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Financial Literacy and Savings Behaviour in the Informal Economy

- A Field Study among Microfinance Clients in Rural Tanzania

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ABSTRACT: Basic knowledge in finance, called financial literacy, is increasingly important all around the world due to elevated complexity of financial instruments. Research in developed countries shows that financial literacy is an important predictor of economic decision-making and individual savings behaviour. In less developed countries, research on financial literacy's effect on individual savings is limited to urban or nationwide contexts, leaving rural settings unexplored. In rural areas, educational attainment and income levels are often low and people rely on informal savings options such as savings groups. The expansion of microfinance introduces formal savings instruments and changes the way poor people in rural areas save money. By estimating OLS regressions on data collected from 291 microfinance customers of Mwanga Community Bank this unique study investigates whether financial literacy can positively affect the propensity to save money in a bank account among microfinance clients in rural Tanzania. In line with previous research, the results reveal low financial literacy levels among rural respondents. However, financial literacy in this context does not have a significant effect on the propensity to save money in a savings account.

Keywords: financial literacy, individual savings, microfinance, rural, Tanzania
JEL: G21, D14, O17, O18, O55

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Contents

1. Introduction

'How could the poor save – they have no money?' (Banerjee and Duflo 2011, p.184).

Rich or poor, we all have a present and a future. Hence, we all need savings to smooth out consumption over time. It might sound illogical, but poor people cannot afford not to save money. Poor people are particularly vulnerable to unforeseen events that cause unexpected expenses and only a small amount of savings could prevent an economic disaster (Banerjee and Duflo 2011). Individual savings can enhance personal wellbeing and economic security, but also boost economic growth and be an instrument to bring nations out of poverty (Mahdzan and Tabiani 2013).

Explanations behind the savings behaviour of poor people in a rural context are many and can be separated into one structural and one psychological dimension. Structurally, limited access to formal savings accounts is a common feature in developing countries. This leads to the usage of informal alternatives such as savings groups in the neighbourhood or putting bills under the mattress. Many people in rural areas save by slowly building a house, brick by brick whenever they get some money (Banerjee and Duflo 2011). Research indicates that individual savings could increase if poor people placed their savings in a bank account to a larger extent, since this has proven to encourage a more long-term perspective on savings (Ashraf et al. 2006b). An experiment conducted among business owners in rural Kenya by Dupas and Robinson (2013a) shows that people who are offered a free bank account save more than people relying only on informal methods. Yet, not everyone with a bank account use it, which suggests that the absence of formal savings instruments is not the whole story behind why poor people do not save more.

The psychological dimension is essential to understand the savings behaviour of poor people. Saving money implies thinking about the future, which many poor people are reluctant to do. For someone who has very little money today it is likely that future expensive goals such as education for a child seem unreachable and simply too distant to be realistic (Banerjee and Duflo 2011).

One way of encouraging the usage of bank accounts and overcoming these psychological and structural obstacles could be by increasing the level of knowledge in finance. Basic knowledge in finance enables people to make more informed decisions about their financial situation. In

academic literature, this basic financial knowledge is referred to as financial literacy and the concept has gained increased attention from economists and researchers in the aftermath of the financial crisis of 2008. It is argued that higher levels of financial literacy could have prevented the profoundness of the crisis. Although this occurred in the developed part of the world the concept applies to developing countries as well (Kefala 2010). Both the Organisation for Economic Co-operation and Development (OECD) and the World Bank have recently acknowledged the relevance of financial literacy to improve conditions for economic growth in developing countries. Increasingly complex products pose a growing need for people all around the globe to accumulate financial knowledge to be able to make informed decisions about their savings and financial planning (Kefala 2010).

Comprehensive research in the developed world shows that financially literate people are more likely to participate in financial markets, to invest in stocks and to hold precautionary savings (Lusardi 2014). In the developing world the impact of financial literacy on economic decision-making is yet a rather unexplored field. Existing findings reveal similar patterns as in richer countries, such as the fact that financial literacy is positively linked to financial planning and household savings (Beckmann 2013). Studies from developing countries that specifically investigate the relationship between financial literacy and savings are based on nationwide data or data from urban areas, which leaves a research gap for the rural context. Savings behaviour differs widely between developing economies and more developed countries since people in developing economies still rely on very informal ways of saving. The inequality becomes even larger in rural areas where educational attainment is low and the poorest people are found. A current expansion of the microfinance[1] industry in rural areas of developing countries changes the way poor people save and borrow money, moving from informal ways of saving to more complex financial products. When microfinance customers are exposed to these complex products they need to be able to make simple interest rate calculations and understand basic financial concepts, why this group is particularly interesting to study.

This paper, conducted in the rural district of Mwanga in northern Tanzania, aims to study the relationship between financial literacy and savings amount placed in a bank account among microfinance clients. To our knowledge, no researchers have previously attempted to explain the usage of savings accounts with measures of financial literacy among microfinance clients. In

[1] Definition of microfinance: 'Microfinance refers to a range of financial services provided to poor clients who are typically unserved or underserved by other financial institutions' (Microrate 2016).

this study we present results from Ordinary Least Squares (OLS) regressions based on cross-sectional data collected from 291 microfinance customers of Mwanga Community Bank along with secondary data on account balances derived from the bank's database.

The main finding of this thesis is that financial literacy does not have a significant impact on savings amount placed in a bank account in this context. We find a very low level of financial literacy, which could be of importance for microfinance institutions and policy makers.

The remainder of this paper is structured as follows: Section 2 describes the current state of knowledge on financial literacy, individual savings and ultimately the link between the two. The subsequent section describes the research setting of Tanzania and microfinancing before presenting our collaboration partner Mwanga Community Bank. In Section 4 we develop our research question and hypotheses and in Section 5 we present the method used to conduct this study. Afterwards, the results are presented in Section 6, discussed in Section 7 and concluded in Section 8.

2. Previous research

2.1 Financial literacy

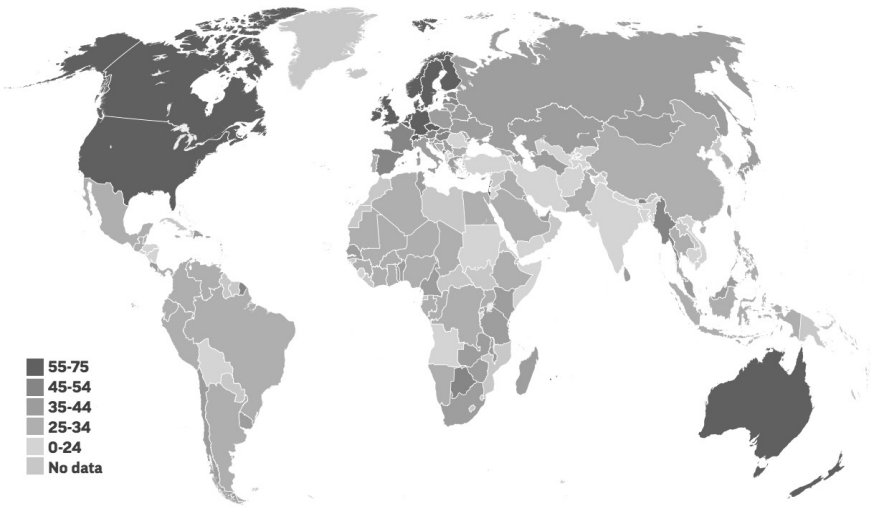
The definition of financial literacy as stated by OECD (2011) is:

> A combination of awareness, knowledge, skill, attitude and behaviour necessary to make sound financial decisions and ultimately achieve individual financial wellbeing.

Financial literacy is an increasingly debated concept in international finance and politics. Lack of basic financial knowledge is one of the explanations behind the misuse of complex financial products that ultimately resulted in the global financial crisis in 2008 (Gerardi et al. 2010). The elevated interest for financial literacy in the developed world gradually poses an interest to research its equivalence in developing countries. Some countries in the developing world have started to promote financial education in order to increase the access and usage of financial services (Kefala 2010). Financial education is not effective for everyone, but it increases the likelihood of opening a bank account among the least educated and financially illiterate households (Cole et al. 2009).

Financial literacy is measured around the world through the use of three standardised multiple-choice questions first constructed in 2004 by Lusardi and Mitchell (2008, 2011a, 2011c). By addressing the issues of compound interest, inflation and risk diversification separately the three questions test knowledge in finance. Financial illiteracy is widespread around the world, and differs widely between socio-demographic groups. Women are less financially literate than men and the least educated show lower levels of financial literacy than highly educated people. Concerning age, financial literacy levels tend to follow an inverted U-shape, peaking for middle-aged people while being lowest among the young and old (Lusardi and Mitchell 2011c). Households in rural areas and families with a female head of household exhibit lower levels of financial literacy than households in urban areas and families with a male head of household (Cole et al. 2009).

The S&P Global FinLit Survey provides an overview of financial literacy worldwide. The study consists of three literacy questions testing the same three concepts as Lusardi and Mitchell but also includes an additional question on basic numeracy. A person is defined as financially literate if he or she answers at least three out of four questions correctly. According to this definition, only 33% of the adult population worldwide is financially literate. Hence, there are still around 3.5 billion adults, mainly in developing countries, who lack basic financial skills. Figure 1 displays huge inequalities around the world where Australia, North America, the Scandinavian countries, Germany, Israel and the United Kingdom have the highest levels of financial literacy, around 65% of the adults are financially literate in these countries. In the developing part of the world, the situation looks completely different. In Tanzania, less than half (40%) of the adult population is financially literate (Klapper et al. 2015).



Source: S&P Global FinLit Survey, reproduced with permission

Figure 1. Global variations in financial literacy levels. Percentage (%) of adults who are financially literate (Klapper et al. 2015).

The first nationwide household survey on financial literacy in the developing world was performed in Indonesia (Cole et al. 2009). Among three questions, testing the same concepts as Lusardi and Mitchell, shares of correct answers were as follows: compound interest 78%, inflation 61% and lastly risk diversification 28%. The same researchers also performed a survey among rural farmers in India where 59% answered correctly to the question about compound interest, 25% to the question about inflation and 31% understood the concept of risk diversification. Comparing the nationwide study in Indonesia to the rural setting in India reveals that financial literacy levels are generally lower among people living in rural areas compared to urban residents.

A survey in Romania uses financial literacy questions that are most similar to the ones in this thesis. Beckman (2013) shows that 41.3% of the Romanian respondents understand compound interest, 31.8% inflation and 14.7% grasp the concept of risk diversification. Almost one third answered 'do not know' to all questions and only 3.8% knew the answer to all three questions.

To sum up, for developing countries, financial literacy levels are very low and research is still limited to a few surveys. In the following section, previous research on individual savings behaviour is reviewed before presenting the current state of knowledge on the link between financial literacy and savings decisions.

2.2 Individual savings behaviour

According to the life cycle model of savings, individual saving patterns tend to change over lifetime and follow a hump shaped curve. People save least in periods of low income, which usually occur during the early twenties and after retirement. Middle-aged people save the most, peaking at the age of 40 (Ando and Modigliani 1954).

Individual saving is an important aspect of everyday life for many reasons. Firstly, it is important on an individual level to assure security, especially in poor countries suffering from limited welfare systems. Secondly, from a macro perspective, models on development economics show that individual savings enable investments that in turn increase productivity and drive economic growth (Harrod 1939; see also, Domar 1946; Solow 1956). Thirdly, individual savings make a nation resistant to uncertain times and financial turmoil (Mahdzan and Tabiani 2010). Finally, evidence from seven African countries, among other studies, shows that there is a long-run relationship between the growth rate of savings and economic growth (Anoruo and Ahmad 2001).

The propensity to save money in a bank account varies extensively between countries, demographic factors and prevailing macroeconomic conditions. Structural aspects in developing countries make many people use substitutes for bank accounts, such as building a house or investing in cattle. Others save in informal savings groups or store cash at home (Banerjee and Duflo 2011).

Several psychological aspects affect individual savings in developing countries like Tanzania. For example, people rely extensively on their family and friends economically, something which is usually referred to as the importance of 'the collective'. Berlin and Kaunitz (2014) show that if a person can quickly acquire a moderate amount of money through their friends and family this cash margin can replace the need for individual savings. Their research is carried out in Sweden, but since collectivism prevails to a greater extent in developing countries, the finding is also likely to apply to Tanzania (Hofstede 1980). Collectivism provides an informal insurance among people in a group, why the need for individual savings decreases (Kyriacou 2016). Other psychological features that limit savings are impatience and lack of self-control, which make people more prone to spend money directly. These features often make people buy temptation goods today while postponing important investments for the future (Banerjee and Duflo 2011). This bias towards spending today is particularly evident among poor people who are relatively more impatient than wealthy people due to higher personal discount rates (Lusardi and Mitchell 2007).

Ironically enough, the only way to get around the issue of lack of self-control is to exhibit self-control. People who realise that they need to commit to prevent themselves from spending today can successfully save, by for example borrowing money. Since they feel the obligation to pay back the loan, this increases their discipline to save money (Banerjee and Duflo 2011). The self-control feature is also demonstrated in an experiment conducted in the Philippines by Ashraf et al. (2006b), where people are offered to open a bank account with a commitment feature. When opening the account the customer sets a goal, for example education, and is not allowed to withdraw money before the amount is sufficient to cover the expenses for the goal. The results show that the commitment feature increases the level of savings in the long run. Nevertheless, there are several structural aspects that prevent people in parts of developing countries from placing savings in a bank account. Distance to the bank office, high fees for opening an account and minimum requirements of deposit amounts are often determining aspects (Banerjee and Duflo 2011).

2.3 The link between financial literacy and savings

Studying the effect of financial literacy on economic decision-making in developed countries shows that financially literate people are more likely to plan for retirement and engage in financial markets (Lusardi and Mitchell 2011a), while less likely to default on debt or engage in high-cost mortgages (Moore 2003). Financial literacy is also linked to holding precautionary savings to use in case of sickness, job loss or other emergencies (de Bassa Scheresberg 2013). In the Netherlands, financial literacy increases stock market participation and an individual's ability to develop a savings and retirement plan (van Rooij et al. 2012). Stix (2013) shows that people in Central, Eastern and South-eastern European countries with higher financial literacy levels are more likely to prefer savings in a bank account over savings in cash. Numerous studies in the developed world find similar patterns, that a high level of financial literacy is associated with more sophisticated economic behaviour.

Moving to developing countries, the link between financial literacy and savings is still moderately researched. The few studies that have been conducted show the same tendencies as in the developed world. In Malaysia, Mahdzan and Tabiani (2013) find that financial literacy is positively and significantly associated with having individual savings. Financial literacy also has a positive effect on the propensity to save in Romania (Beckmann 2013). A different study conducted in India and Indonesia shows that the probability of having a bank account and the demand for formal savings instruments increase if a person is more financially literate (Cole et al. 2009). These findings indicate that financial literacy can increase the propensity to save money in a bank account among poor people in developing countries.

A shortcoming of previous studies, with the exception of the article presented by Cole et al. (2009), is that they are based on nationwide household surveys or on surveys targeting people enrolled in university in urban settings. In these settings, sophisticated savings options are available, such as mutual funds and stocks in the Romanian study. Cole et al. investigate savings behavior among rural farmers in India, but since it is the only one of its kind it is hard to generalise the conclusions drawn from that article. Thus, there is a need for more research in rural settings in developing countries where options for savings are different. To our knowledge, no study that specifically investigates the effect of financial literacy on savings has been conducted among microfinance customers. One study about financial literacy and repayment problems of microcredit was conducted in the urban setting of Dar es Salaam, Tanzania (Tillberg and Westander 2015), why the research gap for financial literacy's effect on savings behaviour in the rural context still remains.

Since economic and socio-demographic inequalities between urban and rural populations in developing countries are substantial, it is plausible to believe that the link between financial literacy and savings behaviour is somewhat different. We aim to add to the literature by studying the relationship between financial literacy and savings among microfinance clients in the rural setting of Mwanga, Tanzania.

3. Research setting

3.1 Tanzania

Tanzania is the largest country in East Africa and has experienced rapid economic growth since a political reform in the 1980s (Globalis 2013). GDP growth rate was 7% in 2014 and the strong positive trend seems to hold. Tanzania's high rate of inflation of 20% in 2011 has decreased to a 5.6% level this year. Despite the strong economic development on a national level, Tanzania is still one of the world's poorest countries with 27% of the population living in poverty. Economic wealth is unevenly distributed between the urban and rural population, an inequality that has increased with the newly gained national wealth (World Bank 2015). Approximately 38% of rural households were considered to live below the economic boundary for basic needs in 2011 compared to 24% of urban households (MFTransparency 2011). In an attempt to alleviate people from poverty, microfinance institutions operate to offer loans and savings instruments to the poor.

3.2 Microfinance in the informal economy

Microfinancing was initiated in the 1970s at Grameen Bank of Bangladesh by the microfinance pioneer Muhammad Yunus, with the aim to give poor people in developing countries access to financial services. Microcredit enables the start of a small business and can enhance economic and social development, which could ultimately raise people out of poverty (Yunus 1999). Microcredit is often the initial contact with the bank for many poor people and opens up to a mutual relationship. This often leads to the use of other financial services such as savings instruments that offer security, liquidity, positive real return and convenience (United Nations 2016). MicroRate is the first microfinance rating agency and reports that there are almost 2,000 microfinance institutions (MFIs) serving 92 million customers (MicroRate 2016).

Similar to in other developing countries, the informal economy plays a significant role in Tanzania. The informal economy refers to activities and income partially or fully outside government regulation, taxation and observation (World Bank 2013). Since workers in the

informal economy frequently lack social benefits and protection in the workplace they rely to a large extent on individual financing (Ilo 2016). For this group, informal microfinance services such as Savings and Credit Co-operatives (SACCOs), where members save in groups and borrow money from each other, have been active for decades. In the mid 1990s, the first official microfinance services were brought to Tanzania by Non-Governmental Organisations (NGOs). Regular banks have provided the poor with microcredit and savings instruments for the past ten years (Millinga 2016).

Current microfinance institutions in Tanzania only cover 5% of the total demand for microcredit. Only 8% of rural Tanzanians have access to a bank account, which is largely due to banks' reluctance to operate in remote areas where infrastructure is inferior and operating costs are high. The importance of access to microfinance services in rural areas is gradually acknowledged and increased economic support is given to microfinance institutions (MFTransparency 2011).

General characteristics of microfinance customers, such as low income and education levels, are correlated with low levels of financial literacy, which make this group particularly interesting to study since they are likely to benefit from financial education (Cole et al. 2009). In addition, they face more complicated financial products, which challenges their knowledge in finance.

3.3 Mwanga Community Bank

This field study is conducted in collaboration with Mwanga Community Bank Ltd, called MCB in the remainder of this thesis. MCB is located in the Kilimanjaro region in northern Tanzania and has four branches with separate service centres. The main branch is located in Mwanga village and has 13,375 microfinance customers, out of which 1,507 have an individual savings account and make up the population for this study. The customers live widely spread in the rural areas around Mwanga and some need to spend more than one and a half hour to reach the bank office. Similarly to what is stated in literature, some of the customers might place parts of their savings in cattle or houses instead of placing them in their MCB savings account. Others place money in savings accounts offered by mobile services such as the most common one called M-Pesa (Chimwaga, 2016, pers. comm., 24 February).

Figure 2. Tanzania. The marked area in the north east of Tanzania is the Kilimanjaro region, where MCB's four service centres are located (authors' own).

MCB's microfinance department offers two types of individual savings accounts. The first one is called a solidarity account, which is opened automatically and free of charge for people in solidarity groups who have a microloan with the bank. The members of solidarity groups grant each other's microloans and a savings amount equal to at least 20% of the loan is required as collateral. Once the loan has been repaid the solidarity account continues to function as a regular savings account, even though some customers stop saving at that time. Other customers default on their loans and thus the bank confiscates their savings. The second type of individual savings account is related to Village Savings and Loan Association (VSLA) groups and offers a way for informal savings groups to save money at the bank. If a VSLA group member has savings that exceed the maximum deposit amount set by the savings group, that person is encouraged to open an individual VSLA account where larger amounts of money are accepted. That way, the customer continues to save informally in the VSLA group with the additional opportunity to save in a formal savings account. The individual VSLA account has an opening fee of 10,000 TZS (36.85 SEK[2]). None of the accounts has a monthly or annual fee but they both charge 1,500 TZS (5.53 SEK) per withdrawal. Both types of savings accounts earn 3% interest (Chimwaga, 2016, pers. comm., 24 February).

4. Research question and hypothesis

Previous studies show that financial literacy is necessary to make sound financial decisions and can lead to financial wellbeing. In the advanced world, this implies that financial literacy increases precautionary savings and the use of more complex financial products such as stocks

[2] Based on exchange rate 1 SEK=271.37 TZS (XE.com). All exchange rates in the remainder of this thesis are derived from the same webpage.

or mutual funds. In a rural context in a developing country, these savings options do not exist. Instead, people rely to a large extent on informal savings options such as storing cash at home or in savings groups and others still define their savings in terms of cattle or houses (Banerjee and Duflo 2011). Currently, the growth of microfinance institutes and mobile services introduces the formal option of a savings account in this setting. Considering liquidity and security, this is a better savings option than the informal ones, why the underlying research question for this paper is as follows:

Does financial literacy affect a microfinance customer's propensity to place money in a savings account?

Due to high inflation, the real interest rate on a savings account is negative for MCB customers. This increases the attractiveness of investing in cattle or houses, which are more likely to maintain their real value. However, research shows that poor people place savings in a bank account despite negative real interest rate, since savings in informal options often offer even more negative returns (Dupas and Robinson 2013a). The fact that money is placed somewhere secure is highly valued (Ashraf et al. 2006a). The option to save in cattle or houses reduces the liquidity of savings and the investment is not possible until a large enough amount of money is accumulated. Continuously having money in a savings account is the most rational option for risk-free savings among people in this context and financial literacy should therefore increase the probability of placing money in a savings account. Accordingly, we develop our first hypothesis:

Hypothesis 1: *Financial literacy is positively related to placing money in a savings account among microfinance customers.*

Secondly, we expect that financial literacy leads to higher amounts of savings. We thus develop our second hypothesis:

Hypothesis 2: *Financial literacy is positively related to the amount of savings that a microfinance customer places in his or her account.*

This is in line with findings from other settings where Stix (2013) finds that more financially literate people prefer savings in a bank account over savings in cash and Cole et al. (2009), Beckmann (2013) and Mahdzan and Tabiani (2010) show that more financially literate people have higher total household savings.

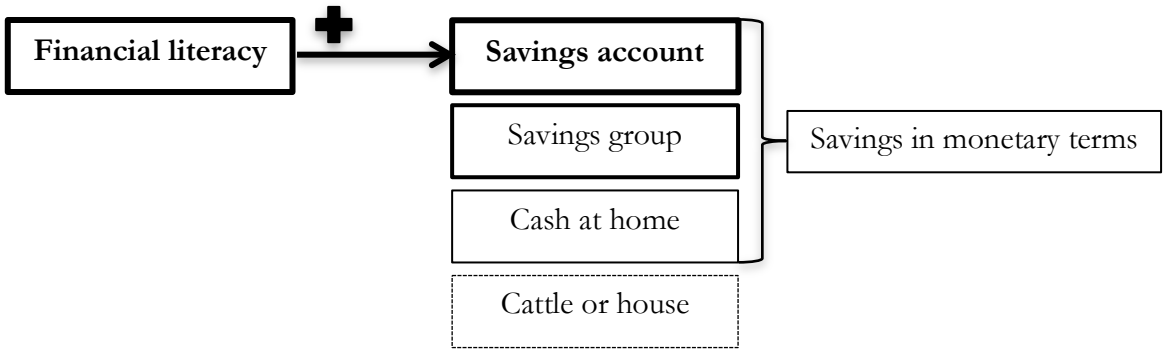


Figure 3. Illustrating the hypothesis of this thesis. Given the available options for savings in monetary terms, the savings account is the most rational alternative. Thus, higher levels of financial literacy should increase peoples' propensity to save in a bank account (authors' own).

5. Method

The hypotheses of this paper are tested through a case study. During five weeks, we collected primary data using a questionnaire distributed among MCB's microfinance customers with an individual savings account. Then, secondary data on their savings amount was extracted from MCB's database. One limitation to this study is that data on account balances over time was not accessible, why cross-sectional data serve as an indicator for how financial literacy affects savings amount at a given point in time.

The case study approach implies that results are not directly applicable to microfinance customers in other settings, such as other developing countries or other rural areas. In line with Flyvbjerg (2006) we argue that without generalising, our in-depth study on financial literacy can contribute with valuable findings on microfinance clients' characteristics and act as starting point for future research in similar settings.

Before starting the survey, general background information about Tanzania, the village of Mwanga and MCB was gathered. A Swedish municipality worker, who has made semi-annual visits to Mwanga for the past seven years, gave a valuable introduction to prevailing customs, culture and habits in the area. Moreover, a clear strategy for the study was established with the bank staff before our arrival to Tanzania.

5.1 Primary data through questionnaire

The primary data, which is the main foundation of this case study, was collected through a questionnaire answered by 327 people out of the total 1507 individual microfinance savers at MCB's Mwanga branch. The questions are based on previous research and took shape in

consultation with bank personnel, previous Swedish interns at MCB and municipality workers. A translator, who had the same dialect as the respondents, translated the questionnaire from English to Swahili. Then, to verify the Swahili version, it was sent to an independent person who translated it back to English. Many English words lack equivalence in Swahili, why wordings were discussed thoroughly and input from both bank staff and translators was evaluated before final decisions were made. Our supervisor at the microfinance department brought in three additional people for consultation on this task.

To test financial literacy, the three questions originally designed by Lusardi and Mitchell in 2004 were used in our questionnaire (Lusardi and Mitchell 2008, 2011a, 2011c), with small modifications. In English, the exact wording is as follows:

Compound interest – Suppose you had 100,000 TZS[3] in a savings account and the interest rate was 2% per year. After 5 years, how much do you think you would have in the account if you left the money to grow?
More than 102,000 TZS
Exactly 102,000 TZS
Less than 102,000 TZS
Do not know

Inflation – Imagine that the interest rate on your savings account was 4% per year and inflation was 5% per year. After 1 year, how much would you be able to buy with the money in this account?[4]
More than today
Exactly the same
Less than today
Do not know

[3] All amounts are expressed in Tanzanian shillings as opposed to the original questions where amounts are in US dollars.
[4] Original question as stated by Lusardi: Imagine that the interest rate on your savings account was 1% per year and inflation was 2% per year. After 1 year, would you be able to buy more than, exactly the same as, or less than today with the money in this account?

Risk diversification - Imagine that you have 100,000 TZS to invest. Do you think the following statement is true or false: 'Investing all 100,000 TZS in the same opportunity usually provides a safer return than investing smaller amounts in many different opportunities.'[5]

True

False

Do not know

To better suit the setting of Tanzania, two modifications were made to Lusardi and Mitchell's original version of the questions. The first modification concerns question number two where the values for inflation and interest rate have been exchanged to better relate to the prevailing reality for microfinance customers in Tanzania where interest rate on a savings account is 3% and inflation 5.6%. This follows the same reasoning as financial literacy research in Romania by Beckmann (2013). The second modification concerns the last question. It has been rephrased because its original counterpart elaborated on stocks and mutual funds, which are savings instruments that our respondents have likely never heard of. In its new shape, the question is understandable to our target group. The complete questionnaire can be found in Appendix 1.

5.2 Implementation of questionnaire

5.2.1 Pilot study

The questionnaire was first tested in a savings group of five people and then, after modifications, a pilot study on 33 customers was conducted. We accompanied bank personnel to visit customers and collected answers on printed questionnaires with the help of a translator. Visiting the rural clusters of houses where most customers live gave us valuable insights and a deeper understanding of our research population. However, this method of collecting data was associated with several difficulties. Some customers were unable to read the questionnaire due to bad eye sight and others had trouble to understand even the basic questions due to limited literacy. The translator had to read the questions out loud to many customers, which caused delays and interrupted the work of the bank personnel. In addition, we could not assure individual answers since a group of people shared a small space. It also came to our knowledge that the groups that we visited were in fact not randomised.

[5] Original question as stated by Lusardi: Do you think the following statement is true or false? 'Buying a single company stock usually provides a safer return than a stock mutual fund.'

5.2.2 Random sample

Given the disadvantages revealed in the pilot study, we established a call centre. Two people were hired and trained to call customers and read the questionnaire to them over the phone. They were carefully instructed to read the questions concerning financial literacy exactly the way that they are phrased in the questionnaire.

To assure a random sample, we manually created lists with phone numbers from the whole research population and then randomised a new list to contact people from. One day before the phone call, the customer received a text message with a brief introduction to the study and an approximate time for the call. This way we managed to reach almost all customers who were randomly selected for our sample. Most customers had a phone number registered with the bank and found it easier to understand verbally asked questions rather than written ones, which made this method of collecting data suitable. This approach also assured individual answers and that we did not interrupt the work of the bank personnel.

5.3 Secondary data

The respondents' true savings amount in their MCB account frequently differed from the self-reported account balance given in the questionnaire. This made us use the account balance extracted from the database for all customers. We excluded customers who had savings at other banks than MCB or in mobile services from our sample, as we were unable to verify the actual savings amount for these customers. Our sample size was therefore reduced from 327 to 291 respondents. Information from the database was also extracted on whether the customer had a loan with the bank or not.

5.4 Validity of data

5.4.1 Primary data

The financial literacy questions by Lusardi and Mitchell were deliberately constructed to be simple, without need for calculations and thus suitable for both face-to-face interviews and telephone interviews. Still, as previous researchers suggest, any type of measurement method of financial literacy is likely to be associated with measurement errors. The multiple-choice format imposes a risk that respondents may simply guess the answers at random. Furthermore, many people choose the first option as the correct one based on intuition (Lusardi and Mitchell 2011c).

After collecting 120 answers we found that respondents did not listen to all alternatives before answering the question. Instead, they frequently interrupted the interviewer to answer the first alternative, much like Lusardi and Mitchell (2011c) found. This made many respondents answer the first financial literacy question correctly. We also found that the Swahili translation for the first question on financial literacy gave an indication to the respondent to answer the correct alternative. Lusardi and Mitchell (2009) and van Rooij et al. (2011) also acknowledged the problem of accurate wording and showed that results can change dramatically depending on how questions are phrased.

In the light of above detected data issues, the translation to the first question was redone to make it as accurate as possible and the data collection was restarted by contacting new respondents. For the subsequent calls, customers were told to listen to all alternatives before answering the questions. Even though restarting the data collection was time-consuming, it was a solid way to assure good quality data and increase the likelihood of obtaining robust results.

A last potential source of measurement error in our primary data is that data on control variables was solely collected through the questionnaire. To improve the validity of this self-reported data, questions were repeated if not understood the first time. When asking about monthly income, which could be difficult for the customers to recall due to large seasonal fluctuations, respondents were given intervals to choose from to minimise the risk of them answering an imaginary figure.

5.4.2 Secondary data

The secondary data on savings amount and information about loans was extracted from the bank's database and phone numbers were added manually. A first problem that was brought to our attention was that some people without a cell phone had registered a number to a family member or a close friend, which meant that for some groups the same phone number was registered for them all. To avoid the measurement errors this might have caused, the names were carefully double-checked when calling the customers. A second potential problem was that a small number of respondents had an additional savings account at MCB, which was registered in a system separate from the microfinance department and not accessible to us. Money placed in the other account could therefore not be added to the customer's total savings amount. Bank employees estimated that very few people had more than one account, why this is unlikely to affect our results. A third potential problem concerns the fact that phone interviews were conducted after we created randomised lists with individual savings and

information about loans from the database. Consequently there is a time discrepancy between the recorded dates of the saving amounts and the day we spoke to the customers. This time discrepancy means that for people who deposited additional money during this period, the amount of savings is not correct. This problem is unlikely to affect a large number of people in our sample.

5.5 Data processing and choice of econometric approach

OLS regressions are used to estimate the relationship between financial literacy and savings since it is the most conventional method in the field and provides straightforward interpretations of variables. The two regressions used have different dependent variables, which are based on the hypotheses of this thesis. Our models were developed after investigation of correlation and multicollinearity between variables. All independent variables included in the same model show low pairwise correlation (see Appendix 2a) and no multicollinearity (see VIF tables in Appendix 2b). *VSLA* and *Years_customer* were highly correlated (0.3909) and therefore never included in the same regression model. The individual distribution of all variables was examined to reveal a potential need for transformation. The distribution of income was skewed in our sample, with many respondents earning small amounts and very few earning larger amounts, which made us use the logarithm of income, *Income_log.* Each independent variable was plotted against our dependent variables to reveal potential skewness and the data was searched for outliers since OLS regressions are particularly sensitive to outliers. The variables were included stepwise for robustness checks and the two final models are specified below and estimated in the last columns of Table 2 and 3.

5.6 Econometric specification

The first regression model, Equation 1, tests the extensive margin of individual savings by using the dependent variable *Save_money,* which is a dummy variable taking the value one if the respondent has an amount exceeding 10,000 TZS (36.85 SEK) in the bank account.

$$Save\_money_i = \beta_0 + \beta_1 Financial\_literacy_i + \beta_2 Age_i + \beta_3 Female_i + \beta_4 Married_i + \beta_5 Dependents_i + \beta_6 Income\_log_i + \beta_7 Distance_i + \beta_8 Loan_i + \beta_9 VSLA_i + \beta_{10} Interviewer_i + u_i \quad [1]$$

The limit at 10,000 TZS is introduced to more accurately define savers. Most respondents with lower amounts than 10,000 in their savings account are not active savers. The small amount is simply forgotten from a past time of active saving (Chimwaga, 2016, pers. comm., 24 February). Thus, with the aim to identify people who actively use their account, we define everyone with

less than 10,000 TZS in their MCB account as non-savers and people with more than 10,000 TZS as savers.

The second model, Equation 2, tests the intensive margin of individual savings by using the continuous variable *Savings_amount* that ranges from 10,000 TZS (36.85 SEK) to 1,239,730 TZS (4,567.57 SEK). The mean among savers is 87,000 TZS.

$$\begin{aligned} Savings\_amount_i = \beta_0 + \beta_1 Financial\_literacy_i + \beta_2 Age_i + \beta_3 Female_i + \beta_4 Married_i + \beta_5 Dependents_i \\ + \beta_6 Income\_log_i + \beta_7 Distance_i + \beta_8 Loan_i + \beta_9 Years\_customer_i + \beta_{10} Interviewer_i \\ + \beta_{11} Patient_i + \beta_{12} Rely\_on\_collective_i + u_i \end{aligned} \quad [2]$$

The key explanatory variable in this study is *Financial_Literacy*, which ranges from zero to three based on the respondent's number of correct answers to the financial literacy questions. The demographic variables *Age, Female* and *Married* are included as savings behaviour tends to differ depending on age, sex and family situation. *Dependents* captures how many people that depend economically on the respondent and is expected to increase the amount of savings needed. People in Tanzania often provide economically for their extended family and friends, rather than just their biological children. Higher levels of income usually imply more savings (Mahdzan and Tabiani 2010), why *Income_log* is included. Because inaccessibility has shown to prevent people from saving in a bank account, *Distance* reflects the time it takes for a respondent to travel to the bank. The variable ranges from one to four, where a one unit increase is equal to a 30 minutes longer distance to the bank office. *Years_customer* is expected to be positively related to savings since the customer have had time to build a trust relationship with the bank. The relationship itself is not possible to control for because everyone in the village knows each other and there is a culture of admiring bank personnel (Chimwaga, 2016, pers. comm., 24 February). *Interviewer* is included as a dummy to control for if our two translators got different results. The dummy variable *Loan* is included to control for the fact that microfinance customers with a microloan are obliged to save 20% of the loan amount. VSLA customers are required to deposit 10,000 TZS when opening their account, why the variable *VSLA* is expected to have a positive relationship with savings. A respondent is classified as *Patient* if he or she chooses to receive a larger amount of money in two weeks rather than a small amount today. Being patient is expected to correlate positively with savings. *Rely_on_Collective* indicates if the respondent is able to get economic support from friends and family. Respondents who say that, if they were in need, they would be able to collect an amount equivalent to a monthly income from their friends or family, are classified as being able to rely

on their collective. For the first model, coefficients on *Patient* and *Rely_on_collective* can be found in Appendix 3. The error term *u* represents all factors other than the independent variables that affect savings.

6. Results

6.1 Respondent demographics

As shown in previous research, financial literacy levels tend to differ widely across demographics. Therefore, this section presents an overview of some of the demographic characteristics of the sample.

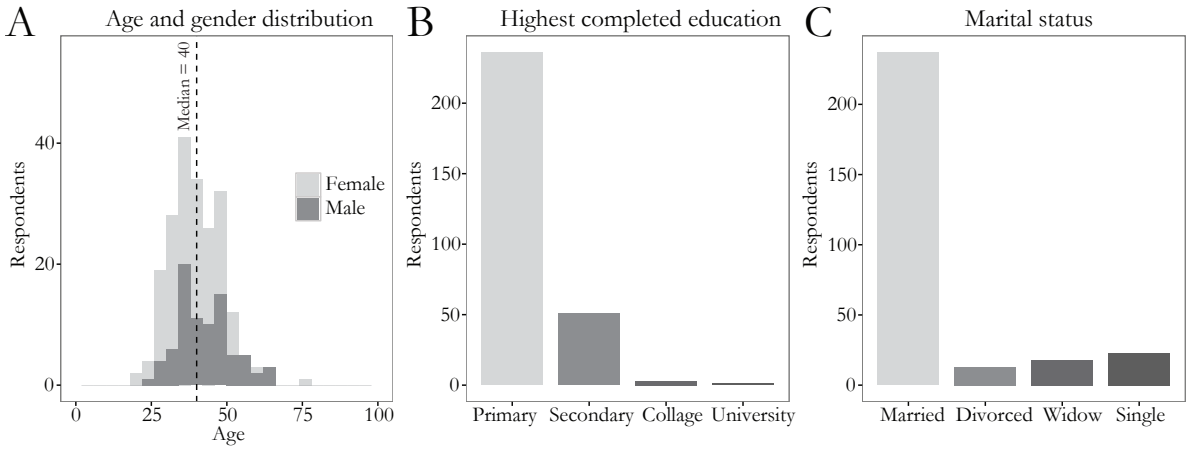


Figure 4. Distribution of sample demographics. **A.** Number of respondents who are female and male respectively across age. **B.** Highest level of completed education among respondents. **C.** Distribution of marital status among individuals (authors' own).

Most microfinance customers in our sample are female, 71.8% of 291 respondents. Around 81% of the participants in the study are married and the same amount have completed no higher education than primary school, which is equivalent to seven years of education. Only one respondent has graduated from university. Being female, with little education and living in rural areas are all demographic factors linked to financial illiteracy (Lusardi and Mitchell 2011c; see also, Cole et al. 2009). Therefore, the prediction from previous research would be that financial literacy levels are low in this sample. The following section presents the results on the three financial literacy questions.

6.2 Financial literacy levels

Below, Figure 5A shows the distribution of answers to the three questions on financial literacy. Figure 5B displays the total number of correct answers among respondents. More than half of the respondents were not able to answer a single question correctly and only 1.4% of all respondents gave the right answer to all questions.

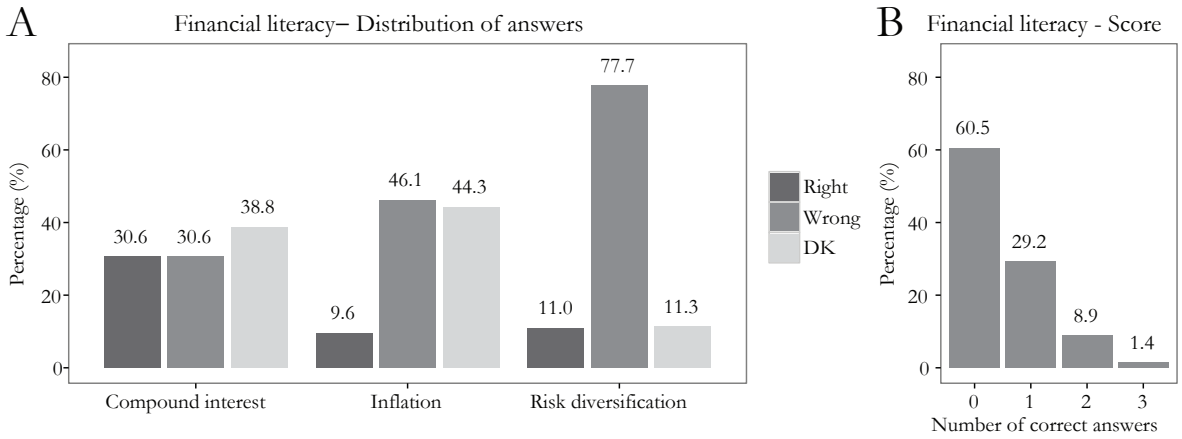


Figure 5. Financial literacy levels in total sample **A:** Share of respondents who answered 'right', 'wrong' and 'do not know' respectively to the three financial literacy questions. **B:** Total number of correct answers given by all respondents (authors' own).

Among all respondents, 30.6% answered the first question about compound interest correctly, 9.6% gave the right answer to the question on inflation and 11% to the risk diversification question. These results show far lower financial literacy levels in our sample than among rural farmers in India, where corresponding numbers to similar questions were 59%, 25% and 31% (Cole et. al. 2009). A large share of the answers, especially on question number two, is represented by 'do not know', which is somewhat concerning since such answers are usually given by people with lowest level of financial literacy (Lusardi and Mitchell 2011b).

6.2.1 Financial literacy levels across demographics

This section links financial literacy levels to demographic characteristics to detect potential differences between them.

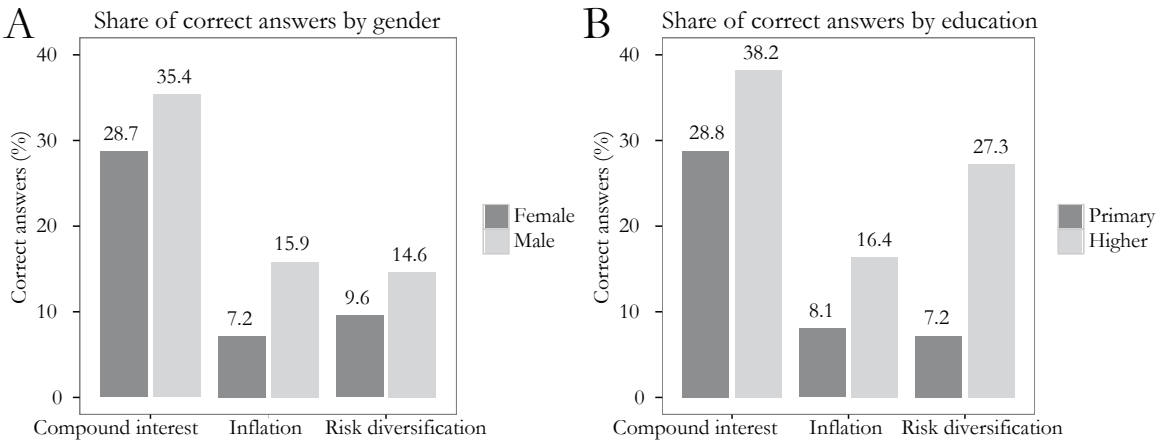


Figure 6. Share of correct answers by demographics. **A.** Distribution of females and males who answered the financial literacy questions correctly. **B.** The percentage of respondents with only primary education separated from the one's with higher education who answered the financial literacy questions correctly (authors' own).

Figure 6A shows that financial literacy levels differ largely between men and women. The share of women who answered correctly is lower than the share of men, which is true for all financial literacy questions. A Pearson's chi square test shows that the difference is significant on a 5% level for the second question on inflation. Figure 6B shows that respondents who completed secondary school, college or university have better financial literacy than the ones who only finished primary school, the latter being the majority of our sample. Here too, the difference is significant for the second question, on a 10% level. Financial literacy levels across the demographic features marital status and age were also tested for but did not show any significant differences. One interesting finding is that correct answers to the first question are lowest among the youngest and oldest in our sample, which indicates the same inverted U-shape on financial literacy levels as suggested by Lusardi and Mitchell (2011c).

6.2.2 Financial literacy, savers and non-savers

All 291 respondents have a savings account at MCB, but as shown in previous research many account holders do not use it actively (Dupas and Robinson 2013a). Our sample consists of around 50% savers and 50% non-savers. Table 1 presents the distribution of answers on the three financial literacy questions among respondents with and without savings respectively.

Table 1. Financial literacy among savers and non-savers (%)

	Savers	Non-savers	p-value
Compound interest			
Right	33.1	28.1	0.353
Wrong	31.0	30.1	0.868
DK	35.9	41.8	0.300
Inflation			
Right	9.7	9.6	0.985
Wrong	46.9	45.2	0.772
DK	43.5	45.2	0.763
Risk diversificaiton			
Right	9.7	12.3	0.466
Wrong	78.6	76.7	0.696
DK	11.7	11.0	0.837
Correct answers			
None correct	58.6	62.3	0.518
One correct	31.0	27.4	0.495
Two correct	9.7	8.2	0.668
All correct	0.7	2.1	0.317
Do not know			
At least one DK	48.3	51.4	0.598
All DK	9.0	8.9	0.985
Number of observations	145	146	

Note: DK means that the respondent answered 'do not know'.

For the interest and inflation questions a lower percentage of savers answered 'do not know', which indicates that people who save money tend to express their opinion to a larger extent than non-savers. Overall, the differences between savers and non-savers are small and as shown in the last column of Table 1 with p-values obtained from a Pearson's chi square test, none of the differences are significant.

6.3 Regression results

6.3.1 Dependent variable Save_money

The OLS regressions below are estimated using the binary dependent variable *Save_money* to investigate if financial literacy matters for a customer's extensive savings margin. The final, robust regression model is presented in column (3). The coefficient for each variable represents the effect from that variable on the probability that a respondent will save money in his or her savings account.

Table 2. Regression table with dependent variable Save_money

	(1)	(2)	(3)
Variables	Save_money	Save_money	Save_money
Financial_literacy	0.00894	0.00889	-0.00339
	(0.0418)	(0.0417)	(0.0401)
Age	-0.00131	-0.00267	-0.00335
	(0.00338)	(0.00351)	(0.00331)
Female	-0.0268	0.0160	0.0800
	(0.0685)	(0.0707)	(0.0673)
Married	-0.0317	-0.0596	-0.0282
	(0.0780)	(0.0789)	(0.0750)
Dependents		0.0278	0.0264
		(0.0178)	(0.0168)
Income_log		0.0844	0.126**
		(0.0564)	(0.0548)
Distance			-0.0323
			(0.0288)
Loan			0.238***
			(0.0621)
VSLA			0.505***
			(0.120)
Interviewer			-0.181**
			(0.0883)
Constant	0.593***	0.444**	0.485**
	(0.179)	(0.190)	(0.200)
Observations	291	289	289
R-squared	0.002	0.017	0.146

Standard errors in brackets

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

The most interesting variable for this study is *Financial_literacy*. After generating a stable regression model, this variable was introduced. The coefficient for *Financial_literacy* is negative, -0.00339, which indicates that for each correct answer given by the respondent to the financial literacy questions, the probability that he or she would save money in a bank account decreases by 0.3%. Thus, the effect on the dependent variable is small and, as shown in Table 2, not significant. With a p-value of 0.933, knowledge in finance does not seem to matter for savings in our sample. This result contradicts the first hypothesis of this thesis and will be further elaborated on in the discussion.

Income proves to be positively and significantly related to a customer's propensity to save money. Another feature that increase the likelihood of keeping savings in the bank account is if the person has a loan. This is in line with the bank's requirement to keep 20% of the loan as collateral in a savings account. The positive coefficient of *VSLA* reflects the fact that a VSLA account is opened solely with the aim for customers to save money. A solidarity account on the other hand is a loan driven product and is sometimes left unused when the loan has been repaid. The significant negative effect of the variable *Interviewer* needs some further explanation. Since the two interviewers randomly contacted people and the amount of savings is extracted from the bank's system, the amount of savings cannot be affected by the interviewer. On account of this, we have compared the two respondent groups with the aim to detect if any of the translators have deliberately chosen to call a particular type of customer from the randomised lists. The two groups did not display any other significant differences, which makes it clear that the negative significant coefficient is random. The reason why it is significant is likely due to the difference in size of the two respondent groups: one interviewer collected 86% of the answers. All independent variables available, including *Head_of_household*, *Female_head_of_household*, *Education*, *Dependents*, *Distance*, *Patient*, *Rely_on_collective* and dummies for occupational groups are presented in Appendix 3. Separate dummy variables for each financial literacy question are also included in the full regressions in Appendix 3.

6.3.2 Dependent variable Savings_amount

To test the intensive margin of individual savings, the dependent variable *Savings_amount* expressed in hundred thousand shillings is used. We present the final regression model in column (4).

Table 3. Regression table with dependent variable Savings_amount

	(1)	(2)	(3)	(4)
Variables	Savings_amount	Savings_amount	Savings_amount	Savings_amount
Financial_literacy	0.0213	0.0210	0.0208	0.0333
	(0.146)	(0.146)	(0.134)	(0.133)
Age	-0.00122	-0.00474	-0.00765	-0.00956
	(0.0118)	(0.0123)	(0.0111)	(0.0111)
Female	-0.312	-0.216	-0.0239	-0.0187
	(0.239)	(0.248)	(0.225)	(0.223)
Married	-0.0695	-0.130	-0.00506	-0.0756
	(0.272)	(0.277)	(0.252)	(0.251)
Dependents		0.0659	0.0778	0.0911
		(0.0627)	(0.0564)	(0.0566)
Income_log		0.193	0.192	0.130
		(0.198)	(0.183)	(0.183)
Distance			-0.00150	0.00272
			(0.0951)	(0.0941)
Loan			1.425***	1.377***
			(0.207)	(0.207)
Years_customer			0.186**	0.192**
			(0.0934)	(0.0926)
Interviewer			-0.778***	-0.605**
			(0.289)	(0.301)
Patient				0.366*
				(0.207)
Rely_on_collective				0.423**
				(0.195)
Constant	1.176*	0.843	0.405	0.0156
	(0.623)	(0.668)	(0.685)	(0.692)
Observations	291	289	289	289
R-squared	0.006	0.013	0.220	0.241

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

In contrast to the previous model that tested extensive margin, *Finanical_Literacy* is positively related to the intensive margin of savings. The coefficient 0.0333 implies that for each correct answer to the questions on financial literacy, a respondent saves 3,330 TZS more (12.27 SEK). This finding indicates that a higher level of financial literacy increases the propensity to place

savings in a bank account and is in line with the second hypothesis of this study. However, the coefficient is very small and insignificant with a high p-value of 0.803. It is therefore unlikely that *Financial_literacy* can explain *Savings_amount* in our sample. Potential reasons behind this deviation from previous research will be thoroughly discussed in the discussion part of this paper.

Similarly to the previous presented model, having a loan is positively and significantly related to *Savings_amount*. Another similarity is the coefficient on *Interviewer*, following the same reasoning as before. The relationship between income and savings is again positive, but in this model not significant. The number of years the respondent has been a customer at the bank show positive and significant effect on *Savings_amount*, which is reasonable considering that a customer have had time to build a relationship with the bank and thus entrust the bank with a larger share of his or her savings.

The two last variables in the table also show a positive and significant relationship with *Savings_amount*. The coefficient on *Patient* is in line with previous research that people with low discount rates are more inclined to save money. In contrast, the coefficient on *Rely_on_collective* contradicts previous research that relying on the collective could be a substitute for individual savings. Our results instead indicate that money that could be collected from close friends or relatives serve as a complement to individual savings. Apart from the control variables presented and discussed here, coefficients on all other available independent variables are presented in Appendix 3.

7. Discussion

This study reveals differences in financial literacy levels across demographics that are in line with previous research. Much like Lusardi and Mitchell (2011c), we find that men in our sample are more financially literate than women and that people with only primary education display lower levels of financial literacy than people with higher education. All respondents in our sample live in rural areas and display overall very low levels of financial literacy, which is in line with findings of Cole et al. (2009), where rural households are found to be less financially literate than urban ones. Since microfinance customers are borrowers and savers they need to be able to grasp basic financial concepts, why their low levels of financial literacy are concerning and to increase them should be a priority among policy makers and microfinance institutions.

This study shows an ambiguous and insignificant effect of financial literacy on individual savings in a bank account. Financial literacy has a small negative effect on the extensive margin of savings whereas the effect is positive on the intensive savings margin. The high p-values for the coefficient on *Financial_Literacy* in both models indicate that knowledge in finance does not affect savings in our sample, which could be the prevailing reality. Another possible scenario is that knowledge does matter for savings but our study fails to capture it. Explanations for this could be that respondents guessed the answers to the financial literacy questions or that the questions originate from Western research settings with concepts unfamiliar to microfinance customers and that we did not adapt them enough. These aspects could prevent us from detecting the true financial literacy levels in our sample and its effect on savings. Below we will discuss other potential reasons behind the insignificant results and findings on control variables that diverge from previous research.

7.1 Homogeneity of the sample

The primary reason why financial literacy is not significant to explain individual savings in either of our models could be the homogeneity of the sample. All respondents live in rural Tanzania and, as presented in Section 6.1, as much as 81% of them have only completed primary education and 81% of the respondents are married. Since they are all microfinance customers of MCB, have their own small self-run businesses and are organised in groups in which they save and lend money or grant each other's loans, the features of their economic situation are very similar. These geographic and socio-demographic homogeneities of the sample aggravate the possibility to detect differences in levels of financial literacy and savings behaviour and are therefore limitations to this study. If the three questions on financial literacy had been posed to a larger group of people, or to random people on the street, the variety in literacy levels and savings would probably have been larger and the relationship between the two easier to detect. Only one feature that has not been controlled for in this study could serve as potential distinction between the microfinance respondents of MCB: the savings group in which the respondent is active. Because the savings group itself is a social network where knowledge is shared and savings behaviour likely to be similar, it is plausible to believe that some differences could be detected between different groups. Depending on the savings group, the frequency of visits to the bank office could also vary. Since information on savings group was not accessible from the bank's system and the respondents could be part of several groups for which they rarely knew the name of themselves this feature was too comprehensive to control for in this study. A suggestion for future research on microfinance customers is to control for these potential differences between groups if possible.

7.2 The definition of individual savings

The second reason why financial literacy is insignificant in our study might be due to the definition of individual savings. This study measures individual savings as the amount of money placed in a bank account at MCB. Previous studies use other definitions, such as the number of savings instruments held by a customer, including savings accounts, stocks and mutual funds (Beckmann 2013). Another study uses the self-reported difference between income and spending (Mahdzan and Tabiani 2013). The greatest advantage of the definition used in this study is that the validity of the data can be assured as savings amounts for all respondents are extracted from a database. A different definition of our dependent variable might have revealed larger differences in saving levels among respondents. The reasons for this are discussed below.

Firstly, our definition of savings does not consider other formal savings options such as interest-bearing savings accounts at other banks or mobile banking services. Customers with savings at other banks or mobile solutions were excluded from our sample because self-reported figures on savings showed to lack reliability. Respondents frequently reported the wrong figure for their savings at MCB, why it is plausible to believe that the self-reported number for their savings at other institutions might not be correct either. If figures on savings held at other institutions could have been collected with certainty, a more sophisticated dependent variable could have been created. Perhaps, with more accurate amounts on total savings and total number of savings instruments held at MCB or other institutions, a significant relationship between financial literacy and savings could have been revealed.

Secondly, using savings in a bank account as dependent variable follows from the reasoning that it is the most rational option available in terms of liquidity and security. In terms of maintaining real value, the option to invest instead in cattle or houses could be preferable due to real return on an MCB savings account being negative. If the reality is that financial literate people value maintained real returns higher than liquidity and security, our dependent variable is too narrow. If this is the case, the variable would benefit from including real investments too. Such a preference contradicts the previous finding from Kenya where people place money in a savings account despite negative real interest rate (Dupas and Robinson 2013a), but could exist in the setting of Tanzania if, for example, the real interest rate is even more negative in this setting or savings in the form of cattle or houses is a stronger tradition.

Thirdly, if maintaining real value is more highly valued than liquidity and security the real relationship between financial literacy and savings in a bank account might be negative, as our first model suggests. There are two reasons why this could be true and yet not revealed in our model. Firstly, our dependent variables are censored and cannot take a negative value. Since the minimum amount of savings is zero and the savings amounts are on average very low, the potential negative effect from financial literacy on savings amount is not detected. An alternative dependent variable that control for this would be net savings, subtracting a respondent's borrowed amount from his or her savings amount. A second reason why the potential negative relationship between financial literacy and savings is not revealed is that the bank requires a minimum deposit of 20% of the loan amount. Consequently, the reason why respondents keep savings could be due to the minimum requirement rather than other features, which is revealed in the significance of our control variable loan.

Finally, with panel data on savings over time, it would have been possible to make a more sophisticated distinction between savers and non-savers. This study defines savers as the ones having more than 10,000 TZS in their account, with the aim to distinguish people who actively save money from the ones who happened to have a small amount left on their account from a previous time as active savers. With panel data, it would instead be possible to distinguish between people who continuously keep savings in their account from people who only save enough to make a particular investment and then withdraw the money. Thus, more sophisticated data on historical savings could have helped to distinguish people who save regularly from those who put money in their account once and happened to have more than 10,000 TZS in their account by the time of our study.

7.3 Surprising results of control variables

Rely_on_collective displays a significant positive effect on *Savings_amount,* which contradicts earlier findings from Banerjee and Duflo (2011) and Berlin and Kaunitz (2014) who claim that easy access to a loan from one's collective is a substitute for individual savings. One explanation to the results in this study is that a high level of reciprocity seems to be expected among microfinance customers. If someone is able to borrow from their collective, that person is expected to provide the same security in return and must therefore have access to a savings buffer. A different explanation is that *Rely_on_collective* is based on question 6a in the appended questionnaire, which is inspired by a Swedish study (Berlin and Kaunitz 2014) and has not been tested in developing countries before. Thus, the variable might not capture what it aims to capture.

The other surprising result is that the variable *Income_log* is not significant in the second model. This could be due to measurement error of the self-reported data. Since all respondents are self-employed and own a small business their income is highly volatile due to for example seasonal variations, which makes it difficult for them to estimate their average monthly income. To get more accurate numbers, we presented reasonable intervals to the customer.

To sum up, our results reveal differences in financial literacy levels across demographics that are in line with previous research. Most importantly, financial literacy levels across the whole sample are alarmingly low. The potential reasons behind the insignificant relationship between financial literacy and savings have been discussed to be the possibility of respondents guessing, unfamiliar concepts in the financial literacy questions, the homogeneity of the sample and the definition of savings to only include savings at MCB at a given point in time. Lastly, surprising results on control variables have been discussed.

8. Conclusions

The few existing studies on financial literacy and individual savings in developing countries reveal a positive relationship between the two. Most of these studies are conducted in urban or nationwide contexts, which is why this study contributes to existing research with findings from microfinance customers in a rural setting. The rural setting is different since most people there are poor and have historically relied heavily on informal savings instruments. The current expansion of microfinance introduces formal savings accounts, which increase the need for knowledge and make financial literacy interesting to study in this setting. By using data from 291 microfinance customers in rural Tanzania, we perform OLS regressions to investigate a potential positive effect from financial literacy on the propensity to save money in a savings account among microfinance customers. The high p-values on the coefficients for financial literacy indicate that financial knowledge does not affect savings in this sample. Since our finding contradicts previous research and this study is the first of its kind, we urge future researchers to survey savings behaviour among microfinance customers in other rural settings.

Apart from testing the hypotheses, this study contributes with the result that financial literacy levels are very low among rural microfinance customers in Tanzania. Assuming that our variable captures the true financial literacy levels, this is in line with previous research on rural, uneducated and poor people. Microfinance customers display low levels of income, education

and financial literacy and therefore represent a group defined in previous research to benefit from financial education. They are also users of financial products, why their low levels of financial literacy found in this study is concerning and support policy interventions that aim to increase financial education among microfinance customers.

Since savings accounts offered by microfinance institutions are still rather new in Tanzania, it is important to continue to study financial literacy and its effect on individual savings. As described throughout this thesis, our conclusions are based on data from microfinance customers in Mwanga. Therefore, research is needed on microfinance groups in other countries and areas to investigate if financial literacy could impact savings elsewhere. If our questions fail to capture true knowledge, future studies might benefit from using financial literacy questions adapted to better reflect familiar concepts in developing countries. More extensive studies should, if possible, include the total amount of savings kept in all savings accounts held by an individual and study panel data over time to reveal saving patterns among microfinance clients. Due to homogeneity of the sample, it would also be of interest to test financial literacy in a broader population of rural customers. Including for example both banked and un-banked people in the research population could reveal features that distinguish microfinance customers.

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Appendix

Appendix 1: Questionnaire Mwanga Community Bank

Dear customer of Mwanga Community Bank,
We are two students from the Stockholm School of Economics, Sweden, who write our thesis in collaboration with Mwanga Community Bank (MCB). We would like to ask for your help to answer some questions that can enable MCB to be a better bank for you as a customer. Your answers will be confidential and used only for scientific purposes. Please answer individually and honestly. Your contribution is very valuable, thank you for participating!

Client's name: _____
Mobile number: _____
Interviewer: _____
Customer type: ☐ VSLA ☐ Solidarity
Loan: ☐ Yes ☐ No

1. PERSONAL INFORMATION

1a. Age: _____

1b. Gender
☐ Male ☐ Female

1c. Marital status
☐ Single ☐ Married ☐ Divorced ☐ Widow/Widower

1d. What is your highest level of completed education?
☐ Primary ☐ Ordinary secondary ☐ High-level secondary ☐ College ☐ University
☐ None of the above

1e. How long does it take you to get to your Mwanga Community Bank (MCB) branch?
☐ Less than 30 min ☐ 30 min – 1 hour ☐ 1 – 1,5 hours ☐ More than 1,5 hours

2. FINANCIAL LITERACY

2a. Suppose you had 100 000 TZS in a savings account and the interest rate was 2% per year. After 5 years, how much do you think you would have in the account if you left the money to grow?

☐ More than 102 000 TZS ☐ Exactly 102 000 TZS ☐ Less than 102 000 TZS ☐ Do not know

2b. Imagine that the interest rate on your savings account was 4% per year and inflation was 5% per year. After 1 year, how much would you be able to buy with the money in this account?

☐ More than today ☐ Exactly the same ☐ Less than today ☐ Do not know

2c. Imagine that you have 100 000 TZS to invest. Do you think the following statement is true, false or do you not know? "Investing all 100 000 TZS in the same opportunity usually provides a safer return than investing smaller amounts in many different opportunities"

☐ True ☐ False ☐ Do not know

3. HOUSEHOLD

3a. How many dependents do you have (in Mwanga and/or other places)?

Number: _____

3b. Are you the only person that these people depend on?

☐ Yes ☐ No ☐ Do not know

3c. Who make the decisions about savings and investments in your family?

☐ Myself ☐ My husband/wife ☐ My parents ☐ My children ☐ Other

4. WORK

4a. What is your main employment status?

☐ Employed ☐ Unemployed ☐ Self-employed ☐ Retired

4b. What is your average monthly income in thousand Tanzanian shillings?

☐ Nothing ☐ TZS 100 – 150 ☐ TZS 250 – 300 ☐ TZS 400 – 450
☐ TZS 0 – 50 ☐ TZS 150 – 200 ☐ TZS 300 – 350 ☐ TZS 450 – 500
☐ TZS 50 – 100 ☐ TZS 200 – 250 ☐ TZS 350 – 400 ☐ More than TZS 500

4c. What is your main source of income?

☐ Agriculture, forestry and fishing
☐ Manufacturing
☐ Construction
☐ Wholesale and retail trade
☐ Transportation and Storage
☐ Accommodation and food service activities
☐ Other service activities
☐ None of the above

5. SAVINGS BEHAVIOUR

5a. How long have you been a customer at MCB?

☐ Less than 1 year ☐ 1-2 years ☐ 2-3 years ☐ More than 3 years

5b. Do you save money?

☐ Yes ☐ No
if no, jump to question 6a

5c. What is your primary reason for saving money?

☐ No special reason

☐ To get a loan from my bank

☐ For a specific goal (renovate/build a house, to buy furniture, car, bike, education, farming equipment etc.)

☐ Other, please specify: _____

5d. Where do you save money? You can tick more than one box for this question

☐ At Mwanga Community Bank

☐ At another bank

☐ At home

☐ Other place, please specify: _____

5e. How much savings do you have at MCB and/or other banks in total? (Thousand TZS)

☐ Nothing	☐ TZS 100 – 150	☐ TZS 250 – 300	☐ TZS 400 – 450
☐ TZS 0 – 50	☐ TZS 150 – 200	☐ TZS 300 – 350	☐ TZS 450 – 500
☐ TZS 50 – 100	☐ TZS 200 – 250	☐ TZS 350 – 400	☐ More than TZS 500

6. PREFERENCES

6a. If you lost your income one month, would you be able to collect the same amount from people that you know (family, friends, neighbours, saving group)?

☐ Yes ☐ No ☐ Do not know

6b. Which alternative would you prefer?

☐ Get 20,000 TZS today ☐ Get 40,000 TZS in two week ☐ Both alternatives are equally good

☐ Do not know

Appendix 2: Variable correlation

2a: Pairwise correlation among all independent variables in the presented regression models

	Financial_literacy	Age	Female	Married	Dependents	Income_log	Distance	Loan	Years_customer	VSLA	Interviewer	Patient	Rely_on_collective
Financial_literacy	1.0000												
Age	-0.0369	1.0000											
Female	-0.1287	-0.1304	1.0000										
Married	-0.0107	0.0080	-0.2189	1.0000									
Dependents	-0.0121	0.2631	-0.2243	0.1361	1.0000								
Income_log	0.0540	0.1186	-0.2213	0.1237	0.0385	1.0000							
Distance	0.0382	-0.0200	0.0046	-0.0921	0.0546	-0.0126	1.0000						
Loan	-0.0478	0.0306	-0.0661	-0.0300	0.0058	0.0869	-0.1497	1.0000					
Years_customer	-0.0492	0.1220	-0.0237	0.0630	-0.0165	0.0607	-0.0356	0.1770	1.0000				
VSLA	0.0443	0.0503	-0.0808	-0.0186	0.0768	-0.1104	0.1602	-0.1856	-0.3909	1.0000			
Interviewer	-0.1939	0.0476	0.0961	0.0892	0.0072	0.1995	0.1215	-0.1377	0.1098	-0.2123	1.0000		
Patient	0.0385	0.0698	-0.0746	0.1004	0.0937	-0.0149	-0.0626	0.0175	-0.0854	0.1005	-0.3088	1.0000	
Rely_on_collective	-0.0163	0.0026	-0.0280	0.0268	-0.1459	0.1484	-0.0425	0.1484	0.0617	0.0104	0.0023	-0.0186	1.0000

2b: Testing for multicollinearity among all independent variables in the presented regression models

VIF-table: dependent variable Save_money

Variables	VIF	1/VIF
Interviewer	1.24	0.808410
Female	1.20	0.834055
VSLA	1.15	0.867309
Income_log	1.15	0.870306
Dependents	1.14	0.876418
Loan	1.11	0.901955
Age	1.10	0.905725
Married	1.10	0.911424
Distance	1.09	0.920306
Financial_literacy	1.07	0.930798
Mean VIF	1.13	

VIF-table: dependent variable Savings_amount

Variables	VIF	1/VIF
Interviewer	1.31	0.763987
Female	1.19	0.837842
Dependents	1.18	0.850292
Income_log	1.17	0.858083
Patient	1.15	0.871118
Age	1.12	0.890162
Loan	1.12	0.892383
Married	1.12	0.893667
Years_customer	1.08	0.926876
Financial_literacy	1.08	0.930065
Rely_on_collective	1.07	0.933125
Distance	1.06	0.945375
Mean VIF	1.14	

Appendix 3: OLS regressions with all available variables

Variables	(1) Save_money	(2) Save_money	(3) Savings_amount	(4) Savings_amount
Compound_interest		0.0141		-0.00253
		(0.0655)		(0.216)
Inflation		-0.0970		-0.117
		(0.110)		(0.361)
Risk_diversification		0.0273		0.123
		(0.100)		(0.331)
Financial_literacy	-0.00802		0.00139	
	(0.0421)		(0.139)	
Age	-0.00316	-0.00304	-0.00875	-0.00866
	(0.00369)	(0.00370)	(0.0122)	(0.0122)
Female	0.0203	0.0179	-0.163	-0.160
	(0.0969)	(0.0975)	(0.319)	(0.322)
Head_of_household	-0.0365	-0.0296	0.256	0.273
	(0.110)	(0.111)	(0.363)	(0.366)
Female_head_of_household	0.0935	0.0892	-0.0121	-0.0293
	(0.134)	(0.135)	(0.442)	(0.445)
Married	0.0249	0.0291	0.584	0.581
	(0.153)	(0.154)	(0.503)	(0.506)
Single	0.0480	0.0536	0.582	0.576
	(0.174)	(0.176)	(0.574)	(0.579)
Widow_or_widower	-0.00945	-0.000587	0.881	0.898
	(0.185)	(0.186)	(0.609)	(0.613)
Dependents	0.0274	0.0288	0.0879	0.0914
	(0.0176)	(0.0178)	(0.0579)	(0.0586)
Primary_education	-0.00306	0.000868	-0.117	-0.100
	(0.0804)	(0.0819)	(0.265)	(0.270)
Higher_education	0.0935	0.112	0.150	0.167
	(0.270)	(0.271)	(0.888)	(0.895)
Income_log	0.125**	0.119**	0.105	0.0999
	(0.0587)	(0.0595)	(0.194)	(0.196)
Distance	-0.0340	-0.0352	0.0293	0.0267
	(0.0308)	(0.0309)	(0.101)	(0.102)
Years_customer	0.0255	0.0299	0.168*	0.175*
	(0.0309)	(0.0314)	(0.102)	(0.104)
Loan	0.215***	0.207***	1.386***	1.376***
	(0.0660)	(0.0668)	(0.217)	(0.220)
VSLA	0.528***	0.534***	-0.365	-0.347
	(0.134)	(0.135)	(0.442)	(0.445)
Interviewer	-0.239**	-0.262**	-0.714**	-0.759**
	(0.0991)	(0.103)	(0.326)	(0.341)
Patient	-0.0648	-0.0633	0.278	0.282
	(0.0658)	(0.0660)	(0.217)	(0.218)
Rely_on_collective	0.00671	0.00970	0.398**	0.403**
	(0.0613)	(0.0615)	(0.202)	(0.203)
Construction	0.459	0.485	0.319	0.359
	(0.549)	(0.551)	(1.809)	(1.817)
Manufacturing	0.552	0.539	0.196	0.185
	(0.586)	(0.588)	(1.931)	(1.938)
Accomodation_and_food	0.623	0.653	0.540	0.584
	(0.512)	(0.514)	(1.685)	(1.695)
Wholesale_and_retail_trade	0.685	0.702	0.897	0.929
	(0.501)	(0.502)	(1.650)	(1.657)
Other_service_activities	0.614	0.634	0.486	0.519
	(0.504)	(0.505)	(1.659)	(1.666)
Agriculture_forestry_fish	0.641	0.657	0.567	0.589
	(0.503)	(0.505)	(1.658)	(1.665)
Constant	-0.183	-0.202	-1.099	-1.132
	(0.536)	(0.538)	(1.766)	(1.774)
Observations	289	289	289	289
R-squared	0.164	0.167	0.261	0.262

Standard errors in brackets

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