Financial literacy and repayment problems among microcredit clients

—A minor field study in Tanzania

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Abstract

This paper investigates the relationship between financial literacy and repayment problems among clients of a microfinance institution (MFI) in Dar es Salaam, Tanzania. The awareness of financial literacy is continuing to increase while recent research has found significant correlation between financial literacy and financial performance and behaviours such as stock-market investment and pension planning. Through a survey of cross-sectional data we measure the effect of financial literacy on repayment problems in a number of OLS regressions. The main finding of the survey is that the microcredit clients who had higher level of financial literacy show a higher risk of having repayment problems. This indicates that other unobserved factors besides financial literacy affect the repayment behaviour of microcredit clients.

Acknowledgements

'Being illiterate does not just mean that people can not read and write. It also means that they have not learned to think abstractly and, as a result, it is harder for them to translate a generic instruction into a different type of action.'

(Ehrbeck, 2015)

1 Introduction

All the more often, financial literacy is the focus of the debate about financial inclusion and economic development worldwide. As financial services offered are becoming increasingly complex and increasingly diversified, this consequently puts greater emphasis on individuals acquiring personal skills in order to handle private finances as well as conducting business. An indication of this is Gerardi et al. (2010) who found a strong correlation between mortgage defaults and low level of financial literacy in the United States. In the aftermath of the severe financial crisis in 2008 this spurred a debate about the importance of financial knowledge within households.

This type of knowledge, commonly referred to as human capital, is often a central factor when analysing growth and development of countries in economic debate. The theory of human capital sets forth a process where education and experience is accumulated into human capital which makes individuals better equipped to handle intellectual problems. The human capital in question, financial literacy, is relevant for the microfinance industry since being poor and often illiterate are stereotypical characteristics of microcredit clients. When being granted a loan from a microfinance bank they are forced to handle interest calculations, if yet simple, as well as consider risk exposure in order to administrate their microloan. Against the background of this introduction, we aim to shed light on financial literacy among microcredit clients and their loan performance. Recent research on financial literacy, which still is a rather young body of economic research, has confirmed its importance for various types of financial performance, such as savings pattern and stock-market investment behaviour.

In this paper we present results from a survey where we have gathered data in Dar es Salaam, Tanzania, during the spring of 2015. We have also obtained secondary data on microcredit clients from our collaborative bank, Tanzania Women's Bank (TWB). The cross-sectional dataset has been applied in a correlation analysis to investigate the relationship between financial literacy and repayment problems among microcredit clients of TWB. To our knowledge, this study on financial literacy among microcredit clients is the first one carried out in Dar es Salaam, Tanzania.

The main finding of the survey is that the clients of TWB who had higher levels of financial literacy in fact face a higher risk of having repayment problems measured in number of missed instalments. We also found that those clients who had parents who had run or currently are running their own business faced a much lower risk of having repayment problems.

The structure of the paper as follows. In this first section we introduce the paper. Next we lay out the background of microcredit and findings in research literature on financial literacy. Subsequently, we present our hypothesis, where we then discuss the methods applied in this survey under 'Methods'. Lastly, we present the results of our survey and regression analysis followed by a discussion of the results and the conclusions of the paper.

2 Background

2.1 Microcredit

The practice of microcredit services stems from an idea that through self-employment and entrepreneurial incentives, poor people can lift themselves out of poverty by borrowing small amounts of money (Yunus, 1999). One often used argument for people staying poor is that they are excluded from traditional financial services as a result of insufficient collateral in order to ensure proper repayment (Banerjee and Dufflo, 2011) and hence are left to their own means to generate an income. However, the most common practice applied by microfinance institutions (MFIs) to bypass this problem is to assemble people into small groups where they all are responsible for repaying the individual loans, utilising peer pressure as a form of social collateral (Yunus, 1999).

2005 was declared the 'International Year of Microcredit' (International Year of Microcredit, 2007) and the following year Mohammed Yunus, together with Grameen bank, received the Nobel Peace Prize 'for their efforts to create economic and social development from below' (Nobel Media AB, 2014). What followed this attention in media was a rise of critical voices disputing over the alleged impact microcredit has on poverty reduction, claiming that reported success stories are few and skewed in their portrays.

It is still highly uncertain whether microcredit can contribute to poverty alleviation or not. A publication by the United Kingdom Department for International Development, compiling over 58 conducted studies, concluded that there was a lack of validity in the execution of the studies as a result of poorly designed and performed randomised control trials (RCT). Notably, Duvendack et al. (2011) debate that their findings of inconclusive results may divert attention from the search for much needed interventions which actually would help the poor. Hence, Duvendack et al. (2011) encourage future researchers to look more closely into the underlying mechanisms and conduct of microfinance in better executed surveys.

For this reason, we want to shed light on financial literacy and its potential role for further explaining microcredit conduct and behaviour. Lusardi and Mitchell (2014) encourages future studies to investigate causality between financial literacy and economic well-being in

different contexts. In this thesis we have interpreted repayment of microloans as an indicator of economic well-being among microcredit clients.

2.2 Financial literacy

2.2.1 Definition of financial literacy

The definition of financial literacy used in this paper can be found in research carried out by Lusardi and Mitchell (2008, 2011a, 2011c). It is a form of human capital defined as people's ability to assess and process economic information and then make rational decisions regarding financial planning, wealth accumulation, debt and pension planning (Lusardi and Mitchell, 2014).

However, it is worth noting that the focus of financial literacy may vary between countries of different economic status. In a developing country it can mean basic concepts such as understanding of borrowing plans, in contrast to developed countries where it may indicate comprehension of more complex ideas such as tax codes and insurance policies (Xu, Zia 2012).

2.2.2 Financial literacy as human capital

It was Theodore W. Schultz (1961) and Gary S. Becker (1962) who first started talking about the process of education and learning as an accumulation of human capital. Human capital is accumulated through observing, gaining experience and drawing lessons that in turn can make individuals better equipped intellectually to handle future problems. Indeed, later researchers such as Benhabib and Spiegel (1994) have through cross-country analysis verified the importance of human capital for a country's economic growth. Financial literacy is one form of human capital that is gaining more and more attention in modern research and it is easy to see why. This is a time when we are heading towards a range of more complex financial services, which puts a greater weight than ever before on individuals obtaining sufficient financial knowledge and literacy to navigate through the world of private finance services. We want to see whether a lack of this type of human capital might be negatively associated with repayment problems among microcredit clients.

3 Literature review

Research on financial literacy levels has been carried out in both developed and developing countries to investigate how it correlates with behavior in different financial markets. For example, studies on how financial literacy relates to retirement planning and savings have been conducted in the United States (Lusardi, Mitchell, 2011d).

Back in 2005, the Organisation for Co-operation and Development (OECD) published the first extensive report on conducted surveys on financial literacy which included 15 of its member nations (OECD, 2005). The aim of the publication was to investigate the level of financial literacy in OECD countries as this was slowly becoming an increasingly central form of human capital to pay attention to. The overall finding was a consistently low level of financial literacy among consumers in all countries participating. The publication recognised both income level and educational level as being important influences on levels of financial literacy. In the conclusion of the OECD (2005) report, development of a standardised framework for financial literacy studies was sought after for future research in order to make possible cross-country comparisons of financial literacy worldwide.

Lusardi and Mitchell (2008, 2011a, 2011c) developed such a set of standardised questions in order to investigate financial literacy further. They formulated three multiple-choice questions about interest, inflation and risk diversification. Through several studies, they and other scholars have investigated the relationship between levels of financial literacy and performance measures such as undertaking a pension plan where participants who displayed higher level of financial literacy are also more prone to plan for their retirement (Lusardi and Mitchell, 2007). Other studies have found less financially literate people to be more likely to choose mutual funds with higher fees (Hastings and Tejeda-Ashton, 2008) and Moore (2003) found less literate people to be more inclined to also have costly mortgages. Much like the OECD report from 2005, Lusardi (2014) also found a set of variables besides education and income level that seem closely correlated with the level of financial literacy, namely age and gender. Regarding age, Lusardi and Mitchell found the lowest levels among younger and older respondents and regarding gender, women generally display a lower level of financial literacy than men. Similar to the results of the OECD (2005) report, higher income levels as well as educational level both correlate with a higher level of financial literacy (Lusardi, Mitchell, Curto, 2010).

Lower-middle-income countries

Only a limited amount of researchers have looked at financial literacy in lower-middle-income countries by using the standardised questions formulated by Lusardi and Mitchell (2014).[1] However, one of these studies is that of Cole et al. (2010) in India and Indonesia. In the Indian region of Gujurat, the inflation question was the one respondents found the hardest to answer correctly, only 25% did so. A slightly higher proportion, 31%, answered the question about risk diversificaation correctly, whereas the corresponding percentage on the question on interest rate was 59%.

Even though most of these studies have not looked at financial literacy among microcredit clients specifically, Schicks (2014) tested the hypothesis that a greater general financial literacy would limit over-indebtedness among microcredit clients in Ghana by using subjective indicators on loan-related sacrifices reported by borrowers. The purpose of contributing an African case study among microcredit clients was extending the modest amount of research conducted in the geographical region compared to e.g. Asia and Latin America. Even though she found no strong evidence of the impact on general financial literacy, debt-specific financial literacy was found to be significantly correlated with a small decrease in risk for over-indebtedness in the corresponding hypothesis.[2]

Concluding the literature review, the majority of research that has investigated levels of financial literacy has not been aimed at studying microcredit clients specifically, although there are some exemplifying studies such as Schicks (2014).

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[1] Relevant since Tanzania is categorised as a low-income country according to The World Bank (2015).
[2] Debt-specific financial literacy is tested in a similar way to general financial literacy only that the questions focus on debt, interest rates and instalments and not risk diversification or inflation (Schicks, 2014).

4 Research environment

To our knowledge, this study on financial literacy among microcredit clients is the first one carried out in Dar es Salaam, Tanzania.

4.1 Tanzania

Over the last decade, Tanzania along with other countries in East Africa has experienced rapid economic development with an annual GDP growth rate that ranks highly in a world wide historic context (Gigineishvili, Mauro and Wang, 2014). For Tanzania, this growth rate is largely based on gold production and a blossoming tourism industry. However, the main sector is the agricultural sector, which still accounts for one fourth of total GDP and employs 80% of the work force (Central Intelligence Agency, 2014). The inflation rate has historically been high, averaging just under 30% per year 1986-1995. The last two decades the country has experienced a lower inflation rate, averaging 5-10% per year (Nord et al., 2009).

Unlike some of its neighbouring countries, Tanzania was a closed economy until 1986, when it introduced a market economy leaving two decades of socialism behind (Nord et al., 2009).[3] Following this transformation from a planned economy into a market-driven economy (Krause, 2005), the business sector of micro, small and medium enterprises (MSME), the recipients of microloans, has played a central part in Tanzania's economic development, employing an increasing part of the worker population (Financial Sector Deepening Trust, 2012). With the intention to investigate this further in depth, the Ministry of Trade and Industry in Tanzania conducted a national baseline survey between the years 2010-2012. Among the features in the national baseline survey was the respondent's financial literacy. Instead of testing their knowledge through questions, the respondents were asked whether or not they had heard the financial term and whether or not they understood what it meant. One of the questions concerned inflation where 70.6% of the respondents answered that they understood the meaning of it, 23.5% answered that they had heard of it but did not know what it meant and 5.9% answered that they had never about it (Financial Sector Deepening Trust, 2012). To our knowledge, this is the only survey conducted to investigate level of financial literacy in Tanzania prior to this study. However, the national baseline survey was carried out on a national level and not only in Dar es Salaam.

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[3] Right after Kenya's transistion into an independent country in 1963, it developed a strong private sector through market friendly policies (Kimenyi and Kibe, 2014).

Microcredit in Tanzania

According to the latest figures from Mix Market, the world's leading source of microfinance data, Tanzania currently hosts 21 MFIs lending out a total of USD 1.4 billion in credit to 348,712 borrowers (Mix market, 2015). However, not all MFIs chose to report their activities to Mix Market, which leaves the actual number even higher.[4]

4.2 Tanzania Women's Bank

Tanzania Women's Bank opened up its first branch in 2009 with a vision to work with female entrepreneurs in order to empower women both economically and socially (Tanzania Women's Bank, 2015). In spite of what the name implies, they serve both male and female clients with credit. Loans are credited on an individual basis but the customers are then placed in groups of five people, where they have a collective responsibility for repaying everyones instalments when they meet up once a week. The company currently has two branches and six regional offices at various locations in Tanzania including its headquarter in Dar es Salaam. Through these they serve a total of 16,102 clients lending out a total of TZS 10.7 billion (USD 5.3 million).[5] TWB are also planning to open up three additional regional offices in order to meet the high demand for credit in Tanzania. In order to qualify for a loan at TWB the aspiring clients must first put 20% of the loan amount in a savings account as collateral. With an explicit desire to enhance the understanding of their clientele in order to improve their customer service, they served as a perfect partnering bank in Dar es Salaam (Chacha 2015, pers. comm., 17 February).

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[4] This is evident since TWB, our partnering bank, was not among the MFI's mentioned on Mix Market
[5] Based on exchange rate from http://finance.yahoo.com/currency-converter, 17 May 2015.

5 Hypothesis and research question

In the light of above presented background we seek to investigate the relationship between financial literacy and repayment problems among microloan clients of TWB. In this survey, repayment problem is defined such that those clients who have missed paying more than four instalments during their time as clients of TWB belong to the category of clients who have a repayment problem. In accordance with this definition, clients who have missed four instalments or less do not have a repayment problem. The research question underlying this paper is therefore:

- Is a low level of financial literacy associated with repayment problems among microcredit clients?

Our hypothesis is that financial literacy is negatively associated with the probability of having repayment problems. Hence, a higher level of financial literacy is believed to indicate a lower number of missed instalments, which in turn would mean that these clients would perform better in terms of having a lower risk of facing repayment problems than those who have a lower level of financial literacy. Recent research has found that less literate individuals are for instance more likely to have costly mortgages (Moore, 2003) and less likely to start planning for retirement (Lusardi, Mitchell, 2011b), which generates the hypothesis that a lower level of financial litearcy might also explain why microcredit clients have difficulties paying instalments on time.

6 Method

The scientific method applied in this paper is a case study method where the observable data, used to quantitatively investigate the relationship between financial literacy and loan repayment, has been gathered through a survey of TWB's microcredit clients in Dar es Salaam, Tanzania, during the spring of 2015. In the estimated regressions we have used both primary data, which was collected through a survey, and complementing secondary data on the participating individuals which was obtained from TWB.

The conduct of case-study research when investigating associative relationships is a debated topic, since some scholars claim it is an invalid scientific method where bias and context-dependent knowledge is insufficient for making any broader generalisations out of findings (Flyvbjerg, 2006). However, Flyvbjerg (2006) clarifies one, in his mind, common misconception regarding case-study research by claiming that it is not until researchers place themselves in a practical situation that in-depth comprehension can be obtained. Therefore we argue that, even though this survey is rather small in numbers, we believe useful insights can be gained through investigating financial literacy in the context of microcredit in order to generate new research angles. We believe that an in-depth study is the most appropriate method for this.

6.1 Data survey

Over a period of five weeks, between February and March 2015, we collected data in the form of a questionnaire reaching a total of 161 respondents. All respondents were clients of TWB, although assigned to different centres located around Dar es Salaam. The centres we visited (Mabibo, Kinondoni, Banana and Kawe) were all located relatively nearby the city centre and were all chosen from a location point of view. The survey was conducted through visiting the four centres and inviting the clients one by one where a local translator conducted the survey with the questionnaire using paper and pencil. The clients were not chosen on individual basis but rather everyone was invited and encouraged to participate and those who had the opportunity given the ongoing instalment meeting came over to our table. Worth noting is that they were not compensated in any way but rather participated out of goodwill and/or an excitement for our project.

The financial literacy section of the survey uses the framework designed by Lusardi and Mitchell (2008, 2011a, 2011c). They developed a method making it possible to do cross-country analysis of the level of financial literacy through formulating three standard questions, all designed to test different concepts of financial literacy. The different concepts are (1) numeracy and the ability to do calculations related to interest rates, (2) understanding of inflation and (3) joint testing of knowledge of financial terms and understanding of risk diversification (Lusardi and Mitchell, 2008, 2011a, 2011c). After consulting a researcher familiar with the financial literacy framework a decision was made to modify the risk question as he believed very few of the respondents would understand the term 'stock mutual fund'. However, similar modifications have been done in previous research presented in Lusardi and Mitchell (2014). The questionnaire and the original question can found in Appendix 1.

The design of the survey was inspired by a more extensive survey recently carried out in Ecuador by researcher Pontus Engström from the Norwegian Centre for Microfinance Research. Noteworthy is that the results of the study in Ecuador are not completed to date and that his study is much more extensive than the scope of this study, including many more explanatory variables. Our questionnaire included a set of demographic variables such as age, gender, educational level and client centre. In addition, we also included a question about whether or not the respondents had parents who themselves had run or are currently running their own business. Another question was the client's self-perceived risk attitude or risk proneness where they were asked to pinpoint on a scale from one to five whether or not they were willing to risk their own resources/assets when starting a business.

Translating the survey was a two-step process where we first had our translator translate it from English to Swahili and then had an international researcher translate it back to English to avoid potential linguistic misconceptions. Prior to gathering data in large numbers, a pilot study of nine clients was carried out which resulted in minor changes of the questionnaire.

After conducting 101 questionnaire surveys we concluded there was a lack of spread in the data from the interest rate question. It was brought to our attention that our translator had helped the respondents along by rephrasing the question in a simpler manner when they could not understand immediately. Consequently, these answers were removed from our sample and

our translator was instructed to only read the questions exactly as phrased in the questionnaire through the remaining interviews.

Secondary data

Apart from the data gathered in the survey, we received data from TWB on the individuals we had conducted interviews with. The most important data being how many instalments the clients have missed. Other than that, we also received data on how long they had been clients at TWB and the size of their loans.

6.2 Delimitations of scope

This paper is delimited to study financial literacy among clients of microcredit. Hence, adjacent financial services such as microinsurance, microsavings and micropension are not considered in the study. Furthermore, since the term microfinance could mean different types of financial services (International Year of Microcredit, 2007), the term microcredit or microloans will be used exclusively in the paper instead of microfinance which might be more commonly referred to in media. In addition, some of the respondents in our survey might also be clients of other financial services, which have been disregarded in this study of financial literacy.

6.3 Validity of data

Primary data

Previous researchers have concluded that estimating people's true ability to process and understand financial knowledge is subject to measurement difficulties. In regard to this, the survey of financial literacy might indeed suffer from systemized errors because of its subjective nature (Lusardi and Mitchell, 2014). Lusardi and Mitchell (2009) found evidence of this by phrasing the same question about risk diversification in two different ways and randomly targeting two different groups of respondents. The results showed a significant impact on the number of correct answers. Hence, Lusardi and Mitchell (2014) conclude that asking questions about financial literacy is rather a proxy for assessing knowledge than true knowledge.

Moreover, since the three questions investigating financial literacy were of multiple-choice character, a plausible implication would be that some answered one or several of the questions correctly because of mere chance rather than true knowledge of the respondents. This risk is also recognised in Lusardi and Mitchell (2014). Further, during collection of data we experienced that in general female clients were more inclined to avoid participation compared to men while expressing fear of not being able to answer correctly. This may have been a source of selection bias in itself, meaning that more confident respondents outnumbered those hesitating, regardless of level of financial literacy among the individuals. Nevertheless, this observation varied between groups and some women were indeed confident in participating in the study expressing no such fear.

In addition, further selection bias might occur since respondents were chosen only from four centres of the bank, which meant the ruling majority of the respondents lived in the same district in Dar es Salaam.

Secondary data

After having spoken to the director of TWB, it became evident that some of the data on instalment repayments of the clients may be subject to bias due to clients in sub groups from time to time helping each other to pay weekly instalments which may lead to themselves failing to pay their own instalments on time **(**Chacha 2015, pers. comm., 17 February). This would mean that clients who actually would be able to pay on time acquire a record of delayed repayment.

6.4 Statistical method

To investigate the relationship between our key explanatory variable financial literacy and the dependent dummy variable repayment problems, we have estimated a number of OLS regression models. The selection of control variables is explained further in the section below after the outline of the various regression equations. A number of ordinary least square (OLS) regressions containing centre fixed effects (2), (4) and (6) were also estimated (see Table 3). This was done to control for unobservable local factors for the centres we visited which may increase chances of repayment problems but which were not captured in our survey. Lastly, to

check the OLS specifications we conducted robustness tests by adding variables stepwise to our main regression to control the validity of our estimates. In addition, a logit regression was run to compare the size of the coefficients estimated and lastly we searched the data for outliers since these may affect OLS estimate, making them sensitive to violations of underlying model assumptions. The robustness tests can be found in Appendix 2.

6.5 Regression equation

6.5.1 Main model

Our main model (1) (see Table 3) is constructed as follows:

Repayment_Problem = β₀ + β₁Financial_Literacy + β₂Gender + β₃Educational_Level+ β₄Age + β₅Age_Squared + β₆Years_at_TWB + β₇log(Loan_Size) + β₈Parent + β₉Risk_Proneness + ε

The β coefficients reveal the measured effect of the correlation between our included variables and ε is the error term that captures all unobserved influencing factors which have not been controlled for.

Our dependent variable *Repayment_Problem* is a dummy created from the amount of missed instalments for each client. The individuals with four or fewer missed instalments are included in the category 'no repayment problems' and therefore take on the value zero while those who have failed to repay more than four are categorised as having a repayment problem and therefore take on the value one. The breakpoint value four is the number which TWB categorises as 'bad' performance by their clients and hence we chose to let this value separate the clients performing well from those performing bad indicating a performance measure for microcredit clients.

The key explanatory variable in our main regression model is the level of financial literacy of the respondents. This is captured by the variable *Financial_Literacy* describing the amount of correct answers, a scale from zero correct answers to answering all three questions correctly. If the respondent has answered 'do not know' to any of the questions, this is recognised as an incorrect answer. This is also the case for each of the dummy variables indicating correct or incorrect answers. *Gender* is a dummy variable where female respondents take on the value

one and *Educational_Level* describes the amount of years the respondents have spent in school. In our regression we include both *Age* and *Age_sqaured* since previous research indicate that there might not be a linear relationship between how old someone is and and his or her level of financial literacy.

In order to control for the fact that the longer serving clients, who have put themselves at risk for a longer period of time, will have a larger likelihood of having missed more instalments due to mere time passage we need to add the variable *Years_at_TWB* to adjust for the time dependency. This is important since our dependent variable is measured over time, whereas the level of financial literacy is tested at a single point in time. Further on we include *Log(Loan_Size)* as another indicator of the risk the clients are exposed to which may affect the likelihood of having repayment problems due to the increasing size of instalments.We have chosen to use the natural logarithm of loan size as this gives us more normally distributed data.

Further on, we have the dummy variable *Parent* taking on the value one if the client's parents have had or currently has their own business. The idea behind it being that these individuals will have acquired knowledge about running a business from their parents and therefore would be able to pay their instalments to a greater extent. Finally, *Risk_Proneness* indicates the client's self-perceived risk appetite on a scale from one to five. A person who is more inclined to face risk when starting their own business, might also have problems paying their instalments if the business opportunity does not pay off.

Our questionnaire also included a question regarding the business profitablity of the clients as we intended to use this as a control variable in our model. However, the data we obtained from the clients contained flaws and we were unable to receive data on this from the bank. Our only option was therefore to omit the varible from our estimated model.

6.5.2 Complementary estimated models

Our third regression model (3) (see Table 3) is constructed as follows:

Repayment_Problem = β_0 + β_1Three_Correct + β_2Gender + β_3Educational_Level+ β_4Age + β_5Age_Squared + β_6Years_at_TWB + $\beta_7$log(Loan_Size) + β_8Parent + β_9Risk_Proneness + ε

The difference between regression (1) and (3) is that in the latter *Financial_Literacy* has been replaced by *Three_Correct*, a dummy variable giving all respondents who answered three questions correctly a value of one and all others zero.

Our fifth regression model (5) (see Table 3) is constructed as follows:

Repayment_Problem = β0 + β1Interest_Rate + β2Inflation + β3Risk+ β4Gender + β5Educational_Level+ β6Age + β7Age_Squared + β8Years_at_TWB + β9log(Loan_Size) + β10Parent + β11Risk_Proneness + ε

Once again the key explanatory variable has been replaced however in this model by three dummies instead of one capturing financial literacy. *Interest_Rate*, *Inflation* and *Risk* are all based on the respondent's answers in each of the questions taking on a value of one for a correct answer and are the disaggregated variables of the single dummy in model (3).

6.5.3 Fixed effects

In order to try to control for the fact that the centres we visited were not chosen randomly but instead from a location point of view, we decided to run each of the models also including a dummy as a fixed effect to compare with the original OLS estimates.

7 Results

7.1 Summary statistics

The sample consists of cross-sectional data gathered from 161 individuals all microcredit clients of TWB. The client's age vary between 24 and 66 with an average age of 39.94. Of the 161 respondents 116 (72%) were female (see Figure 1). The average client had been in school for 12.07 years and had loan size of TZS 1098757.76 (USD 546.71).[6] The amount of missed instalments each individual had ranged from 0 to 41 with an average of 3.29. Figure 2 shows the samples distribution between the different centres.

Table 1: Summary statistics

Variable	N	Mean	Std. Dev.	Min	Max
Age	161	39.94	9.38	24	66
Education (Number of years)	161	12.07	3.30	9	18
Loan Size	161	1098757.76	710962.17	200000	3500000
Years at TWB	161	0.88	0.56	0	5
Risk Proneness	161	3.86	1.68	1	5
Missed Instalments	161	3.29	5.95	0	41

Figure 1: Gender
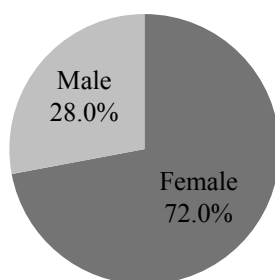
Figure 2: Centre

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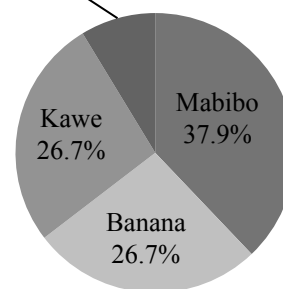
[6] Based on exchange rate from http://finance.yahoo.com/currency-converter, 17 May 2015.

7.2 Financial literacy levels

In this section we present the data on the financial literacy levels among our sample. The percentage of respondents who answered all three questions correcltly was 24.8%. Moreover, 31.7% of the respondents answered do not know (DK) to at least one of the three questions. The highest percentage of correct answers was found in the interest rate question, while the risk diversification question had the lowest percentage of correct answers

Table 2: Sample level of financial literacy

	Correct	**Incorrect**	**DK**
Interest Rate	65.8%	11.8%	22.4%
Inflation	59.6%	26.1%	14.3%
Risk Diversification	47.8%	46.6%	5.6%

Figure 3: Division of number of correct
answers for entire sample
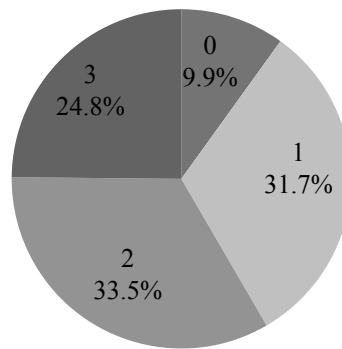
Demographics

The men we interviewed displayed a higher level of financial literacy than the women. 28.9% of all men answered all three questions correctly compared to 23.3% among the female respondents. Financial literacy levels also differ across age groups where the highest level of financial literacy is found among individuals in the range between 51-65 years. Without considering the eldest age group, which only holds one individual in our sample, the lowest

level of financial literacy can be found among the youngest respondents aged 35 or below. Respondents with a higher educational degree managed to answer all three questions correctly to a larger extent than the other sub-group and the respondents who had finished secondary school had a higher percentage of correct answers than those who had only finished primary school.

Table 3: Demographic categories

		Interest rate	Inflation	Risk diversification	All 3 correct
Gender					
	Male	62.2%	60.0%	57.8%	28.9%
	Female	67.2%	59.5%	44.0%	23.3%
Age					
	<36	66.7%	50.0%	45.0%	21.7%
	36-50	64.9%	62.3%	50.6%	24.7%
	51-65	65.2%	78.3%	47.8%	34.8%
	>65	100.0%	100.0%	0.0%	0.0%
Education					
	Primary	61.9%	53.6%	42.9%	15.5%
	Secondary	66.7%	66.7%	51.5%	30.3%
	Higher	90.9%	63.6%	63.6%	63.6%

7.3 Regression results

Table 4: Estimated models

Variables	(1)	(2)	(3)	(4)	(5)	(6)
Financial_Literacy	.072**	.073**				
	(.032)	(.032)				
Three_Correct			.085	.102		
			(.073)	(.072)		
Interest_Rate					.043	.032
					(.063)	(.063)
Inflation					.062	.062
					(.064)	(.064)
Risk					.108*	.117*
					(.062)	(.061)
Gender	.025	.017	0.023	.017	.032	.027
	(.068)	(.067)	(.069)	(.068)	(.069)	(.068)
Educational_Level	.008	.012	.009	.013	.008	.012
	(.009)	(.009)	(.010)	(0.010)	(.009)	(.010)
Age	-.030	-.033	-.025	-.027	-.031	-.034
	(.024)	(.024)	(.024)	(.024)	(.025)	(.025)
Age_Squared	.000	.000	.000	.000	.000	.000*
	(.000)	(.000)	(.000)	(.000)	(.000)	(.000)
Years_at_TWB	.092*	.120**	.091*	.121**	.092*	.121**
	(.053)	(.053)	(.054)	(.054)	(.053)	(.053)
Log(Loan_Size)	.099**	.099**	.099**	.098**	.099**	.100**
	(.046)	(.046)	(.047)	(.046)	(.047)	(.046)
Parent	-.134	-.135**	-.123*	-.122*	-.135**	-.136**
	(.065)	(.064)	.066	(.065)	(.065)	(.064)
Risk_Proneness	.032*	.028	.032*	.028	.032*	.029
	(,018)	(.018)	(.018)	(.018)	(.018)	(.018)
Constant	-1.016	-1.135	-1.055	1.187	-.995	-1.127
	(.812)	(.811)	(.822)	(.820)	(.818)	(.817)
Centre Fixed Effect	No	Yes	No	Yes	No	Yes
Observations	161	161	161	161	161	161
R Squared	.170	.212	.150	.196	.173	.217

Standard error in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Estimated effect of Financial Literacy

As shown in Table 3 the different measures of financial literacy all show a positive effect on *Repayment_Problem*. In our first regression we estimate an effect of 0.072 at a 5% significance level. The interpretation of the measured effect is that for every question you answer correctly the risk of having repayment problems increases by 7.2 percentage points.

When it comes to our dummy *Three_Correct* in regression (3), we obtain a slightly higher but statistically insignificant effect.

The only one out of the three individual dummies which is statistically significant (on a 10% significance level) is the variable *Risk*. The interpretation of this result is that those individuals who answered the risk question correctly face a 10.8 percentage points higher risk of having repayment problems than those who answered incorrectly. We do however obtain large standard errors for many of the variables and both *Interest_Rate* and *Inflation* have standard errors larger than the size of the estimated coefficients.

Estimated effect control variables

When it comes to the variable *Gender,* we estimate a small effect in all regressions, indicating that women have a greater likelihood of having repayment problems. There is a lack of statistical significance for this variable and the standard errors are 2-3 times the size of the coefficients. Neither can the positive effect of the variable *Education_Level* be estimated with any statistical significance.

We do not obtain a statistical significance for *Age* and neither is *Age_Squared* significant apart from in our last regression (6)*. Age* signifies a decrease in the probability of *Repayment_Problem* as age increases. However, we estimate a statistically significant correlation between *Years_at_TWB* on *Repayment_Problem.* The effect ranging from 9.1 percentage points to 12.1 percentage points depending on whether or not you include the centre fixed effect. The size of the loan also increases the likelihood of repayment problems, estimated at a 5% significance level.

Lastly, we see statistically significant effects of a correlation between both *Parent* and our dependent variable *Repayment_Problem* as well as between *Risk_Proneness* and *Repayment_Problem.* The respondents with parents who have had or currently has their own business range between being 12.3-13.6 percentage points less likely to have a repayment problem and the higher you rate your own self perceived risk appetite the more likely you are to have a repayment problem.

8 Discussion

What stands out when analysing our regression results is the sign of the estimated effect of our key explanatory variable. In contrary to our hypothesis, our estimated models show a positive association between financial literacy and repayment problems. These results are also consistent after conducting robustness tests. For instance only slight deviations appear in the estimates when including centre fixed effects. Worth noting is that the smallest measured effect for the three dummies is estimated for *Interest_Rate*, which one could argue is the knowledge most relevant in the capacity of being a microcredit client in order to avoid repayment problems.

To begin, there are two key factors which we believe in part can explain this unexpected result. Firstly, since the set of standardised financial literacy questions is a proxy for true financial literacy, it may well be the case that the individuals whom in fact have severe difficulties repaying the loan on time, simply may have taken a guess during the survey, obtaining three correct answers without truly understanding the meaning of the concepts. This would hence increase the bias in the sample data resulting in estimated models which reveal a positive relationship instead of a negative one between financial literacy and repayment problems. However, since we cannot estimate true knowledge but need to rely on a proxy measure, we cannot eliminate this risk nor could we have taken greater precautions during data gathering. It is simply a result of trying to measure subjective knowledge and in the estimated models it appears to have influenced the estimated effect to a large extent, providing us with regression specifications.

Another plausible explanation for the sign of the coefficient for financial literacy is endogeneity problems. Since we have not conducted an RCT but instead a correlation analysis, the statistically significant correlation between financial literacy and repayment problems may not per se imply causality. Rather it may be the other way around that those clients which historically have had issues with repayment of instalments may have learned from experience, alternatively have had more knowledgeable input from TWB when handling repayment difficulties meaning the estimated models may suffer from an endogeneity problem. Another possibility is that a third factor is influencing both financial literacy as well as the likelihood of repayment problems as the regression suffers from an omitted variable bias (OVB).

A conceivable explanation for OVB in the specifications is cultural behaviour and influences in Tanzania. From our experience, after having talked to people familiar with the Tanzanian culture, the perception of proprietary and repayment of loan is different from that of ours with a differently perceived promptness on repaying borrowed money. However, this might by no means imply a universal truth throughout Tanzania. But it may serve as an interesting aspect to consider when trying to explain why the respondents who had 2-3 correct answers out of three questions in some cases had as many as 23 missed instalments. According to the results found in this survey, this points toward a subjective factor influencing willingness to repay rather than not understanding the concept of interest and repayment of loan among some individuals in our sample. While we were given indications of this during the field study, such a subjective factor would be too extensive to investigate and we did not experience we had the means during our survey. Another cultural factor which we acknowledge is present among the clients after having discussed this with the CEO of TWB, is that within the loan groups there is a great willingness to help each other repay instalments in times of need. This means according to the CEO, that some clients which indeed would be able to repay on time instead choose to help another group member with repayment, which consequently puts the helping person in a situation with a repayment problem.

These two factors are central to our analysis of the main regression results and are also what makes the findings of our survey interesting. Perhaps increase of financial knowledge is merely one of *several* important factors to focus on rather than being the only one when trying to understand the actions and intentions of microcredit clients in developing countries. There may also be underlying cultural factors which are important to identify in order to better comprehend why some clients who do not necessarily lack financial literacy but instead are accustomed to cultural habits such as helping someone else instead of prioritizing one's own repayment plan. Rather as previously mentioned, there is simply a different way of perceiving the promptness of repaying a loan due to a different pace in life.

However, one concept that might explain loan default, investigated by Fisher and Ghatak (2010), is that microloan borrowers may or may not benefit from a high frequency repayment depending on the subjectiveness of their persona. For instance, if they are present biased by nature it may impact their chance of defaulting on a large loan for immidiate gains in forms of money at hand. Hence, recent scholars have debated that microloan, in terms of repaying with a high frequency as opposed to repaying less frequently, may be a good or less good idea

depending in the nature of the borrowers. It may be the case that allowing for a more flexible repayment scheme may be preferable in the context of microcredit clients of TWB, which would have little or nothing to do with their financial literacy. Rather, the subjective bias of prefering immidiate gains to future repayments itself presents a challenge that needs to be addressed further in this field of research alongside the increased awareness of financial literacy.

Further on, the limited scope of our survey could mean that we have failed to include other variables which may have a large effect on the the respondents repayment. Factors such as sickness in the family and the number of workfare individuals in the household might both have a large impact on whether they are able to repay their loans.

Another relevant factor to discuss is the size of our sample, which contains only 161 observations. Although it is enough to obtain some statistically significant coefficients, we believe it contributes to possibly dubious estimates in our specifications. For instance, educational level we believed would have the opposite sign and reduce the probability of having repayment problems, but our regressions instead show a slight positive association. Although, when we run educational level on financial literacy it does indicate a positive relationship with level of financial literacy as believed and hence the positive coefficient could either be the result of a small sample or an OVB problem in the model. Moreover, the standard errors of the estimates coefficients for several of the independent variables (e.g. *Gender*) are very large which means the accuracy of the predictions is disputable.

Furthermore, some of the control variables in our survey show interesting results. For example, *Parent* where those respondents with at least one parent who currently has or has had a business have a significantly smaller risk of having repayment problems, exceeding 10%. This may indicate that apart from educationally acquired knowledge, experience could also be a factor where clients learn from their parents. Another interesting variable is *Risk_Proneness*, which shows a small indication that the respondents who rated their willingness to risk their collateral when starting a business higher, have a slightly higher risk of having repayment problems. Although statistically significance at 10% level, this variable is subjective and hard to measure and may not be exact in its capture of true risk proneness. However, it may be interesting when considering the cultural factors discussed above. These

clients may not perceive risk as something negative but rather as something self-evident in order to sustain livelihood.

Compared to the study carried out by Cole et. al (2010) in the Indian region of Gujurat, we can see that our sample reveals a higher rate of correct answers for each question on financial literacy, the most significant difference being on the question regarding interest rate. Only 25% of the respondents in India answered this correctly compared to nearly 66% in our sample. A possible explanation behind this might be that the study conducted by Cole et. al (2010) was not directed specifically towards microcredit clients but rather they investigated the general level of financial literacy in the society. While the level of financial literacy in our study is tested among the clients which have already been microcredit clients for at least a number of weeks (those having started in 2015), their high score might merely be a result of having learnt during this experience.

When decomposing financial literacy into different demographic categories, we conclude that our results to a large extent reinforce the findings of previous research. Much like Lusardi, Mitchell and Curto's (2010), the findings of the men we interviewed displayed a higher level of financial literacy than the women. The same goes for the age of the respondents where we see a positive relationship between financial literacy and age. Having only one individual in our sample over the age of 65 it is hard for us to draw any conclusions regarding whether or not the level of financial literacy is non-linear over the life cycle as previous researchers have suggested (Lusardi and Mitchell, 2011a, 2011c), but we do find the lowest financial literacy score in our youngest sample.

To conclude, this kind of survey is the first one to be conducted in Tanzania and a more extensive study is to recommend for future scholars in order to establish these findings to any larger extent. Another important aspect is that our survey was conducted in an exclusively urban environment without including any the rural microcredit clients. This might per se be a problematic insight, since the vast majority of Tanzania's population belong to the agricultural sector. In order to investigate further on any universal cultural influences, it would be advisable to also include this group of microcredit clients.

9 Conclusion

Through a field study survey on 161 microcredit clients in Dar es Salaam, Tanzania, we aimed to test the hypothesis that a higher financial literacy level is negatively associated with having repayment problems. Contrary to our hypothesis, we found that a higher level of financial literacy is positively associated with repayment problems at a 5% significance level and for every additional question clients answer correctly the risk of having repayment problems increases by 7.2 percentage points.

In our discussion we speculate over several reasons why we might have obtained these results. Firstly, the standardised questions used to test the client's financial literacy can merely be seen as a proxy of their true knowledge and clients might have guessed their way to three correct answers. Moreover, there is a risk for an endogeneity problem, since we have not conducted an RCT but rather a correlation analysis. The financial literacy level performed by the clients might therefore simply be a result of the previous repayment problems having served as a learning experience. Further on, there are two cultural aspects that need to be taken into consideration according experience drawn from this study. The first one is the perception of proprietary rights and repayment of loan. Secondly, there is a potential transparency issue with data, due to some clients lending out money to each other within the loan groups and therefore failing to pay their own instalments on time.

Considering our findings, we suggest future researchers to further investigate the association between financial literacy and financial performance among microcredit clients in developing countries on a larger scale than we had means for doing in this study. We also encourage further investigation into the identified cultural behaviour in this thesis which might help in understanding the repayment behaviour of the clients. In order to circumvent any possible endogeneity problems, we believe an RCT should be conducted where one group of microcredit clients with high financial literacy could be tested against a corresponding group with low financial literacy over a longer period of time to obtain more extensive panel data, in order to also follow changes in level of financial literacy among individuals. Such future surveys might help us further comprehend the importance of financial literacy and its impact on financial performance in developing countries.

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Appendix 1: Questionnaire

1. Our questionnaire

Name of client: _____

Centre name: _____

Group number:_____

Name of interviewer: _____

Questionnaire

to customers who are clients of TWB

Introduction of the survey:

We are conducting a survey with clients of TWB. We are two research students from the Stockholm School of Economics, and all information will be kept confidential and will only be used for scientific purposes. Your participation is important to us as well as to the bank and you as their clients. Your answers will help improve the services of TWB in the future.

A. Demographic profile

A.1 Gender

☐ Man ☐ Female

A.2 Age

_____

A.3 Martial status

☐ Married ☐ Unmarried ☐ Single ☐ Widow/Widower

A.4 Highest level of finished education
☐ Primary ☐ Secondary ☐ University
☐ None of the above

A.5 Which district do you live in?
☐ Ilala ☐ Temeke ☐ Kinondoni

☐ Other

B. Financial literacy

B1 - Suppose you have $100 in a savings account earning 2 percent interest a year. After five years, how much would you have?

Pick one:

☐ More than $102   ☐ Exactly $102   ☐ Less than $102   ☐ I do not know

B2.- Imagine that the interest rate on your savings account is 1 percent a year and inflation is 2 percent a year. After one year, would the money in the account buy more than it does today, exactly the same or less than today?

Pick one:

☐ More ☐ The same   ☐ Less   ☐ I do not know

B3.- Do you think investing everything in one opportunity usually provides a more certain economic reward than investing smaller amounts in many different opportunities.

☐ Yes (True)   ☐ No (False)   ☐ I do not know

D. Business profitability

D1. Approximately, what is the average sales of your business (i.e. daily, weekly, monthly)? TZS_____-
_____

D2. Approximately, what are the average expenses of your business (i.e. daily, weekly, monthly?) TZS_____

E. Work experience

E2.- Which year did you start your business?_____

E3 - Current business activities (please choose one alternative)
☐ Agriculture, forestry, fishing
☐ Manufacturing
☐ Wholesale and retail trade
☐ Accommodation and food service activities
☐ Other services

F. Attitude towards risk

Indicate your level of agreement with the following statements from 1 (strongly disagree) to 5 (full agreement)

	1	2	3	4	5
F2.- I am willing to use some of my resources/assets when starting a business	☐	☐	☐	☐	☐

G. Family network

G1.- Indicate if at least one of your parents has ever started their own business?

☐ Yes   ☐ No

	1	2	3	4	5
G2.- If yes , rate their degree of success from 1 (not at all successful) to 5 (very successful)	☐	☐	☐	☐	☐

2. Lusardi and Mitchell's (2008, 2011a, 2011c) original question on risk diversification

Do you think that the following statement is true or false? "Buying a single company stock usually provides a safer return than a stock mutual fund".

☐ Yes (True)   ☐ No (False)   ☐ I do not know

Appendix 2: Econometric specifications

Table 5: OLS when adding variables stepwise

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Financial_Literacy	.086***	.076**	.073**	.076**	.078**	.074**	.077**	.071**	.072**
	(.032)	(.032)	(.032)	(.032)	(.032)	(.031)	(.031)	(.032)	(.032)
Age_Squared		.000**	.000**	.000**	.000*	.000*	.000	.000	.000
		(.000)	(.000)	(.000)	(.000)	(.000)	(.000)	(.000)	(.000)
Log(Loan_Size)			.096**	.087*	.088*	.095**	.098**	.096**	.099**
			(.046)	(.046)	(.046)	(.046)	(.046)	(.046)	(.046)
Years_at_TWB				.099*	.098*	.090*	.090*	.090*	.092*
				(.053)	(.053)	(.053)	(.052)	(.052)	(.053)
Parent					-.110	-.111*	-.126**	-.131**	-.134**
					(.064)*	(.063)	(.064)	(.064)	(.065)
Risk_Proneness						.031*	.030*	.031*	.032*
						(.018)	(.018)	(.018)	(.018)
Age							-.033	-.030	-.030
							(.024)	(.024)	(.024)
Educational_Level								.009	.008
								(.009)	(.009)
Gender									.025
									(.068)
Constant	.044	-.094	-1.381**	-1.351**	-1.286**	-1.478**	-.823	-.960	-1.016
	(.064)	(.085)	(.630)	(.625)	(.622)	(.628)	(.781)	(.796)	(.812)
Observations	161	161	161	161	161	161	161	161	161
R Squared	.042	.076	.101	.120	.137	.154	.165	.169	.170

Standard error in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Dependent variable: *Repayment_Problem*

Table 6: Logistic regression

Varibles	Repayment_Problem
Financial_Literacy	.554**
	(.263)
Gender	.238
	(.510)
Educational_Level	.069
	(.074)
Age	-.145
	(.183)
Age_Squared	.002
	(.002)
Years_at_TWB	.684*
	(.362)
Log(Loan_Size)	.940**
	(.397)
Parent	-1.001**
	(.480)
Risk_Proneness	.309
	(.167)
Constant	-15.638
	(.028)
Observations	161
Nagelkerke R Square	.271

Standard error in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 7: OLS with all variables available

Variables	Repayment_Problem
Financial_Literacy	.076**
	(.033)
Gender	.026
	(.074)
Age	-.026
	(.025)
Age_Squared	.000
	(.000)
Educational_Level	.013
	(.010)
Years_at_TWB	.131**
	(.054)
Log(Loan_Size)	.098**
	(.048)
Parent	-.160**
	(.069)
Risk_Proneness	.024
	(.018)
Log(Average_Daily_Sales)	.031
	(.029)
Kinondoni_District	.594
	(.394)
Ilala_District	.388
	(.415)
Temeke_District	.397
	(.485)
Years of experience	-.005
	(.005)
Wholesale and retail trade	.020
	(.084)
Manufacturing	-.105
	(.112)
Agriculture, forestry and fishing	-.009
	(.107)
Accomodation and food services	-.013
	(.094)
Mabibo	.127
	(.079)
Kinondoni	.002
	(.118)
Banana	.409**
	(.159)
Married	.035
	(.083)
Widow/Widower	-.101
	(.157)
Constant	-2.176
	(.997)
Observations	161
R Squared	.260

Standard error in parentheses
*** p<0.01, ** p<0.05, * p<0.1