

While global inequality between nations reached its peak by 1970 (Milanovic, 2016), this stylized fact does not accurately describe the situation in the poorest part of the world, Sub-Saharan Africa. There the development has been the opposite, with the GDP per capita of the European Union going from being 9,7 times higher than that of sub-Saharan Africa in 1970, measured in constant 2015 USD, to 19,6 times higher by 2020 (World Bank, 2022). The issue has created a long line of research on how to achieve economic growth, one of the most influential (Perkins et al., 2013) being the Solow growth model, named after the economist Robert Solow in 1956.

At the center of the Solow model is the importance of capital accumulation, achieved through a steady flow of new investments generated from household savings (Solow, 1956). The process required to facilitate these flows is a functioning financial system, also known as financial intermediation (Perkins et al., 2013). The ability of banks to establish a process of gathering household savings however requires the connection of household's savings to financial institutions. Financial intermediation therefore directly ties into the issue of financial inclusion (FI), defined by the World Bank (2014) as "the share of individuals and firms that use financial services" (p. xvii). FI in Sub-Saharan Africa however remains low, with more than 80 percent of the adult population lacking access to any formal financial services and only 22 percent of the total adult population having access to a regular bank account (Adedokun & Aga, 2021). Financial inclusion is in other words a current issue and can help in explaining part of the currently low GDP per capita levels.

In contrast to this bleak image, the country of Tanzania has seen a rapid rise in mobile money usage since introduced in 2009, with 38 percent of adults using it in 2015 (Abiona & Koppensteiner, 2022), rising further to 60 percent in 2017 (FSDT, 2017). The technology has been shown to be beneficial in terms of consumption smoothing and human capital investments (Pradhan, Upadhyay, & Upadhyaya, 2008) in both Tanzania (Abiona & Koppensteiner, 2018) and Kenya (Jack & Suri, 2014), which also positively affects growth (Barro, 2001). Mobile phones could reduce communication costs (Aker & Mbiti, 2010), while mobile money could also reduce the level of transaction costs as the service enables faster and easier remittances compared to cash-based transactions, making it easier to send smaller amounts at a lower cost (Ahmad et al., 2020), which can have additional benefits for growth (North, 1991). It furthermore gives access to services previously unattainable, acting as a form of poverty alleviation (N'dri & Kakinaka, 2020). For this

reason, it would be beneficial to know the potential that mobile money has in improving the overall level of financial inclusion, as it could be argued to be a prerequisite for economic growth.

### **1.1 Aim of the study**

The purpose of this paper is therefore to understand what current constraints exist in expanding uptake, and the potential of mobile money in providing further formal FI. It will also explore what pieces of the financial inclusion puzzle it solves and what pieces mobile money has not solved. Firstly, it will investigate the difference in mobile money account and bank account uptake across various explanatory variables that acts as proxies for supply and demand. This question is asked to better understand where the limitations of financial inclusion currently exist, and what would be needed to improve the level of formal financial inclusion. Secondly, the paper will try to explain how mobile money helps in improving the level of conventional forms of FI. This improvement can occur in two ways, either through the increased usage of certain financial services, or as a catalyst in transitioning towards more conventional forms of financial inclusion. This question is investigated to fully grasp the potential for alternative financial solutions, i.e., mobile money, in improving financial inclusion, and where it does not suffice. These questions will be answered using various models of multivariate regressions. The analysis will be complemented with a section consisting of in-depth analysis of real-life experiences and attitudes towards financial services through qualitative interviews conducted in the Arusha region of northern Tanzania.

### **1.2 Contributions**

While previous studies have been conducted, there are limitations in their scope. Several of the studies conducted until this day has aimed and understanding the situation as it is today, without providing any guiding thoughts on the full potential of mobile money. In an early study after the introduction of mobile money it was found that both banked individuals were more likely to use mobile money (Jack & Suri, 2011), and that mobile money reduces the use of informal financial services while also increasing the probability of being banked (Mbiti & Weil, 2011). Yenkey, Doering, and Aceves (2015) also find a positive correlation but are hesitant in drawing any causal inference from their results. The results are in other words ambiguous. Besides the ambiguity of the results in the existing literature, it does not attempt to answer the direction of causation and is furthermore largely limited to the Kenyan context. Additionally, these studies are limited to only quantitative analysis. This study thus adds to the existing literature by adding research to the Tanzanian context and by providing more in-depth analysis of the causes of the current situation through the explorative interviews.



### **1.3 Thesis outline**

The paper has been structured in the following way. The next section, the literature review, will cover two relevant aspects. The first section will provide a brief yet conclusive overview of the historical development of the financial sector in Tanzania to provide a better understanding of the contextual conditions of the location of study. The following section will describe historical developments of economic growth theory, what factors that they include, and consider crucial. The section will show the relevance of studying financial inclusion in the context of economic growth. After this, theoretical considerations will be made by focusing on the importance of supply and demand factors in creating a flourishing market of financial services. Based on these descriptive sections, multivariate regression analysis of mobile money and bank account usage, and the impact of mobile money on financial inclusion will answer some of the questions pertaining to existing constraints. The analysis will then be complemented with interviews exploring current problems experienced by people in Tanzania. A section discussing the connection between the multivariate regression results and interviews will follow to disentangle the mechanism behind existing constraints and connect to existing theory. Implications for the future concludes.

### **1.4 Delimitations**

The methodology used has certain limitations that needs to be addressed. The most prominent limitation of the chosen methodology is the risk of Omitted Variable Bias (OVB), intrinsic to the ordinary least square multivariate regressions (Angrist & Pischke, 2015). OVB can occur for two reasons; lack of data availability due to limitations in the scope of the chosen datasets, and due to the exclusion of variables (e.g., income) from the models that would act as strong confounding variables. Another limitation is found in the qualitative interviews in terms of the representability of responses to the broader population. These limitations are however compensated for as follows.

Firstly, the effect of variable exclusion is mitigated using proxy variables for income, which are believed to cover the main effects. These proxies measure the ability of respondents to accrue enough income to put aside for savings, believed to be the main venue that income impact account ownership. The limitation is further compensated for by exploration in the qualitative section, where interviewees explain in-depth why they do not use bank accounts for their savings. The limitation of representability is compensated for through the inclusion of a diverse set of backgrounds for the chosen participants, having considered differences in income, education, employment, and demographic factors. As the interviews explored general, community-wide patterns it is also believed that the themes derived are applicable to a wider set of the population.

## **2. Literature review**

### **2.1 Context – Tanzania's history of financial development**

After independence in 1961 Tanzania was amongst the poorest countries in the world, heavily reliant on subsistence agriculture with a minimal number of estate crops and a miniscule industrial base (World Bank, 1981). With the establishment of the Arusha Declaration in 1967 the country focused on developing an agricultural society under the Ujamaa system (Klocke, 2021), with a nationalization of commerce and industry. Financial institutions were largely dysfunctional, and lending was determined by the government instead of via market mechanisms, resulting in most loans going to the public sector (Akinboade, 2000). The government also exhibited hostility towards private market activity, and steered Tanzania on a path of development through peasant agriculture rather than industrialization (Klocke, 2021, p. 66). At the dawn of liberalization in the late 1980's, financial markets were highly underdeveloped, having one of the least developed financial systems in all of Africa in the 1980s (Heritage, 2022). A study of small and medium sized enterprises in Dar es Salaam between 1989-1990 found that only 45 percent of firms interviewed relied in part on formal finance to fund their operations, albeit the figure was lower for enterprises with less than 5 employees (Levy, 1993). Multiple firms also identified access to finance as a constraint, citing long processing times and stringent preconditions as the main reason.

The Ujamaa system began straining the economy from the mid-1970's (Biermann & Wagao, 1986) and the country eventually began a process of liberalization. Starting in 1986, a shift in the national policy strategy was steadily implemented as the country completed large economic transformations leading to economic liberalization and financial reforms (Kapaya, 2021). As the Ujamaa policy that had characterized the country since independence was left behind, policies including the control of the economy by the state and ownership of all major enterprises ended, whilst exchange rates and pricing became regulated by the market instead (Kapaya, 2021). In 1991 the Banking and Financial Institutions Act was passed, allowing for the licensing of new banks and financial institutions for the first time in 30 years (Bank of Tanzania, 2011). Further liberalization within the financial sector between 1996 and 2017 resulted in a market-based regulations framework and a more competitive banking system that ensured higher flows of credit to the private sector (Robinson, Gaertner & Papageorgiou, 2011; Marobhe, 2019), and a privatization of the banking sector (Allen, Otchere, & Senbet, 2011). The policy changes had clear effects on bank supply, as the number of commercial banks grew from 3 before the reforms to 42 by 2010, resulting in an increased supply of ATM's and related services (Bank of Tanzania, 2011). Nevertheless, supply of bank services in the country remained among the lowest during the mid-00's (Beck, Demirguc-

Kunt, & Peria, 2007). These developments were followed in 2009 by the introduction of mobile money, at a time when the level of FI in the country remained low (Abiona & Koppensteiner, 2022). After introduction it led to a rapid expansion in uptake, reaching 60 percent of the population in 2017 (FSDT, 2017).

## **2.2 The development of growth theory**

The idea that finance is important for economic growth is not a novel idea (Bagehot, 1873). Its importance was put into theory through the Solow growth model in the 1950's and in Rostow's stages of economic growth (Rostow, 1959). The Solow model states that growth occurs through the accumulation of capital by making productive investments exceeding the rate of depreciation, investments accrued through household savings (Solow, 1956). From this theory the idea that poorer countries should converge with richer countries in terms of per capita output as they inevitable will grow faster than their richer counterparts appeared (Durlauf & Johnson, 1992; Barro, 1991).

It was formalized into the catch-up hypothesis, stating that low-productivity countries have the potential to experience relatively more rapid growth than high-income countries (Abramovitz, 1986). That returns to capital would be higher at lower levels of income was also at the center during the process of globalization in the late 20th century, where open economies were believed to converge at a faster rate than closed economies (Sachs & Warner, 1997). Explained by Rodrik (2011), it was argued by some during the late 20th century that it would allow for global savings to flow to places where they would be most productive and raise global incomes. Empirical evidence for this was found by Baumol (1986) and Mankiw, Romer, and Weil (1990). These results were however quickly critiqued for being highly dependent on the control variables used (Durlauf & Johnson, 1992), where the convergence pattern disappears after controlling for among other things, educational attainment (Barro, 1991). It is also, in critique to Baumol (1986), dependent on the countries included in the analysis (De Long, 1988), where Sub-Saharan Africa was shown to not have caught-up at the turn of the millennia (Temple, 1999). Additions to growth theory were made after Solow, by including the importance of technological advancements (Kuznets, 1973), and with further studies related to the convergence debate made, it eventually led to a new formalized theory, an extension to the neoclassical model (Romer, 1994).

This elaboration from the neoclassical model is known as endogenous growth theory, and stems from research conducted during the 1980's (Romer, 1994). The theory is based on that growth

occurs within an economic system that can alter the path of output growth. The endogenous growth model thus allows for an extension of the Solow growth model by stating that a country can go beyond the steady state income level decided by the savings rate and population growth rate and grow through the so-called Solow residual, which is the growth accrued not from capital or labor (Cypher, 2013). Empirical evidence of the time supports this claim, finding that large parts of output-differentials between countries was driven by the Solow residual, specifically differences in institutions and government policies, referred to as social infrastructure (Hall & Jones, 1998).

Social infrastructure, or institutions, are defined as the rules and context under which economic interactions takes place and affects the level of transactions costs associated with economic activity (North, 1991). Poor social infrastructure can impact the likelihood of having a functioning financial system, reducing the level of formal savings (Karlan, Ratan, & Zinman, 2014). A functioning financial systems role in the importance for economic growth was formalized with the creation of endogenous growth theory (Roubini & Sala-i-Martin, 1991) with the creation of a model where lack of full financial development can result in a poorly functioning financial intermediation system, resulting in less-than-optimal allocation of inputs. Poorly structured institutions, called institutional inadequacy and more common in less developed countries, could also result in market failures with poorly functioning banks and processes of financial intermediation, with the consequence of low access to credit (Stiglitz, 1992). Low access to credit reduces the ability to make useful investments, which would further ingrain the low productivity paradigm (Rodrik, 2011). This is supported by evidence from Wade (1993) who found that countries with higher investment rates tend to also be the fastest growing countries, where the line of causation goes from higher investment rates to higher rates of economic growth (Romer, 1987). As borrowing to initially establish is prevented, institutional failures could also result in a low level of establishment of industrial firms (Cypher, 2013). A developed system of financial intermediation therefore becomes a necessity in kickstarting a growth process.

Financial intermediation, the process of transforming savings into investments through banks (Perkins et al., 2013; Muhoza, 2019; Burda and Wyplosz, 2013) allows for a reduction in the share of savings held in unproductive liquid assets, enabling a mechanism of allocating financial resources (Bank of Tanzania, 2011). A functioning financial system therefore reduces the misallocation of resources, enabling higher capital investment and higher growth (Bencivenga & Smith, 1991; Karlan et al., 2014), and has been shown to be a key component in achieving sustained economic growth (Yakubu, Abokor, and Balay, 2021). Functioning financial intermediation will

also enable easier flow of credit to finance households and firms, limiting cuts in spending which would negatively affect the economy (Mishkin, 2007). The size of the formal financial intermediation system has also been found to positively impact the rate of economic growth using cross-country regression analysis (King & Levine, 1993), and that initial levels of bank development positively impact future growth rates (Levine and Zervos, 1998). Furthermore, Brixiová et al. (2020) find that firms with access to formal finance create more employment than firms without access to formal finance. Overall, there is plenty of evidence pointing to a link between financial development and long-run economic growth (Levine, 1997).

### **2.3 Previous studies – the importance of financial inclusion**

Financial intermediation thus highlights the role of savings, which has remained an important factor in the economic growth literature (Sachs & Warner, 1997). This is aptly seen in writing at the turn of the millennia by Temple (1999) who acknowledges the validity of the neoclassical exogenous growth model by Solow, while also pointing out that policies impact future growth trajectories. Being able to utilize household savings, however, also require the need for a financially included population.

FI has therefore been argued to be important for a multitude of reasons. This has resulted in many studies investigating the factors impacting the level of financial inclusion in various geographical contexts (Tuesta, Sorensen, Haring, & Cámara, 2015; Akudugu, 2013; Zins & Weill, 2016). According to the World Bank (2018) in their most recent report from the Global Findex Database, FI can help in creating development and alleviating poverty, by enabling better methods of savings, or investments for education, health, or personal businesses. These claims are supported by empirical evidence focusing on both savings (Dupas & Robinson, 2013a) and labor market and income outcomes (Bruhn & Love, 2014). It can also help mitigate the adverse effects on poverty caused by the Covid-19 pandemic (Gutiérrez-Romero & Ahamed, 2021).

### **2.4 Theoretical perspectives – supply versus demand**

The establishment of a financial market, specifically, the use of commercial bank accounts among households, consists of both supply and demand factors. Supply relates issues of access to services and infrastructure, while demand relates to individual attitudes, such as awareness and literacy. Both sides have been studied heavily.

In terms of financial services at large, the relative demand for mobile money services can be expected to decline as the infrastructure for financial services gradually improves (Donovan, 2012). In other words, at a certain point in the process of development, the supply of conventional financial services becomes large enough for people to demand these services (i.e., bank accounts), to a relatively larger degree than they would demand mobile money services, and use should thus shift from mobile money to bank accounts. This line of reasoning follows theories focusing on supply constraints. In their discussion of causality of mobile money on other forms of financial inclusion, Yenkey, Doering, and Aceves (2015) sketch up three potential pathways for how increased supply would lead to higher uptake. One, supply of mobile money might induce new forms of financial behavior, thus spurring demand. Secondly, it may induce certain financial behavior by providing a service already demanded but not previously accessible through conventional financial services. Thirdly, mobile money does not create new forms of financial behavior but is rather used by people already interested in the service. In support of supply-based theory, previous studies have found that getting access to a given service does change behavior, including the rate of saving from access to formal savings services (Aportela, 1999; Ashraf, Karlan, & Yin, 2006; Dupas & Robinson, 2013b). These findings support the first pathway (Yenkey, Doering, and Aceves, 2015). Another study investigating an expansion of rural bank presence in India found that poverty fell through the increased use of savings and credit services (Burgess & Pande, 2005). It has also been found in terms of access to credit (Angelucci, Karlan, & Zinman, 2015; Banerjee, Duflo, Glennerster, & Kinnan, 2015), adding further support to the idea that lack of supply can be a constraint (Banerjee & Duflo, 2014). Johnson and Nino-Zarazua (2011) also claim that physical proximity is important, but that other variables of socio-economic and cultural nature also play a role. Demand constraints can thus limit the potential effects from increasing supply.

Regarding demand, one claim is that it is the initial force necessary for a given service or market to exist and grow, and that supply will follow given that the markets are free (Easterly, 2007). The importance of demand has been established in other geographical contexts outside Tanzania. Examples include the supply of family-planning clinics and the impact on fertility in Indonesia (Pitt, Rosenzweig, & Gibbon, 1993), or the supply of contraceptives and the impact on reducing fertility in Colombia (Miller, 2010). In both cases, changes in uptake were limited, indicating the existence of demand constraints. In the field of education, the supply of schools and teachers does not necessarily lead to a more educated populace as absentee rates can go up as high as 50 percent, implying that demand for education is the culprit (Banerjee & Duflo, 2011). More closely related

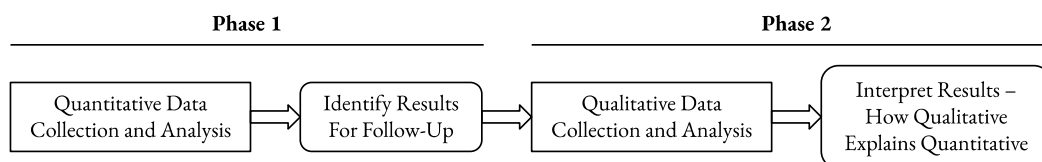
to the topic of financial inclusion, a study from India measuring the impact of insurance coverage through the marketing of an insurance scheme through a well-known microfinance institution had a limited impact on overall sign-up, and with those signing up only getting limited coverage (Cole, Sampson, & Zia, 2009). Demand has also been shown to be important in terms of bank accounts uptake (Kostov, Arun, & Annim, 2015). There are various theories providing suggestions for this pattern

One is the constraint of high fixed costs of formal financial services, resulting in individuals in developing countries not demanding the services at existing market prices (Cole et al., 2009; Ndanshau & Njau, 2021). Another theory is that low financial literacy caused by inadequate education results in few people wanting to use the services available (Cole et al., 2009). In both evidence and theory, then, uptake of a given service or product may not improve simply by increasing supply.

### 3. Methodology

This study applies a mixed methods approach, integrating both quantitative analysis of preexisting datasets as well as qualitative interviews to conduct more in-depth analysis of existing themes and patterns that could explain the result found in the quantitative analysis. It therefore follows an explanatory sequential design, a two-phase design following a chronological order starting with the quantitative data analysis followed by the qualitative interviews (Creswell & Creswell, 2018, p. 218). An example of the method used can be found in Blattman (2009). Phase one consists of collecting and analyzing the quantitative data followed by identifying the results. Phase two then uses these results to conduct qualitative analysis which are interpreted to explain the quantitative results. In sum, the qualitative analysis complements the quantitative section by helping in disentangling the mechanism behind any potential causality found in the quantitative section.

**Figure 1.** Explanatory Sequential Design



*Notes: Adapted from Creswell and Creswell (2018).*

### 3.1 Data

The datasets used are the CGAP Smallholder Household Survey 2016 available from the World Bank Microdata Library (World Bank, 2016) and the FinScope 2017 dataset (FSDT, 2021). The data for the CGAP dataset was collected by InterMedia Survey Institute in early 2016, and is a nationwide survey consisting of three sections, where the final section covering randomly selected adults in households was chosen. The section was chosen as it is the individual level of behavior that the study is interested in and consists of a total of 2 795 respondents. This dataset has been used to conduct the regression analysis found in table 1 and table 2 column 1-6, measuring uptake of mobile money accounts and bank accounts. The data from FinScope 2017 was collected by the Financial Sector Deepening Trust (FSDT, 2021), and is a nationwide survey that covers the financial behavior of adults in Tanzania above the age of 16 and contains a total of 9 459 observations. The FinScope 2017 dataset was used to investigate the impact of literacy on financial inclusion, as well as the impact of having a mobile money account on having other types of financial services including bank accounts and insurances (table 3). The combinations of both datasets enable a more thorough analysis of FI.

### 3.2 Defining Financial Inclusion

The selection of dependent variables is based on the definition of FI. This definition has some variation, such as the broader definition by the World Bank (2014), or more specific definitions such as that by Lotto (2022) which focuses on three areas: formal account ownership, formal savings, and formal credit. While the definition can vary somewhat, the focus on access to formal financial services is consistent (Chakravarty & Pal, 2013). In this paper, the definition of FI will be based on three measures: ownership of a mobile money account, ownership of a bank account, and ownership of an insurance. The data for these variables is based on the questions "*How many insurance policies do you have?*" to indicate if a respondent has an insurance, "*How many bank accounts do you have?*" to indicate if a respondent has a bank account, and "*Are you currently using mobile money?*" to indicate if a respondent has a mobile money account. These questions have been coded as 1 if a respondent indicate using a service, and 0 if not. The resulting coefficients will thus be a value between 0 and 1, which will indicate the percentage of the given sample that is using the given financial service.



### 3.3 Multivariate regression models

The first section of the study consists of a quantitative analysis of the ownership of mobile money and bank accounts. The first set of models uses a dichotomous dummy variable as the dependent variable, indicating if a respondent has a mobile money account or not based on the question "*Are you currently using mobile money?*" from the CGAP 2016 dataset (World Bank, 2016). The first model is a bivariate regression including an urban-rural dummy variable, equal to 1 if a respondent lives in an urban area as the independent variable. The variable acts as a proxy for the supply of mobile money agents and is thus included to better understand how supply affects the uptake of mobile money accounts. Econometrically, this gives the following specification:

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

where  $\beta_1$  is the parameter indicating the gap in mean uptake of mobile money accounts between urban and rural residents for a given respondent  $i$ . Additional variables are added to the basic specification to control for the effect of demographic differences, including gender, marital status, geographical location, and educational attainment. These are added as they are believed to act as strong confounding variables. These variables have been used in previous studies of financial inclusion and been found to be statistically significant (Lotto, 2022; Irankunda & Van Bergeijk, 2020; Soumaré, Tchana, & Kengne, 2016). It furthermore includes controls for various measures of individual attitudes towards the importance of saving, investing, and financial planning. These measures are included as it has been shown that peoples perceived control of future outcomes affects a person's ability to save and control spending (Perry & Morris, 2005), which in turn affects the likelihood of using formal financial services. The scores have been constructed by coding answers on various questions into self-made indices. A detailed description of each index and how they have been calculated can be found in the appendix. This is followed by adding mobile-money specific controls including a dummy variable indicating if the respondent has a mobile phone or not, attitudes towards mobile money (methodology of constructing these indexes is also found in the appendix), and awareness of mobile money. Lastly, age fixed effects were added, by grouping respondents into 5-year age groups to adjust for generational differences, as well as district fixed effects to control for district-specific differences. District-specific differences has previously been observed when investigating other geographical contexts (Kumar, 2005), while age is expected to influence savings behavior as stated by the Life-cycle hypothesis (Ando & Modigliani, 1963). The hypothesis has received empirical support in being an important explanatory variable (Asuming, Osei-Agyei, & Mohammed, 2019; Ouma, Odongo, & Were, 2017). The full model therefore gives the following specification:

$$mmacc_i = \alpha + \gamma_1 urban_i + \gamma_2 male_i + \beta_1 aware_i + \sum_{i=1}^{16-20} \theta_1 age_i + \sum_{i=1}^{Arusha} \theta_2 district_i + \eta_1 X' + \varepsilon_i$$

where  $\gamma_i$  represents the parameters estimating the effect for dummy variables and  $\beta_i$  represents the estimated coefficients for various discrete indices.  $X'$  is a vector of control variables not listed in the regression table, but which can be found in the appendix. The last regression model to measure uptake uses the FinScope 2017 dataset (FSDT, 2021), and adds controls for literacy and proxies for income. These proxies are variables indicating a respondent's ability to accrue enough capital for long-term savings. Literacy has in previous studies been shown to be an important factor in explaining why people do not use various financial services (van Rooij, Lusardi, & Alessie, 2011; Fanta & Mutsonziwa, 2021; Morgan & Long, 2020) or may not request it (Calcano & Monticone, 2015; Cole, Sampson, & Zia, 2011) and can thus be an important factor in explaining the limited uptake of formal financial services in Tanzania. The studies measuring the impact of financial literacy use various methodological approaches of measuring it, with this paper using approach that sum scores from individual questions coded as 0 or 1 into a single index. This approach has been used in other studies as well (Lusardi & Mitchell, 2008; Perry & Morris, 2005; Fanta & Mutsonziwa, 2021; OECD, 2017). A detailed description of the methodology used in coding these variables can be found in the appendix. Similarly, income has also been shown to be an important factor in explaining the gap in uptake of financial services (Hasan, Le, & Hoque, 2021; Johnson and Nino-Zarazua, 2011; Cole et al., 2011), and has been coded in a similar manner as literacy. The full specification gives the following model:

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

where  $X'$  again represents a vector of control variables not listed separately in the regression table, but which can be found in the appendix. A similar specification exists for the regression output in table 2 where the explanatory variables are unchanged, and the dependent variable  $mmacc_i$  has been replaced with  $bankacc_i$  which is the dummy variable indicating if a respondent  $i$  has a bank account or not.

The third set of regressions measures the impact of having a mobile money account on having a bank account or insurance coverage. The full specification looks as follows:

$$y_i = \alpha + \gamma_1 mmacc_i + \gamma_2 urban_i + \gamma_3 male_i + \beta_2 grade_i + \beta_3 save_i + \gamma_4 salary_i + \sum_{i=1}^{16} \theta_1 age_i + \sum_{i=1}^{Arusha} \theta_2 district_i + \eta_1 X' + \varepsilon_i$$

where the main independent variable is a dummy variable indicating if a respondent has a mobile money account or not. This is followed by controlling for the urban-rural dummy variable, gender, educational attainment, the ability to save as a proxy for income, and district and age fixed effects. The dependent variable is represented by  $y_i$ , which in column 1-3 is the dummy variable indicating if a respondent has a bank account and in column 4-6 is the dummy variable indicating if a person has an insurance.

Finally, to accentuate the effect of differences in supply of bank branches and services between urban and rural villages, the final set of regressions estimates the different marginal effects in the gap of account ownership between rural and urban residents depending on the score on the financial literacy index and index measuring respondent  $i$ 's ability or save. The regression results have been achieved through the following specification:

$$acc_i = \alpha + \gamma_1 urban_i + \beta_1 score_i + \delta_1 (urban_i * score_i) + \eta_1 X' + \varepsilon_i$$

where  $\delta$  is the parameter of interest, referring to the interaction term between the dichotomous urban-rural dummy variable and the variable indicating the financial literacy score or the ability to save score. The parameter thus gives the marginal effect on the probability of having a mobile money account or bank account of living in an urban area for a given score.

### 3.4 Qualitative Interviews

The semi-structured interviews with residents were conducted in the Arusha region of northern Tanzania, in both the urban districts as well as rural villages in the nearby area of the city. The name of the villages is Ngarantoni, Uzunguni, Sombetini, Tengeru, Usa River, Bangata, Unga Limited. Interviews were conducted both as semi-structured interviews with prepared topics to be explored, as well as more spontaneous conversational interviews. In total, 24 separate interviews were conducted with a total of roughly 50 individuals sharing their experiences. These include individual interviews, 2 group interviews and an additional handful of spontaneous serendipitous interviews, the latter of which are done in passing as a part of social life, conducted as they can provide additional insights (Rossman & Rallis, 2017, p. 155).

To capture a broader spectrum of experiences found in the population at large, the selection of the interviewees was based on the demographic characteristics which were added as control variables in the multivariate regression analysis. These stratifications will include separation across gender and urban/rural residence, as well as age and income levels. Furthermore, to gain insights into differences in themes based on the level of financial inclusion, they were also separated across different levels of financial service usage, including the ownership of mobile money accounts and bank accounts. These are akin to the independent variables in the regression analysis, categorizing individual respondents into three groups: Non-users, mobile money only-users, and both mobile money and bank account-users.

Topics explored in the interviews pertain to usage of financial services such as mobile money, bank accounts, and insurances, as well as financial behavior and conditions in terms of income and savings. Other topics explored for contextual purposes are background information of the interviewees, mainly, family structures, daily activities for income generation, educational attainment, and economic status. Their beliefs and attitudes towards financial behavior, services, agents, and government were also explored. It is structured according to the rules of a narrative research design (Creswell & Creswell, 2018, p. 13), asking interviewees to recall their experiences with financial services. These help in disentangling the mechanisms behind the patterns found in the multivariate regressions and enables a discussion on the direction of causality in terms of mobile money use and conventional forms of financial inclusion.

The topics were explored to derive overarching and generalizable themes, using the "saturated" or "theoretical saturation" approach described by Charmaz (2006, p. 113-114). The method is based on grounded theory and implies that data collection should be conducted until "gathering fresh data no longer sparks new theoretical insights" (p. 113). The methodological approach also implies that the sample size, i.e., the number of interviewees, is superseded by the logic of saturation. The themes were derived by coding responses according to four different categories: stories about encounters with financial service providers, problems experiences, purpose of usage, and emotions elicited in the context of dealing with financial services.

## **4. Results**

### **4.1 Multivariate regressions**

The first regression results investigate the probability of mobile money account ownership based on different demographic characteristics. These results can be found in table 1. Without any

controls, the urban-rural coefficient is 0.240 with a constant of 0.402. Since the model measures a simple difference in means, the probability of having a mobile money account in rural areas is 40.2

**Table 1:** OLS Estimates of Mobile Money usage

	CGAP 16						FinScope 17
	Main	Controls	Trust/ awareness	Reduced	Age FE	District FE	Income
(=1) Urban resident	0.240*** [0.0251]	0.206*** [0.0277]	0.106*** [0.0235]	0.0956*** [0.0249]	0.101*** [0.0236]	0.126*** [0.0421]	0.0969*** [0.0200]
<b>Demographics</b>							
(=1) Male gender		0.0619** [0.0268]	0.0442** [0.0217]	0.0361 [0.0230]	0.0432** [0.0219]	0.0632*** [0.0216]	0.00914 [0.0125]
Age							-0.00125*** [0.000406]
Highest grade completed							0.0258*** [0.00458]
Highest grade attended		0.115*** [0.0136]	0.0570*** [0.0121]	0.0599*** [0.0130]	0.0596*** [0.0122]	0.0478*** [0.0122]	
<b>Trust and awareness</b>							
Trust – MM providers			0.0211 [0.0132]	0.0236* [0.0137]	0.0217* [0.0131]	0.0235* [0.0131]	
Trust – MM agents			0.0258* [0.0134]	0.0374*** [0.0143]	0.0245* [0.0132]	0.0146 [0.0132]	
MM awareness			0.0822*** [0.0107]	0.159*** [0.00737]	0.0801*** [0.0107]	0.0701*** [0.0108]	
<b>Literacy and Income</b>							
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*** [0.0149]	-0.225** [0.112]	-0.742*** [0.141]	-0.517*** [0.111]	-0.799*** [0.144]	-0.631** [0.266]	0.156*** [0.0466]
<b>Controls</b>							
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
<b>Fixed effects</b>							
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 <sup>2</sup>	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. \*  $p < 0.1$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$ .

percent, while the probability of having a mobile money account in an urban area is 24 percent higher, or 64.2 percent. After adding controls for demographic characteristics, the urban-rural gap drops to 0.204, or 20.4 percent. The gender gap is 0.0619, or 6.19 percent, significant at the 5 percent level. When controlling for mobile money-specific variables including ownership of a mobile phone, trust of mobile money providers and agents, and awareness, the urban-rural gap drops by a substantial amount. The coefficient is now 0.106, or 10.6 percent, significant at the 1 percent level. The effect remains after removing the controls of respondent-specific attitudes and behavior towards saving and investing (urban rural gap of 9.56 percent), indicating that a large part of the gap can be explained by a lack of awareness of mobile money providers in rural areas. Adding age group fixed effects, thus comparing respondents only within the same 5-year interval age groups, has a limited effect on the coefficient on the urban-rural gap. In the final regression model district fixed effects are added, which also has a limited effect on the urban-rural gap coefficient. When comparing respondents only within the same district, the coefficient is equal to 0.126, or 12.6 percent. While the standard error increases by notable amount, the urban-rural gap remains significant throughout all regression models at the 1 percent level.

The difference in bank account ownership can be seen in table 2, where column 1 depicts a simple difference in means between urban and rural residents. While bank account ownership in rural areas is 4.45 percent it is 15 percentage points higher in urban areas (coefficient of 0.150). After adding demographic controls for, but not limited to, gender and educational attainment, the gap drops slightly to 0.136 or 13.6 percent. It also shows that educational attainment has a significant impact on the probability of having a bank account, rising 10.7 percentage points for each level of completed education. After adding controls for financial behavior and trust of banks and bank agents the coefficient increases slightly, while the coefficient for trust of banks is significant at the 1 percent level with a coefficient of 0.0353. When dropping the controls for financial behavior in the fourth regression model the coefficients are unaffected, indicated again that it does not appear to play a large role in the probability of having a bank account. The fifth model includes age fixed effects, which also has a marginal impact on the coefficients, reducing the urban-rural gap by 0.8 percentage points and the gender gap by roughly 1 percentage point. After adding district fixed effects in the sixth column the coefficient for the urban-rural gap drops to 0.109 or 10.9 percentage points, still significant at the 1 percent level. In the final regression model, which uses the Finscope 2017 dataset to control for literacy and income using the proxy variables for income which measures an individual's ability to save, the coefficient drops sharply. In this model the urban-rural coefficient is equal to 0.0276 or 2.76 percentage points, significant at the 5 percent level (compared

**Table 2: OLS Estimates of Bank Account Ownership**

	CGAP 2016					FinScope 17	
	Main	Controls	Trust	Reduced	Age FE	District FE	Income
(=1) Urban resident	0.150*** [0.0174]	0.136*** [0.0190]	0.141*** [0.0189]	0.140*** [0.0189]	0.132*** [0.0186]	0.109*** [0.0294]	0.0276** [0.0140]
<b>Demographics</b>							
(=1) Male gender		0.0395** [0.0155]	0.0363** [0.0153]	0.0370** [0.0154]	0.0266* [0.0153]	0.0325** [0.0154]	0.0295*** [0.00962]
Age							0.00256*** [0.000281]
Highest grade completed							0.0484*** [0.00506]
Highest grade attended		0.107*** [0.0117]	0.105*** [0.0113]	0.105*** [0.0113]	0.110*** [0.0112]	0.0973*** [0.0116]	
<b>Trust</b>							
Trust – Banks			0.0353*** [0.00910]	0.0351*** [0.00923]	0.0328*** [0.00887]	0.0220** [0.00902]	
Trust – Banks agents			-0.00511 [0.00917]	-0.00501 [0.00927]	-0.00310 [0.00878]	0.00612 [0.00878]	
<b>Literacy and Income</b>							
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*** [0.00562]	-0.360*** [0.0934]	-0.389*** [0.122]	-0.481*** [0.0928]	-0.410*** [0.117]	-0.389*** [0.129]	-0.144** [0.0688]
<b>Controls</b>							
Demographics	No	Yes	Yes	Yes	Yes	Yes	Yes
Financial behaviour	No	No	Yes	No	Yes	Yes	No
Trust	No	No	Yes	Yes	Yes	Yes	No
Literacy	No	No	No	No	No	No	Yes
Income proxies	No	No	No	No	No	No	Yes
<b>Fixed effects</b>							
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 <sup>2</sup>	0.058	0.144	0.163	0.159	0.189	0.284	0.336

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

to 1 percent in the previous regressions). In other words, roughly three quarters of the urban-rural gap in bank account ownership disappears after controlling for literacy and the ability to save.

### 4.1.1 Mobile money and the impact on conventional FI

The next section of the results consists of the estimated impact of mobile money on conventional forms of financial inclusion. These can be found in table 3, which show the estimated impact on the probability of having a bank account and on having insurance coverage. When controlling for demographic variation the estimated impact on the probability of having a bank account is 0.042 or 4.2 percentage points, significant at the 1 percent level. When adding controls for income, or proxies measuring the ability to save and having a salary, the difference drops to 0.0159, or 1.59 percentage points, significant at the 5 percent level. The significance disappears after adding age and district fixed effects, while the coefficient also drops to 0.00571, or 0.57 percentage points. In other words, having a mobile money account does not appear to have any impact on the probability of having a bank account.

**Table 3:** OLS Estimates of Mobile Money on Financial Inclusion

	Bank Account			Insurance Coverage		
	<i>Basic</i>	<i>Income controls</i>	<i>Fixed effects</i>	<i>Basic</i>	<i>Income controls</i>	<i>Fixed effects</i>
Mobile Money	0.0420*** [0.00763]	0.0159** [0.00776]	0.00571 [0.00715]	0.0625*** [0.0106]	0.0483*** [0.0108]	0.0435*** [0.0107]
<b>Controls</b>						
Urban	0.0955*** [0.0126]	0.0694*** [0.0125]	0.0232* [0.0133]	-0.0460*** [0.0120]	-0.0609*** [0.0119]	-0.0322* [0.0186]
Male	0.0502*** [0.00970]	0.0352*** [0.00948]	0.0277*** [0.00915]	-0.00700 [0.0111]	-0.0157 [0.0109]	-0.0351*** [0.0102]
Educational attainment	0.0514*** [0.00486]	0.0396*** [0.00488]	0.0464*** [0.00486]	0.0263*** [0.00504]	0.0187*** [0.00504]	0.0308*** [0.00502]
Ability to save		0.00686 [0.00435]	0.0161*** [0.00412]		0.0175*** [0.00448]	0.0203*** [0.00460]
Constant	-0.180*** [0.0131]	-0.166*** [0.0157]	-0.176*** [0.0682]	0.0235 [0.0153]	0.000409 [0.0181]	-0.188*** [0.0568]
<b>Controls and Fixed Effects</b>						
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 <sup>2</sup>	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).*

The probability of having any insurance coverage based on having a mobile money account is 6.25 percentage points higher compared to non-mobile money users (coefficient of 0.0625). When adding controls for income it drops to 4.83 percentage points, and after adding age and district



fixed effects, the difference remains. Thus, after adding all controls, mobile money users are 4.35 percentage points more likely to have insurance coverage compared to non-mobile money users. The difference is significant at the 1 percent level for all three regression models.

Lastly, table 4 depicts the regression results from the final specification, estimating the marginal impact on the probability of having a bank or mobile money account from living in an urban area versus a rural area, for different scores of the financial literacy and the ability to save index. The first model estimates the marginal effect of living in an urban area on having a bank account for financial literacy. The coefficient is positive and significant at the 1 percent level, indicating that there is an increase in the urban-rural gap as financial literacy increases. Although not shown in the table, this increasing gap is mainly caused by an increase in the bank account ownership among urban residents as financial literacy increases. When instead looking at the impact for the ability to save index, the coefficient is also positive but not significant. Thus, there is no evidence that the gap would increase as a person has a greater ability to put money into a savings account at a bank. For mobile money, the coefficient for financial literacy is negative and small, as well as insignificant. The same is true, albeit positive, when looking at the ability to save index. Thus, there is no difference in the mobile money account ownership gap as financial literacy or the ability to save index increase.

**Table 4:** OLS Estimates of the Marginal Impact on Account Ownership

	Bank account		Mobile money	
	<i>Literacy</i>	<i>Saving</i>	<i>Literacy</i>	<i>Saving</i>
Urban	-0.00737 [0.0251]	0.0125 [0.0295]	0.124*** [0.0356]	0.104*** [0.0363]
Self Reported Financial Literacy	0.00209 [0.00321]		0.0450*** [0.00658]	
Ability to save		0.0207*** [0.00346]		0.0202*** [0.00655]
<b>Interactions</b>				
Urban * Self Reported Financial Literacy	0.0279*** [0.0102]		-0.00790 [0.0131]	
Urban * Ability to save		0.0121 [0.0102]		0.000417 [0.0115]
Constant	-0.279*** [0.0398]	-0.319*** [0.0409]	0.118 [0.0786]	0.165** [0.0780]
Observations	9459	9459	9459	9459
$R^2$	0.255	0.260	0.406	0.401

*Notes: Ordinary Least Squares regression estimates of the marginal impact of living in an urban on the probability of having an account at different scores of financial literacy and ability to save index. Column (1)–(2) depicts the marginal effect of having a bank account while column (3)–(4) depicts the marginal effect of having a mobile money account. Column (1) and (3) depicts the marginal effect for financial literacy. Column (2) and (4) depicts the marginal effect for the ability to save index. Dataset used is the FinScope 2017 dataset (FSDT, 2021). Standard errors in brackets. \*  $p < 0.1$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$ .*

## 4.2 Qualitative Interviews

From the qualitative interviews, various themes have been derived. These can be separated into three overarching areas of focus: Institutional constraints, supply constraints, and demand constraints. The following section lists the themes derived for each area.

### 4.2.1 Institutional Constraint

#### *Theme 1: Fee structures*

A recurring problem mentioned by the interviewees is the high fees of sending money through their mobile money providers. It was furthermore expressed at multiple occasions that interviewees used to have bank accounts, but that they stopped using them due to unclear fee structures and high deductions on the accounts, which especially affected those interviewees who reported not having enough income to sustain their bank account balances. In other words, there was an expressed constraint among interviewees that their incomes, even when sufficient to pass the minimum capital threshold, ended up eventually being too low to be able to sustain the account, resulting in several idle accounts.

#### *Theme 2: Access to Formal Employment*

For those individuals interviewed who have or previously had bank accounts, multiple respondents indicated that they first opened them in connection to their formal employment to receive their salaries. Many of these individuals also had relatively higher levels of education than other respondents, which was often a precondition to get into their field of employment, through which they also became more aware of the benefits with bank accounts. For these interviewees getting financially included was in other words a natural process and not something they had to actively seek out. As employment oftentimes is in urban locations, this further raises the financial inclusion of the urban population at large.

#### *Theme 3: Regulatory deficiencies*

On several occasions the interviewees mentioned the increased fees of mobile money transfers and withdrawals, as well as cost structures of bank accounts as a disincentive to using the services and opening accounts. In other words, the current fee structures are putting limitations on the use of the products among poorer individuals. Furthermore, many individuals who indicated having bank accounts claimed that they do not use them due to a lack of funds or due to high deductions.

## 4.2.2 Supply Constraints

### *Theme 4: Access to banks*

A lack of access to bank branches in rural areas was also a reason for why many did not have bank accounts. The reason was twofold, either because they themselves had low access to it, or because their relatives in rural areas to send remittances to do not have bank accounts. The consequence for many was that mobile money was the only option. Lack of access as a disincentive was twofold, one being the time it would take to travel, the other being the cost of traveling.

### *Theme 5: Historical provision of education (generational gap)*

Multiple respondents highlighted that they became aware of the benefits of saving through their formal education. Multiple respondents who indicated having a bank account also opened it in connection to their employment. In other words, getting financially included was a natural step in the process from their high levels of education. In this regard, there was also a generational pattern, with older generations lacking enough formal education, younger ones more likely to have proceeded to formal employment, and their children's generation more likely to stay in school for a longer time. Several interviewees indicated a belief that financial inclusion will in part sort itself out as their children grow up, as their educational attainment was naturally higher. In other words, formal education appears to be an important foundation to make usage of financial services more likely, and to reduce the need for awareness campaigns many interviewees had experienced.

### *Theme 6: Substitution effects*

Several interviewees indicate that mobile money is mainly used for daily expenses and remittances, while bank accounts are used as a safe way to store long-term savings, reducing the risk of using up the savings for short-term needs. This means that the services are used for different purposes. A part of this, as many interviewees explain, is the lack of bank branches in rural areas, meaning that mobile money becomes the only option for remittances. This was highlighted during a group interview, where high fees for mobile money did not cause a shift to bank account usage among their relatives in rural villages, as access to bank accounts is both limited and costly in terms of monthly deduction fees and transportation costs.

### *Theme 7: Wakalas and accessibility: easy to open and ease of entry*

Some interviewees were also self-employed as mobile money agent on the side of their main businesses. When asked to explain their experience with the process of becoming a mobile money agent, the process was said to have been relatively simple, with representatives making sure there

was enough people moving around the area to accrue enough customers, and a minimum capital requirement. Setting up a Wakala for banks required a longer and more expensive process, including registering their businesses, having a license and tax clearance. Requirements to become a mobile money agent was thus fewer, and with lower capital requirements.

### **4.2.3 Demand Constraints**

#### *Theme 8: Awareness*

One respondent recalled their first interaction with banks, CRDB, and how they became aware of the benefits after being approached by bank representatives. Benefits mentioned include the security of not storing money in cash, and easier access to credit. Another respondent mentioned how education and awareness provided by the government is more common in urban than rural areas, and that people in rural areas might have enough capital but lack education and therefore also lack trust in banks. The importance of awareness was further highlighted by one interviewee in urban Arusha. The interviewee, a Maasai, said that in the Maasai community there may be individuals with enough capital but who due to their lack of education and access to awareness campaigns do not use or trust banks, even if access to bank branches and ATM's during the last ten years has increased. The same interviewee stated that there are cultural barriers in rural areas, where tradition and customs are not aligned with keeping assets or wealth stored at bank accounts. Several respondents also indicated having moved to their current residence to find jobs through self-employment. In their self-employment, through customer interactions, they would then become aware of mobile money and its benefits.

#### *Theme 9: Lack of trust*

One recurring theme was the importance of trust for the banks, and that trust may be low due to limited exposure to bank representatives. The choice of bank was also oftentimes driven by the fact that the bank is perceived to be government owned, which many felt provided more security relative to smaller and private banks. An example of security was given by two respondents from the same village recounting their experience with a local community bank, in which they lost their savings after the closing of the bank, unable to recoup their savings. This heavily affected their trust in the banking sector. In sum, trust appears to be an important factor in people's willingness to open a bank account.

#### *Theme 10: Lack of sufficient income*

Income was said to be a key factor in explaining the lack of financial inclusion. It was oftentimes expressed by those without a sustained source of income that they store all money left over in cash. Lack of sufficient capital, or savings, was mentioned during multiple interviews as the main reason for why the interviewee did not own a bank account. Many people also indicated that income was their only constraint, and that having enough capital would likely make them consider opening bank accounts, as trust or awareness was not an issue. One respondent –which highlights the income constraint – claimed to be living on a daily income that would put them below the World Bank definition of extreme poverty of \$1.90/day, indicated being aware of the importance of keeping track of their money, actively engaging in bookkeeping for their business and that they do trust the banks, but that their lack of sufficient income was the only reason for lacking a bank account. Furthermore, starting capital was a recurring problem mentioned among non-users of bank accounts, while it was not an issue for mobile money users to the same extent. Thus, an individual's income appears to have an important impact on the probability of owning a bank account, but not a mobile money account.

#### *Theme 11: Differential products*

One of the interviewees indicated that mobile money was used specifically for remittances to their children and for daily expenses, while their account at the bank was solely used for long-term savings. Another interviewee highlighted the ease of getting a loan if sustaining a savings account at a bank. While getting loans from mobile money is possible, another respondent who had taken a loan to pay for their children's school fees explained that the loan amounts from mobile money providers are too small to cover larger expenses. In other words, mobile money loans can be used for small-scale expenses, while loans for larger long-term expenses and investments requires bank accounts.

#### *Theme 12: Inelastic demand of mobile money*

A recurring issue with mobile money was the increased fees and deductions recently implemented for sending and withdrawing money. The result, expressed by both users and mobile money agents, was fewer transactions being made. However, many also expressed a sense of frustration about the raised fees, stating that they do not have any alternative means of sending remittances, feeling forced to continue with their mobile money accounts despite the higher deductions. In other words, there was an upheld demand for mobile money relative to other forms of sending

remittances (bank accounts) as the restrictions on opening and using a bank account, as well as access to it, gave them no other choice.

## 5. Discussion and Analysis

### 5.1 Explaining the urban-rural gap – mobile money

Why does the urban-rural gap in mobile money uptake persist after adding all controls? The answer from the qualitative interviews gives some hints at what the cause might be. One suggestion is that the relative supply of mobile money providers is lower in rural areas than urban areas. This argument is based on a recurring theme from the interviews which was that urban residents were using more than one provider, with Airtel being used specifically to send remittances to rural relatives as it is usually the one (and only) provider that is available in rural areas. It was also hinted at that those in urban areas use it both for daily transactions as well as for remittances. One potential explanation can thus be that rural residents mainly use it to receive remittances, causing fewer members of each household to use it. Another potential issue, hinted at in the interviews, is connectivity issues which are more prevalent in rural areas. Connectivity issues is an institutional constraint, but which may hamper the demand for the service especially for daily transactions. Thus, use may be limited to remittances in rural areas with cash being the main means of daily transactions. This could potentially reinforce the limited scope for the use of mobile money, and the number of household members needing it becomes lower.

There might however also be limitations in the way that some explanatory variables are coded. An example of this is the impact that awareness has on service uptake. Both in the regression model and in the qualitative interviews was the provision of awareness pointed out as being one of the main catalysts for signing up for a given financial service, including mobile money. The relatively static nature of the coefficient measuring the urban-rural gap in table 1 after awareness of mobile money has been controlled for indicate that it is a key variable in explaining uptake, and that a large part of the gap can be derived from differences in exposure to the service, providing further robustness to the results. In the interviews it was mentioned as being the initial mechanism for why an individual would demand the service, either through dealings with customers or through friends and relatives. In the regression analysis, it almost halved the urban-rural gap (20.6 percentage points versus 10.6 percentage points). However, the awareness variable in the regression model is coded from the question of if a respondent is aware of any mobile money *providers*, not necessarily the purpose of the service per se. In other words, it could be that awareness explains a greater part of the gap than shown in the regression model. As highlighted by the

interviews, urban residents started using it after finding out about its benefits, not from seeing that the service existed. They may therefore be more aware of the service and its perceived benefits than rural residents due to differences in daily activities, even though both are aware that the provider, and service, exists.

Finally, another reason for the remaining gap could be due to variables not included in the regression at all, such as cultural differences between those in urban and rural areas. Many urban residents explained having moved to urban areas to provide for their families and themselves more easily, either through employment or through self-employment. This brings the potential explanation that rural residents are more likely to be engaged in more traditional activities or be part of pastoral communities, where the need for mobile money is less common. Furthermore, in line with the argument provided above, it may reduce the number of users within the same household in rural areas, as fewer members are actively engaged in the economy through formal employment or in the form of self-employment.

Finally, it is noteworthy that age did not seem to have an impact, which can be expected from the life-cycle hypothesis. The answers given in the qualitative interviews also support the argument of a lack of generational differences, as usage among the respondents was high across ages and as a large part of the usage included remittances between family members, thus naturally implying the inclusion of all age groups. A potential explanation for this is that most users of mobile money did not use it for savings, which in turn would limit the potential age differences assumed from theory.

## **5.2 Explaining the urban-rural gap – bank accounts**

Based on the regression models, both literacy and income appear to be important explanatory variables to why a person will not have a bank account. Based on the interviews, income appears to be the biggest constraint, with many individuals lacking the income to pass the initial capital threshold. This is in support of the fixed costs constraint, which would reduce demand. The answers from the interviews also suggested that knowledge on the benefits of bank accounts and long-term savings reduced the demand among some users. The lack of knowledge was however also coupled with a lack of access to bank branches, meaning that low supply reduced the scope for learning about the potential benefits of having a bank account. Supply also explains part of the current uptake of services. Improved access, and an increase in supply of bank branches and ATMs could potentially increase bank account ownership, reducing the reliance on mobile money. Another variable that could help explain part of the gap is that formal employment is more

common in urban areas. The variable is added in the final regression in table 2 and appeared based on the interviews to require the use of a bank account for salary payouts.

There are also limitations with the multivariate regression analysis which the interviews highlighted. Many of those with bank accounts are unlikely to be actively financially included, and the data in the quantitative section on bank account use risks being misleading in its ability to measure bank account usage. This line of reasoning has been pointed at by Aduda and Kalunda (2012), mentioning that frequency of use would be a better measure of FI. The interviews conducted indicate that the level of FI in Tanzania might be lower than the data suggests, with many bank account owners indicating having dormant accounts after not being fully aware of the deductions or not having been properly informed about the fee structures. As some had lost their jobs or ended up in worse economic situations than when the account was opened, their use of the bank accounts was limited.

### **5.3 Mobile money – a path to formal financial inclusion?**

Table 3 investigates if mobile money can be a venue to improve conventional forms of formal FI. Mobile money does not seem to be a venue to increased bank account use. One reason for this is the capital requirements for bank accounts that does not appear to exist for mobile money, meaning that many individuals using mobile money are not constrained by demand factors, but rather by a lack of supply of affordable options from the banks. That capital is a major constraint for bank accounts, but not mobile money is supported by the regression results, where the urban-rural gap was not affected by the inclusion of income proxy variable such as the ability to save, while the urban-rural gap of bank account ownership dropped by a magnitude of three quarters. It is also supported by the answers given during the interviews, where those living in poverty indicated being able to use mobile money and wanting to use bank accounts, but not being able to due to lacking enough savings to put aside or due to the deductions taken by the banks from maintaining a bank account.

A second reason is that mobile money does not appear to drive individuals to want a bank account to a greater degree. In other words, it is not clear that there would be a causal link between mobile money use and bank account ownership, either in terms of changing behavior, awareness, or ability to afford the capital requirements. The respondents indicating wanting a bank account appeared to have gained their demand through other channels, either through information campaigns, friends, and relatives, or through their self-employment. Mobile money is thus unlikely to solve



any demand constraints that exists. The supply constraints mentioned during the interviews also suggests that the low uptake of bank accounts is due to institutional constraints.

Instead, themes derived from the interviews suggests that mobile money has helped in solving issues in terms of remittances and smoothing consumption, by reducing the risks and costs associated with sending remittances in cash. Bank accounts on the other hand, solves the issue of having access to a secure way to store long-term savings. As many of the interviewees indicated sending money to older relatives, it also works as an informal insurance for older generations. While mobile money is beneficial for individual welfare, the differential needs that the services fulfill nevertheless limits the technology's ability to increase bank account ownership and use.

The final regressions for table 1 and table 2 also showed that a part of the gap could be explained by literacy levels for bank accounts but not much for mobile money. It did not affect the coefficient of the urban-rural gap for mobile money, while doing so for bank accounts. In other words, it is possible that bank accounts require better understanding of the services and puts more pressure on the need for formal education than mobile money does. It is therefore an institutional constraint that will persist beyond what can be solved through mobile money. The responses given by the interviewees supports this claim, as many expressed the need to learn more about the conditions of having a bank account despite owning a mobile money account. Having a mobile money account thus does not appear to suffice in bridging the gap that low levels of educational attainment cause.

In terms of insurance coverage, mobile money appears to be a path to improve access to the service. This is supported by column 4-6 in table 3, and by the themes derived from the interviews. The reason for this is the access to more tailored insurance schemes, easily accessible from their mobile money accounts. In other words, the option to get some type of insurance became more readily available through their phones, meaning that the supply of insurance made more people likely to sign up. If this sign-up was driven by a preexisting demand or if the demand was created through awareness of being exposed to the access through the phone remains ambiguous. Either way, the income and supply constraints therefore does not seem to apply to the same extent.

#### **5.4 Supply and demand – theoretical implications**

As was shown in table 4, there appears to be a constraint on supply of bank branches in rural areas vis-à-vis urban areas. The measure of the marginal effect on the urban rural gap on bank account

ownership for different levels of financial literacy indicate that while those with higher financial literacy in urban areas, more likely to demand bank accounts, also can access it (less of a supply constraint). Those in rural areas with higher financial literacy (also likely to demand it) cannot access it to the same extent, causing bank account ownership in rural areas to remain low even among those who are relatively financially literate. The same pattern could not be seen measuring the marginal effect for mobile money uptake. The relatively lower access to banks in rural areas was also mentioned on multiple occasions to be a major contributor to why they did not use bank accounts, or why they used mobile money to send money to relatives, as no other option was available at a reasonable cost. As explained in the qualitative interviews section, this could be due to higher opportunity costs of travelling to bank branches, causing rural residents to rationalize their spending behavior and remain unbanked.

## **6. Conclusion**

Financial inclusion has been shown to be an important factor in having a functioning system of financial intermediation which is an important catalyst in achieving long-term economic growth. This paper has therefore analyzed the uptake of mobile money and bank accounts to investigate where gaps in uptake exists, using various proxy variables for supply and demand, as well as income, to better understand where, if anywhere, the financial market is lacking in its ability to get individuals financially included. It has furthermore analyzed the potential of mobile money in achieving conventional forms of formal financial inclusion, to better understand the technology's potential. This latter part is important as the transition would be beneficial in improving the allocation of productive resources.

The results presented in this paper show that uptake of mobile money in rural areas is less prevalent than urban areas, even after controlling for explanatory factors including income, literacy, demographic characteristics, trust, and attitudes. A potential reason for this, indicated by the answers given in the interviews, is that demand is limited to remittances. This can be explained by having more traditional habits, with those engaging in the formal or informal economy moving to urban areas. The limited need could also result in lower uptake among individuals in the same household, which could explain part of the urban-rural gap. The uptake of bank accounts appears to be heavily dependent on both the ability to accrue enough savings as well as on literacy levels. This is supported by the interviews where many non-users indicated wanting a bank account, but with the inability to use them due to a lack of funds. The responses from the interviews support the claim that financial inclusion can and has been improved in some regards with the use of

mobile money, notably, in terms of ease of remittances and small-scale savings for poorer individuals. While not having a significant impact on bank account ownership, it can improve access to insurances as indicated by the regression results in table 3 column 4-6 and by the respondents in the interviews indicating accessing it through their mobile money accounts.

However, it should not be seen as a panacea in solving the overall low levels of FI. There are clear supply constraints of bank branches and services in rural areas, as well as a lack of awareness. Lack of income is an important constraint in bank account use but not for mobile money, while access to mobile money agents is relatively higher than access to bank branches. These two factors are important explanatory factors to why mobile money use is higher than bank account use. The existence of supply constraints is supported by the regression result in table 4, which indicate that the urban-rural gap in bank account ownership increase as literacy levels, a proxy for demand, increase. As the same pattern is not found for mobile money, and interview responses indicated having greater access to mobile money agents in rural areas relative to bank branches and ATM's, the current market structure does not seem to fulfill the banking needs of rural residents.

These results have implications for policy makers. Proper access to quality education can improve both literacy and awareness of the importance of savings, which would raise the need for savings accounts. Furthermore, cost structures of bank accounts and transparency of the terms appear to be a clear hindrance for bank account uptake, not least in terms of trust. There are also questions that remain to be answered, which opens venues for future research. One of these is a harmonization of data to make more fruitful comparisons possible. This would also enable more robust analysis of variables. Additionally, it would be useful to make time-varying studies to better understand the direction of causality. While this study provides some insights through its qualitative interviews, an extension of the interviews to other locations in the country could help in painting a fuller picture of current constraints. Furthermore, future studies should look at the different outcomes of financial inclusion using other units of analysis, including at the firm level, to better understand how increased financial inclusion impacts firms access to credit. Furthermore, the qualitative interviews pointed at new ways to measures differences in uptake that has not yet been done. Future research could therefore focus including variables measuring the awareness of benefits of a given service, as well as frequency of use instead of a variable limited to ownership of an account.

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## 8. Appendix

The following table lists all the variables included in the regression models. The table includes the questions they were based on, how they were coded and the range of the values each variable could take. While some variables used were preexisting ones from the data set, others have been used to create author-made indices. How these have been coded and the motivation for why the given methodology has been used is explained in more details after the table.

**Table A1:** Variables used in the regression models

<i>Variable name</i>	<i>Purpose</i>	<i>Coded values</i>
has_mm_account	Measures uptake of mobile money accounts	0 or 1
has_bank_account	Measures uptake of bank accounts	0 or 1
has_insurance	Measures uptake of insurances	0 or 1
Urban	Indicates urban or rural residence	0 or 1
Male	Indicates a respondent's gender	0 or 1
Age	Indicates a respondents age in years	16–85
Highest_grade_attended	The highest level of schooling attended	0–5
Highest_grade_completed	The highest level of schooling completed	0–5
Marital_status	A respondent's marital status	Single, Married, Divorced, Living together, Widowed
Zone	Indicate geographical location	Coastal, inland, border, lake
has_mobile_phone	Measures if respondent owns a mobile phone	0 or 1
District	Indicates the district the respondent resides in	Name of district
propensitytosave_score	Score on the willingness to save	0–16
Important_savephone_score	Perceptions on the importance to save money on a phone	0–4
propensitytoinvest_score	Score on the willingness to make investments	0–4
financialplanning_score	Score on a respondent's level in financial planning	0–3
controloffuture_score	Score on a respondent's perceptions on their control of their own future	0–3

motivation_score	Score measuring a respondent's motivation about their future	0–3
Everused_mobilephone	Indicates if a respondent has ever used a mobile phone	0 or 1
Owens_a_mobilephone	Indicates if a respondent owns a mobile phone	0 or 1
Important_tohave_mphone	Indicates if a respondent finds it important to have a mobile phone	0 or 1
benefits_with_mmaccount	Indicates if a respondent finds benefits with having a mobile money account	0 or 1
leveloftrust_mmproviders	Indicates the level of trust of mobile money providers	1–5
leveloftrust_mmagents	Indicate the level of trust for mobile money agents	1–5
mmawareness_score	Indicates the number of mobile money providers a respondent is aware of	0–6
agegroup5y	Indicates which age group a respondent belongs to	1–13
leveloftrust_banks	Indicates the level of trust for banks	1–5
leveloftrust_bankagent	Indicates the level of trust for bank agents	1–5
current_school_status	Indicates if a person is currently in school	0 or 1
longterm_saving	Indicates if a person has put money aside for long-term savings	0 or 1
salaried	Indicate if a respondent receives a salary or not	0 or 1
willingness_to_save	Indicates a person's willingness to save money	0–5
ability_to_save	Measures a respondent's ability to put money aside for savings	1–5
selfreported_finlit	Measures a respondent's financial literacy	0–4
math_lit	Measures a respondent's level of mathematical proficiency	0–4

*Notes: Variables used have been taken from the CGAP 2016 dataset (World Bank, 2016) and the FinScope 2017 dataset (FSDT, 2021).*

The indices measuring attitudes and behavior related to saving, investing, and financial planning were calculated by summing the values on a set of variables related to the given index. For the propensity to save index the respondent answered the question " In your opinion, how important is it for your household to save for each of the following?" with the following related events:

1. Save money for a future purchase
2. Save money for an unexpected event
3. Save money for regular purchases
4. Save money for school fees
5. Save money for a marriage ceremony/dowry
6. Save money for health care
7. Save money for death in the family
8. Save money for future loss of income

With the answer choices "very important", "somewhat important", "not important", and "don't know", coded with a value of 2 if "very important", 1 if "somewhat important" and 0 if "not important" or "don't know". The answers to these 8 questions were then summed up, with a potential maximum score of 16 and minimum score of 0. Similarly, the index measuring the perceived important at saving at a formal institution or on a mobile phone was based on the question " In your opinion, how important is it for your household to save at each of the following?" with the following questions:

1. Save money at a financial institution
2. Save money on a mobile phone

The answer choices were the same as for the propensity to save index, with answers coded in the same way. The total score for this index was thus a maximum of 4, with a low value of 0. The propensity to invest were based on the question "In your opinion, how important is it for your household to invest in each of the following?" with the following specific related questions:

1. Invest money in a farm or buying land
2. Invest money in a home/home improvement
3. Invest money in a future educational opportunity
4. Invest money in a business (non-farm)
5. Invest money in health care

These were also coded as 2 if answered with "very important", 1 if answered with "somewhat important" and 0 if answered with either "not important" or "don't know". The maximum potential score for the index as 10 and the minimum score was 0.

The financial planning index had a maximum score of 3 and a minimum score of 0. It was based on the following questions, coded as 1 if answered "disagree" and coded as 0 if answered "agree":

1. I only focus on the short-term
2. I live more for the present day than for tomorrow
3. The future will take care of itself

The index measuring the respondents perceived control of their own future were also based on question with the answer choices "agree" or "disagree", where the answer "agree" was coded as 1 and the answer choice "disagree" was coded as 0. The index had a total maximum score of 3 and a minimum score of 0. It was based on the following statements:

1. My life is determined by my own actions
2. I can mostly determine what will happen in my life
3. When I get what I want, it is usually because I worked hard for it

The motivation score was also based on statements coded as 1 if answered "agree" and 0 if answered with "disagree". The total score was thus also a maximum of 3 and a minimum of 0. It was based on the following statements:

1. I always work hard to be among the best at what I do
2. I always look for opportunities for improving my situation
3. I have many aspirations

The awareness variable was based on the respondent answering either "yes" or "no" to the question "Please tell me the names of any mobile money providers that you are aware of?" with the mobile money providers M-Pesa, Tigopesa, Airtel money, Zantel, Smart, and Halotel listed. The final score is the sum of the number of providers that a respondent answered "yes" to, with a maximum score of 6 and a minimum score of 0.

Each of the variables measuring the level of trust for a given institution or provider was based on a single question, with 5-range list of answer choices, going from "fully distrust" to "fully distrust", where "fully distrust" was coded as 1 and "fully trust" coded as 5.

Besides the methodology used in this paper for the literacy index, other methods have been used in previous studies. Others have used a 5-point scale on each question, generating a final score based on the average score of all individual questions (Collins, 2007), or made regressions including controls for educational attainment, age, employment status, gender, and income (Lotto, 2020). This paper coded four questions as 1 if the respondent answered "agree" and 0 if answered "disagree". The final score of the literacy index was then the sum of these scores, and is based on the following four statements:

1. You keep track of money that you receive and spend
2. You know how much money you spent last week
3. You adjust your expenses according to the money you have available
4. You often have to spend more money than you have available

Similarly, the math literacy index is based on four questions posing different mathematical problems, where an answer was coded as 1 if answered with the correct answer and 0 if answered with anything else. It is based on four mathematical problems, being the following:

1. A person spent TSH 13,000 to buy food one day but only TSH 8,000 the next day. How much did they spend to buy food over the two days?
2. A person has TSH 50,000 in cash and spends TSH 13,000 on food and TSH 8,000 on clothing. How much money do they have remaining?
3. 20 people each won a prize of TSH 35,000. What was the total amount of money received by the 20 people?
4. A prize of TSH 180,000 is shared equally between six people. How much will each person receive?

Lastly, the willingness to save index was calculated based on five statements, coded as 1 if answered "agree" and 0 if answered "disagree" for the following four statements:

1. You sometimes don't buy things that you want in order to save money
2. You save or put money away for a specific purpose and you do not use it for any other purpose
3. You got information about different options before you decided where/how to save
4. You try different savings options to find the one where you can get the most interest

It was coded as 0 if answered "agree" and 1 if answered "disagree" on the following statement:

1. You save or put money away for a specific purpose but you end up using it for something else before you used it for that purpose

The final score was then calculated by summing up these individual scores.