Centre Emile Bernheim
Research Institute in Management Sciences

Solvay Brussels School
Economics & Management

OVER-INDEBTEDNESS IN MICROFINANCE – AN EMPIRICAL ANALYSIS OF RELATED FACTORS ON THE BORROWER LEVEL

Jessica Schicks

This paper analyses the over-indebtedness of microborrowers in Ghana. It defines over-indebtedness from a customer protection perspective and considers borrowers over-indebted if they continuously struggle with repayment and experience unacceptable sacrifices related to their debt. It finds that poorer microborrowers are more likely to be over-indebted. The risk of over-indebtedness further increases with the occurrence of adverse economic shocks to a borrower's income or expenses. The likelihood of over-indebtedness is higher for borrowers with low returns on their investment and if borrowers use loans, at least in part, for non-productive purposes. It is higher for borrowers with a low, debt-specific financial literacy. General financial literacy has negative effects on over-indebtedness. We find no effect for mere numeracy. The paper also breaks down the relationship of the above factors to the specific sacrifices that borrowers make, to how frequently they repeat them and to how acceptable sacrifices are to borrowers.

JEL Classifications: O16, O50, G21

Keywords: Microfinance; Microcredit; Over-Indebtedness; Debt; Customer Protection; Sacrifices

CEB Working Paper N° 12/017
2012

Université Libre de Bruxelles - Solvay Brussels School of Economics and Management
Centre Emile Bernheim
ULB CP114/03 50, avenue F.D. Roosevelt 1050 Brussels BELGIUM
e-mail: ceb@admin.ulb.ac.be Tel. : +32 (0)2/650.48.64 Fax : +32 (0)2/650.41.88

ULB

OVER-INDEBTEDNESS IN MICROFINANCE –

AN EMPIRICAL ANALYSIS OF RELATED FACTORS ON THE BORROWER LEVEL

Jessica Schicks*
Centre for European Research in Microfinance (CERMi)
Solvay Brussels School of Economics and Management
Centre Emile Bernheim, Université Libre de Bruxelles

This paper analyses the over-indebtedness of microborrowers in Ghana. It defines over-indebtedness from a customer protection perspective and considers borrowers over-indebted if they continuously struggle with repayment and experience unacceptable sacrifices related to their debt. It finds that poorer microborrowers are more likely to be over-indebted. The risk of over-indebtedness further increases with the occurrence of adverse economic shocks to a borrower's income or expenses. The likelihood of over-indebtedness is higher for borrowers with low returns on their investment and if borrowers use loans, at least in part, for non-productive purposes. It is higher for borrowers with a low, debt-specific financial literacy. General financial literacy has negative effects on over-indebtedness. We find no effect for mere numeracy. The paper also breaks down the relationship of the above factors to the specific sacrifices that borrowers make, to how frequently they repeat them and to how acceptable sacrifices are to borrowers.

Keywords: Microfinance; Microcredit; Over-Indebtedness; Debt; Customer Protection; Sacrifices
JEL-codes: O16, O50, G21

* The author would like to thank the Independent Evaluation Department of KfW Entwicklungsbank and the ACCION Center for Financial Inclusion's Smart Campaign for their contribution to study design and for financing the empirical research project. She is indebted to the Ghanaian microfinance institutions who have shared their data and access to their clients to make this database possible. Prof. Marek Hudon, Prof. Ariane Szafarz, and Prof. Oscar Bernal have provided valuable comments.

1. Introduction

The literature on consumer finance in developed countries literature has extensively analysed why borrowers enter into burdensome levels of debt and what for what borrowers the risk of personal over-indebtedness is particularly high (Bridges & Disney, 2004; Lea, Webley, & Walker, 1995; Lusardi & Tufano, 2009; Webley & Nyhus, 2001). The microfinance industry, which provides financial services to poor populations in developing countries, has only recently become aware of the risk of over-indebtedness. There is a limited amount of research on delinquency and default in microfinance (Godquin, 2004; Schreiner, 2004; Vogelgesang, 2003), but hardly any research on over-indebtedness. With increasing concerns about negative effects of microfinance on customers, at a time where trust in the positive impact of microfinance is weakening (Duvendack et al., 2011; Karlan & Goldberg, 2011), over-indebtedness is one of the most pressing challenges facing the microfinance industry. It endangers at the same time the sustainability of microfinance institutions (MFIs) and their social impact. The lack of research on over-indebtedness in microfinance thus presents a substantial research gap.

Developing measures to avoid over-indebtedness requires a sound understanding of what drives it. To tailor effective solutions to the challenge, we need to understand the situations where over-indebtedness is most likely to exist and which borrowers are most at risk. To our knowledge, there are no academic studies that analyse which factors are related to over-indebtedness in microfinance. It has not been tested which of the factors identified in consumer finance research could equally apply to the microfinance context.

This paper analyses factors related to over-indebtedness in microfinance. Taking a customer protection perspective to enhance our understanding of the phenomenon, this paper contributes to the development of customer protection measures to combat over-indebtedness. We work with a unique primary dataset from a survey among 531 microborrowers in Accra, Ghana. We use logistic regression analysis to identify how poverty, adverse shocks, loan returns and financial literacy relate to over-indebtedness. We detail the relationship of these factors to the individual sacrifices that borrowers experience. By means of ordered logit regressions, we shed light on the role that these factors play concerning how acceptable sacrifices are to borrowers and how frequently borrowers repeat specific sacrifices.

We find that poorer borrowers, in terms of income and assets, are more likely to be over-indebted, as are borrowers who experience adverse economic shocks, who use their loans, at

least in part, for non-productive purposes, and whose investments into microenterprises produce low returns. A lack of debt-specific financial literacy also comes with a higher likelihood of being over-indebted, but surprisingly, the opposite is true for general financial literacy. The same factors that relate to over-indebtedness also relate to which sacrifices borrowers employ as coping strategies for their debt, to how acceptable sacrifices are to borrowers, and to how frequently borrowers repeat sacrifices.

The correlations of borrower-level factors with over-indebtedness confirm prior expectations based on theory and on empirical research in non-microfinance environments, for what might be the causes of over-indebtedness. These related factors are therefore likely to be causes of over-indebtedness. Because measures against over-indebtedness should address the borrowers that are most at risk and would optimally address the causes of the over-indebtedness phenomenon, our findings have important implications for the development of measures against over-indebtedness. They indicate that the spectrum of measures of over-indebtedness may be broader than expected.

The next section reviews the literature for factors related to over-indebtedness. In the absence of longitudinal studies, these factors represent the best candidates for potential causes of over-indebtedness. Section 3 describes our dataset and our econometric approach. Section 4 contains a presentation and discussion of our empirical findings. Concluding remarks and recommendations are provided in section 5.

2. Factors related to over-indebtedness

To develop measures against the problem of over-indebtedness, it is necessary to identify the most effective levers. These measures should address the cases with the highest risk for over-indebtedness; optimally, they would address the main drivers of over-indebtedness. The former requires knowledge concerning which customers are most at risk of over-indebtedness, i.e., we need to identify borrower characteristics related to over-indebtedness. The latter requires knowledge about the causes of over-indebtedness. However, there are no panel data for dealing with the challenges of endogeneity and causal interactions. The best possible approximation of the causes of over-indebtedness is thus to depart from theory and our knowledge of the causes of over-indebtedness in consumer finance and empirically analyse factors that are related to over-indebtedness in the microfinance context. A statistically significant relationship in multivariate analysis that confirms theoretical expectations and

prior empirical findings is currently the best available indication that a factor might be a cause of over-indebtedness.[1]

This section identifies the socio-demographic and economic borrower characteristics that are related to over-indebtedness according to the microfinance literature and consumer finance research. It also analyses business and loan-related factors and financial literacy, exploring the theory of what might be the causes of over-indebtedness. It develops four hypotheses for factors related to over-indebtedness in microfinance. We empirically test these hypotheses in section 4.

There is no consensus on a definition of personal over-indebtedness in the literature. From the viewpoint of risk management, delinquency or default are common indicators for over-indebtedness. From the viewpoint of customer protection, these indicators represent only late stage consequences of over-indebtedness. Over-indebted borrowers often struggle significantly with their loans before they reach the stage of manifest repayment problems. Following Schicks (in press), this paper therefore uses an over-indebtedness definition that takes the borrowers' experiences with debt into account: "*A microfinance customer is over-indebted if he/she is continuously struggling to meet repayment deadlines and structurally has to make unduly high sacrifices related to his/her loan obligations*".

The empirical research analysed in this section works with a range of measurements of over-indebtedness, problem debt, repayment problems, or high indebtedness. While the measurement is prone to influence empirical findings, factors that are related to any of these phenomena are also likely candidates for factors related to over-indebtedness according to the above sacrifice-based definition. This section therefore reviews factors that the literature identifies to be related to debt problems, independently of the exact measure of debt problems used in each study. The studies we review also vary according to their geography and cultural context, the type of debt products they include, and the type of borrowers they analyse. This paper is the first to test the transferability of their findings to a microfinance setting.

Socio-demographic factors

A borrower's risk of personal over-indebtedness varies with his/her socio-demographic background. For example, the borrower's age is a frequently studied characteristic in

[1] See Schicks (in press) for a framework of the causes of over-indebtedness.

consumer finance research is age. Although evidence is mixed, in the UK and the US, younger people seem to have a higher risk of indebtedness (Bridges & Disney, 2004; Drentea & Lavrakas, 2000; Lea, Webley, & Levine, 1993; Livingstone & Lunt, 1992). This is consistent with a life-cycle approach to borrowing that assumes consumption smoothing over an individual's life time with debts acquired at a young age based on expected future income (Friedman, 1957; Modigliani, 1980). Vogelgesang (2003) confirm this finding in a microfinance-specific study in Bolivia. In two studies by Canner and Luckett (1991) and Tokunaga (1993) with subjects from the US, the age effect is not significant.

Another influence factor is the borrower's household situation. Livingstone and Lunt (1992) find that in the UK, having more children reduces risk, assuming that children create discipline in their parents. The common view is, however, that having many children and younger children is positively associated with debt risks (Canner & Luckett, 1991; Lea et al., 1993; Lea et al., 1995). This may be because children augment the fixed expenses of a household, while at the same time reducing its income generating capacity. Except for Tokunaga (1993), most studies find increased over-indebtedness among single adult households, particularly after a divorce (Bridges & Disney, 2004; Canner & Luckett, 1991; Del-Río & Young, 2005; Lea et al., 1993; Webley & Nyhus, 2001). The problem might be the household dependence on a single income, combined with lingering habits and expenses that, in divorce cases, were appropriate for a different economic situation. This finding holds in the microfinance study conducted in Bolivia by Vogelgesang (2003). Webley and Nyhus (2001) get closest to actually establishing a causal relationship because their study uses a longitudinal approach based on panel data.

Several UK studies find higher debt risk for renters as opposed to home owners (Bridges & Disney, 2004; Disney, Bridges, & Gathergood, 2008; Lea et al., 1995), an effect that is not significant in the US-based multivariate analysis by Canner and Luckett (1991). According to Del-Río and Young (2005), Drentea and Lavrakas (2000), and Disney, Bridges, and Gathergood (2008), ill health is related to debt problems; however cause and effect are ambiguous. Finally, gender (Lea et al., 1993) and ethnicity (Del-Río & Young, 2005) have been correlated to indebtedness.

Concerning education, Bridges and Disney (2004), Canner and Luckett (1991) and Tokunaga (1993) find a higher risk of debt when a borrower's level of education is low. According to Livingstone and Lunt (1992) the effect of education is not significant in the UK. Gonzalez (2008) confirms the relationship of low education to over-indebtedness in microfinance in

Bolivia. More educated households might have a better economic standing in general but may also be better able to make more advantageous financial decisions. The risk of over-indebtedness could result from behavioural biases that make borrowers take on more debt than is reasonable. Humans do not make fully rational decisions, sometimes due to a lack of information, or due to a lack of cognitive abilities. They may be subject to temptations and over-value present benefits. Laibson (1997) explains this with the theory of hyperbolic discounting, where decision makers apply time-inconsistent discount rates. For example, in taking a loan, a borrower may give too much weight to the pleasure of receiving immediate cash and too little weight to the future burden of repayment. To a certain extent, a higher educational level may help borrowers deal with these biases.

Economic factors

The academic debate on economic factors influencing over-indebtedness focuses, most importantly, on income. Having a low income is a major cause of indebtedness in many consumer finance studies in the US and UK (Bridges & Disney, 2004; Disney et al., 2008; Lea et al., 1993; Lea et al., 1995; Livingstone & Lunt, 1992). It is, however, not significant in the US studies by Canner and Luckett (1991) and Tokunaga (1993). Livingstone and Lunt (1992) find that the absolute amount of borrowing among US households increases with income, but confirm that repayment difficulties mainly exist among low-income borrowers. Earning a low income probably reduces a borrower's repayment capacity, due to a low absolute amount of cash inflow at a borrower's disposition, and due to a larger share of total income being bound for essential living expenses. In microfinance, Paxton, Graham, and Cameron (2000) find a higher risk for repayment problems among rural borrowers in Burkina Faso that could be related to their lower incomes. In contrast, in South Africa, Collins (2008) finds that indebtedness is negatively related to income only in urban areas.

Alternatively, income uncertainty can be a driver of debt problems (Webley & Nyhus, 2001). If income is instable but the instalment schedule for a loan is fixed, borrowers may not have the means to serve their debt in low-income periods, even if their average annual income might be sufficient to deal with a given debt load. Moreover, an association between wealth levels and debt (Del-Río & Young, 2005; Disney et al., 2008) is confirmed by Sharma and Zeller (1997) and Godquin (2004) among microfinance borrowers in Bangladesh. The positive effect of wealth on a borrower's repayment capacity is likely to be most important for liquid assets, such as cash savings that could be used to reimburse a loan in periods with

insufficient income. Less liquid assets may still enhance repayment capacity if a borrower sells or pawns them. Wealthier borrowers are more likely to have assets to liquidate that they can spare without incurring significant sacrifice as a result. In terms of labour market status, being unemployed or in an instable or part-time position is related to higher debt in the UK (Lea et al., 1995). This effect is probably related to that of a borrower's income and income volatility.

Aside from the economic background characteristics of a borrower, adverse shocks to the income or expenses of borrowers reduce their capacity to repay debt and can trigger a situation of over-indebtedness (Disney et al., 2008; Stone & Maury, 2006). We define shocks as irregular events such as sudden expenses for emergencies, expected but irregular lump sum expenses (e.g., wedding ceremonies), or sudden impermanent drops in income (e.g., due to illness). While borrowers may be able to adapt to longer-term reductions in income by reducing their consumption or shifting their income generating capacity, they may not have the means or financial buffer to deal with sudden income reductions that occur unexpectedly. Human beings tend to display habit persistence that prevents them from immediately adjusting their consumption in response to income cuts (Brown, 1952). This effect is similar to but distinct from that of generally volatile incomes. Similarly, adverse shocks to a borrower's expenses, such as large lump sums required either for expected events (e.g., school fees, marriages), or unexpected shocks (e.g., medical expenses, funerals), may consume most of a borrower's income in a given period and may not leave sufficient cash flow for debt repayment. Bouquet, Wampfler, Ralison, and Roesch (2007) find that the main reasons for credit problems mentioned by microborrowers in Madagascar are sudden increases in expenses or loss of income.

There are two main factors that emerge from this analysis: material poverty and adverse economic shocks. The findings discussed above suggest that over-indebtedness is related to material poverty in the form of low incomes and low asset ownership. They also indicate a higher risk of over-indebtedness following unexpected reductions in income or sudden lump sum expenses. We test two hypotheses relating to economic factors to confirm that both a borrower's general economic situation and sudden events that negatively affect their income and expenses are independently related to over-indebtedness. We test the influence of material poverty separately for income and for asset ownership.

H1: Poorer borrowers are more likely to be over-indebted.

H1a: A borrower's income is negatively related to his/her likelihood of over-indebtedness.

H1b: A borrower's ownership of assets is negatively related to his/her likelihood of over-indebtedness.

We test the influence of the following adverse economic events: unexpected shocks to expenses, lump sums such as school fees that are expected but nevertheless difficult to manage, and shocks to income.

H2: Borrowers who experience adverse economic shocks are more likely to be over-indebted.

H2a: Unexpected shocks to a borrower's expenses are positively related to his likelihood of over-indebtedness.

H2b: Expected lump sum expenses are positively related to a borrower's likelihood of over-indebtedness.

H2c: Unexpected shocks to a borrower's income are positively related to his/her likelihood of over-indebtedness.

Business and loan-related factors

Finally, as microcredit was originally (and often still is) primarily directed towards productive purposes, i.e., the investment into microenterprises, low returns on this investment can increase the difficulties of borrowers coping with their debt (Gonzalez, 2008; Hulme, 2007). The return on an investment (ROI) depends on the specific investment, for example the borrower's choice of what to invest in, the market conditions, the general condition of the microenterprise, the borrower's entrepreneurial skill and other factors (de Mel, McKenzie, & Woodruff, 2008). Additionally, the ROI may depend on the general characteristics of the enterprise, for example on its sector of activity. Some sectors of activity may have higher returns than others, i.e., they may be more profitable. This may result, for example, from a relaxed competitive situation in a sector, due to entry barriers that allow businesses to exploit monopoly rents. Sectors of activity might also differ in the timing of cash flows. A loan for working capital used to restock a small shop with a quick turn over generates returns faster than a loan invested in agriculture where farmers must wait until harvest to generate returns.

A highly profitable investment does not increase a microborrower's repayment capacity if returns only materialise after the end of the instalment schedule. Schreiner (2004) finds manufacturers in Bolivia to be nearly twice as risky borrowers as traders, i.e., they are less likely to repay their loans. This might be a result of the profitability of trading businesses, but it is also due to their faster turnover.

Furthermore, the ROI goes down if a borrower decides to use the loan (at least partially), for non-productive purposes. On the one hand, scholars increasingly argue for the benefits of microlending for consumption purposes and income smoothing (Collins, Morduch, Rutherford, & Ruthven, 2009; Karlan & Zinman, 2009). A loan that does not generate financial returns may, nevertheless, be very beneficial to a borrower, for example, in avoiding periods of hunger by financing food in a low-income period, or in avoiding a deterioration in health by financing medical expenses. On the other hand, non-productive loan use is considered a risk factor for repayment (Gonzalez, 2009; Vogelgesang, 2003). Buying goods for immediate consumption does not create returns and thus does not help to repay a loan on time and without excessive sacrifice. In certain cases, it is difficult to distinguish which loan use is productive and which one is not (Collins, 2008). A loan for medical expenses may avoid the loss of one's income generating capacity and may therefore have an indirect positive financial return. Nevertheless, the loan inflicts the cost of interest and fees on the borrower and does not create any extra repayment capacity compared to the base scenario that prevails without medical expenses and without the loan.

Finally, loan use is not the only loan-specific factor related to over-indebtedness. The characteristics of a loan, such as the amount of interest charged, the instalment schedule, and the lending policies of MFIs, also influence a borrower's ability to repay their debt. In this paper's sample population in Ghana, these factors vary mainly on the institutional level, i.e., between MFIs, rather than from one borrower to the other. Where they vary within MFIs, it is mainly between group borrowers and individual borrowers. As a result, this paper does not go into the detail of loan and lender influences on the risk of over-indebtedness. Instead, along with the most common borrower level controls for loan characteristics, the empirical analysis will control for general loan characteristics on the MFI level and for the lending methodology (i.e., group or individual).

We test the hypothesis that microborrowers' over-indebtedness is related to the return on investment on their loans. We test if there is an independent influence of the borrower's

decision about loan use (i.e., at least partially for consumption or exclusively for productive purposes) and of the returns on investing the loan into a productive activity.

H3: Borrowers with low returns on their loan are more likely to be over-indebted.

H3a: Using a loan for non-business purposes is positively related to a borrower's likelihood of over-indebtedness.

H3b: Returns on investment in a borrower's productive activity are negatively related to the borrower's likelihood of over-indebtedness.

Financial literacy

More specifically than education, a borrower's financial literacy, his understanding of financial products, may be related to over-indebtedness. Empirical research indicates that the cognitive abilities of an average individual are low compared to the complexity of financial decisions. Tiwari, Khandelwal, and Ramji (2008) find that microfinance clients in India think about their loans in terms of how much they owe on a weekly basis but know very little about their interest rate or total interest expenses. This is in line with the theory of mental accounting (Thaler, 1985), which shows that individuals think about their financial decisions in terms of budgets for various mental expense categories but not in terms of interest rates and the time value of money. Similarly, Atkinson, McKay, Kempson, and Collard (2006) provide empirical support from the UK for people making poorly informed financial choices, by for example not reading the terms and conditions of contracts and by not comparing providers. Lusardi and Tufano (2009) discover strikingly low levels of debt literacy across the U.S. population, for example serious difficulty in grasping percentages. Those who are less debt literate bear a disproportionally large share of avoidable costs (e.g., late fees). They are also more likely to be over-indebted. Similarly, studies by Paxton, Graham, and Cameron (2000) and Schreiner (2004) in Burkina Faso and Bolivia show that a lack of borrower training and experience with past loans is related to a lower payment performance.

This paper therefore tests the hypothesis that financial literacy is negatively related to microborrowers' over-indebtedness risk. The more borrowers understand loans, the better borrowing decisions they can make and the less likely they are to take on debt beyond their means.

H4: Borrowers with a higher level of financial literacy are less likely to be over-indebted.

H4a: A borrower's numeracy is negatively related to his risk of over-indebtedness.

H4b: A borrower's general financial literacy is negatively related to his risk of over-indebtedness.

H4c: A borrower's debt literacy is negatively related to his risk of over-indebtedness.

3. Data and econometric framework

This paper is based on a unique primary database from Accra, Ghana. In cooperation with the Independent Evaluation Department of the German development bank KfW and with the Smart Campaign hosted by ACCION International, we conducted 531 structured interviews among microfinance borrowers[2] at the end of 2010. The interviews were anonymous. Five of Ghana's leading microfinance institutions, ProCredit Ghana, Opportunity International Ghana, Sinapi Aba Trust, EB-ACCION and Advans Ghana contributed to this random sample of microborrowers. They account for 83% of Ghana's microborrowers as reported to the MIX Market[3] in 2010 and for 95% of Ghana's gross microloan portfolio. We oversampled delinquent customers as they were likely to augment the number of over-indebted respondents in the sample and would allow for more variation in the over-indebted subgroup.[4] We corrected for both oversampling and response rates with sample weights for a borrower's lending institutions, a borrower's delinquency status, and the lending methodology of the borrower's main loan. There was no need to correct for gender.

Respondents reported details on all of their outstanding formal or informal loans at the time of the interview, including the purpose for which they used the loans and their subjective categorisation of return on their investment. Because borrowers would not be able to indicate the ROI in quantitative terms, they could choose from three categories of returns: the first indicating that the respondent did not permanently increase his/her earnings due to the investment; the second indicating that earnings increased but not enough or not stable enough

2 To apply a common threshold for micro- and SME-borrowers across all MFIs, we designate all customers with active personal loans below 5000 Ghana Cedis (GH₵; 1 GH₵=0.7 USD) as microborrowers. For most MFIs in the sample, all of their borrowers fall into this category. A total of 87% of disbursed loan amounts in the sample are below 2000 GH₵.

3 www.mixmarket.org. The site provides self-reports of limited liability and is likely to overstate the role of our partner MFIs in the local market as not all of the smaller MFIs may be reporting to the MIX.

4 With some MFIs, for groups over-sampling implied over-sampling delinquent groups rather than individuals.

to cover the instalments on the loan; and the third indicating that, on a regular basis, the borrower earned significantly more income due to the investment or productive activity financed with the loan. A fourth category captures the few loans (3% of our sample) that have no productive component at all. Although a subjective measurement of returns is much less precise than a quantitative percentage, the relatively broad categories and their verbal description are tuned to avoiding endogeneity, i.e. a respondent will not indicate lower returns *because* of being over-indebted. A borrower can report positive returns even if he is over-indebted, if, for example, his repayment difficulties are related to adverse shocks rather than to low returns (23% of the over-indebted in table 2 categorise ROI as a permanent and significant increase in income). Or a borrower who repaid his loan without problems can report having experienced no (12% of borrowers who are not over-indebted) or too little increases in income (36% of borrowers who are not over-indebted). These borrowers may have had sufficient other resources at their disposal to not need the loan returns for investment. Our measurement of returns therefore focuses on the impact of returns on over-indebtedness.

Moreover, respondents reported their socio-demographic, economic and business characteristics, and took a test of financial literacy. Appendix 1 contains the financial literacy questions based on Lusardi and Mitchell (2007) and Lusardi and Tufano (2009). In consultation with local MFI staff and after a pilot of the questionnaire, the questions were adapted to the local environment and to the aptitude of Ghanaian low-income borrowers. For our measurement of over-indebtedness, respondents listed all sacrifices that they experienced related to their loans over the course of one year (see Appendix 2 for the list of sacrifices). They indicated how many times they experienced each of the sacrifices ("Once in past year", "1-3 times in past year", ">3 times but not often", or "Frequently in past year")[5] and weighted their sacrifices according to their subjective judgment of how acceptable the experience was to them ("Easily acceptable", "Only just acceptable", "Not really acceptable", or "Not acceptable"). The first two categories summarise as "acceptable", and the latter as "unacceptable" or "not acceptable".

Based on this data on sacrifices, we can apply the sacrifice-based over-indebtedness definition and determine which borrowers are over-indebted in our sample. Respondents are over-indebted if they indicate that they struggle to repay their loans on time, make unacceptable

[5] For a respondent cutting down on their food at several points for a week at a time, instead of every individual day, each week would count as one occurrence.

sacrifices related to their loans, and that their experiences of unacceptable sacrifices are structural. To determine if sacrifices are a sign of structural debt problems, we only consider borrowers who experience a minimum of three repeated, unacceptable sacrifices as over-indebted. Only the structural one-off sacrifices, asset seizures, unacceptable loan recycling, and selling or pawning assets to be able to repay a loan, do not need to be repeat experiences.[6]

As a robustness check, we introduce a threshold free measurement of a borrower's level of sacrifice. We construct a score that increases from zero to 72 for each sacrifice that a borrower makes. Sacrifices weigh more the less they are acceptable (one to four points) and the more frequently they occur (one to four points). This score does not allow us to determine which factors are related to over-indebtedness, as it does not distinguish between low, acceptable levels of sacrifice, and sacrifices at the level of over-indebtedness. However, if empirical results for factors related to over-indebtedness and to the general score of sacrifices are similar, this proves that our findings are not sensitive to the exact threshold of our binary over-indebtedness measurement.

<insert table 1 about here>

Tables 1 and 2 provide an overview of the sample characteristics.[7] On average, the borrowers in our sample are representative of "typical microborrowers". They are mostly female (72%) who are poor but economically active and not living in extreme poverty. They are predominantly self-employed (98%) and are mainly traders (81%). The sample is almost evenly split between the group lending methodology (48%) and the individual lending methodology (52%), with some MFIs following only one or the other model, and some offering both types of lending products. According to borrowers' reports, almost all loans are, at least in part, used for productive purposes (97%), although many of them have not gone exclusively into a microenterprise but have also been used for consumption purposes (30%).

<insert table 2 about here>

The descriptive statistics in table 1 and 2 provide a first indication of which factors are related to over-indebtedness. Using t-tests for the difference in means between the over-indebted group and the borrowers who are not over-indebted, we find significant differences in terms

---

6 The measurement is not sensitive to these exceptions. They affect only very few cases.

7 As the research methodology relies on self-reports, statistical data regarding the borrowers' economic situation are subject to limitations. Aside from questions of honesty, respondents often experience difficulty estimating the monetary value of their assets and, given their volatility, their average incomes. However, on average there is no reason to assume a general upward or downward bias of the estimates and we consider the data sufficiently reliable for our level of analysis.

of a borrower's income and assets, as well as adverse shocks to income. Similarly, all three dimensions of financial literacy have significantly different means among the over-indebted. In contrast to income shocks, the amount of adverse shocks a borrower has experienced to his/her expenses is not significantly different between groups. Using a chi-squared test on our categorical variables, we find a significant correlation between the returns on investment that a borrower reports and his over-indebtedness status. There is no significant relationship between over-indebtedness status and loan use. However, neither t-tests nor the chi-squared contingency analysis can control for the influence of other variables on over-indebtedness. We therefore regress our indicators of financial literacy, poverty, adverse economic shocks and loan returns on our binary over-indebtedness measurement in a multinomial logistical regression. As identified in section 2, we control for the socio-demographic and economic characteristics of borrowers and the business- and loan-related factors that may be related to over-indebtedness.

$$(1)\ O_i = \beta_0 + \beta_1 LN_i + \beta_2 LG_i + \beta_3 LD_i + \beta_4 I_i + \beta_5 A_i + \beta_6 SUE_i + \beta_7 SEE_i + \beta_8 SI_i + \beta_9 CU_i + \beta_{10} ROI_i + \beta_6 X_i + \beta_6 Y_i + \beta_6 Z_i + u_i$$

For each respondent, *i*, *Oi* is a dummy variable that takes the value one for a borrower who is over-indebted and zero otherwise. *LNi* is the result of the literacy test specific to numeracy, *LNi* is the result for general financial literacy related to savings accounts and inflation, and *LDi* denotes the result of the debt-specific literacy test. *I* represents income, and *A* total assets. Regarding adverse shocks, we distinguish unexpected expense shocks (*SUEi*), expected large lump sum shocks (*SEEi*) and adverse shocks to income (*SIi*). For returns, *CUi* stands for at least a portion of the loan being used for consumption and *ROIi* for the return on investment. *Xi* is a vector of controls for socio-demographic characteristics that include the following categories: gender, age, ethnic background, marital status, the number of children, household size, housing type, employment status, a subjective categorical measurement of health problems and a borrower's level of education.[8]

Yi is a vector of the economic characteristics, income volatility and amount of savings owned, as well as the key loan characteristics of the number of lenders to whom a borrower is indebted, the total amount of debt disbursed on current outstanding loans, the average

[8] In the regression analysis, for reasons of limited observations in certain uncommon categories of socio-demographic variables, we summarize the categories Gurma/Other for Ethnic_background, No formal education/PreSchool for Level_of_education, Minor/Strong health problems for Health_problems, Own house/Other for Housing_type, Permanent/Temporary employment/Student for Employment_status, and Production of goods/Other for Main_occupation.

maturity of their loans and the lending methodology of their main loan (group or individual). The variable Main_occupation controls for the sector of activity in which the microborrower is mainly active. *Yi* includes the borrower's subjective assessment on a five-point Likert scale of the fairness of the lender's treatment. To retain the information on the order of categories, we assume equal distances between the different categories of agreement and treat the Likert scale as continuous. This control ensures that the subjective judgment on the acceptability of sacrifices in our over-indebtedness measurement is not distorted by the borrower's perception of having been treated unfairly by a lender. Finally, *Zi* is a vector of controls for a borrower's main lender among our partner MFIs that covers all loan characteristics that differ on the institutional level. This variable introduces an aggregate explanatory variable into our regression on the individual level. To account for common variance effects on the MFI level that would bias our estimated standard errors and thus the significance of our coefficients, we cluster standard errors according to *Zi* (Greenwald, 1983; Moulton, 1990).

We employ a five-step estimation procedure for the logistic regression model suggested above. The first model serves as a basic benchmark for analysis. It includes all potential variables and controls but does not yet take common variance effects into account. We report odds ratios and White's heteroscedasticity consistent standard errors (White, 1980). In model (2) we add the correction for common variance components on the lender level. Given that our controls describe borrowers' individual situations quite comprehensively, there is the potential for interactions between some of our explanatory variables. We expect women to differ from men in how they use microloans (Agier, Guérin, & Szafarz, 2012; D'Espallier, Guérin, & Mersland, 2011). Women might be more likely to use loans for household purposes rather than for productive investments (Garikipati, 2008). We also expect that lending methodology may have an effect on loan use, because the pressure to invest a loan into a microenterprise as well as the extent to which loan use is monitored are likely to be higher in the group lending model (Ghatak & Guinnane, 1999). Model (3) therefore expands on model 2 by adding interaction terms for gender with loan use and for lending methodology with loan use.[9] Model (4) drops all controls that were not significant in the previous models, eliminating the noise that potential non-significant variables may have created. This parsimonious model

[9] We also tested the following interaction terms: whether loan use differs between the customers of different MFIs, whether gender or group lending had any impact on returns on investment, whether there was an interaction of either gender or the lending methodology with a borrower's debt literacy, and whether gender and methodology interacted with each other. None of these interaction terms were significant. We tested if the debt-to-income ratio had an independent relationship to over-indebtedness in addition to absolute income and absolute debt amounts, but it was not significant.

represents our main model and is the basis for all consecutive analyses. Model (5) shows the effects of running our regression on the main hypotheses only, excluding control variables.

As a robustness check, we repeat the same regressions (1) to (5) with a different dependent variable that does not depend on our over-indebtedness definition and on the specific threshold applied in our measurement of over-indebtedness. We regress the factors that are likely to be related to over-indebtedness on the 72-point sacrifice score, as described earlier in this section. The results are unlikely to be exactly the same, given that different factors may be related to minor sacrifices than to severe ones. Also, factors that explain if a borrower is over-indebted may not explain small variations in the intensity of his struggles. Nevertheless, we expect the robustness check to deliver roughly similar results to those obtained from the main regression. It thus confirms that our findings are not specific to the details of the over-indebtedness measurement but are capable of explaining borrower sacrifices in general.

To understand the relationship of poverty, adverse shocks, loan returns and financial literacy to sacrifices in more detail, we run additional regressions that consider the sacrifices underlying over-indebtedness separately. We run our main parsimonious model (4) for the prevalence of each sacrifice in the borrower sample, independently of the severity of sacrifices and of a borrower's over-indebtedness status. We then run the same model for the four most common sacrifices as an ordered logistic regression on the 4-point scale of sacrifice acceptability. Due to the limited numbers of observations for less common sacrifices (the ordered logit model with all variables requires approximately 100 observations per sacrifice), this analysis is possible only for the following sacrifices: cutting down on food, working harder, postponing important expenses, and depleting one's savings. We repeat the same analysis for the 4-point scale that measures how frequently a borrower repeats the same sacrifice.

This analysis allows us to understand the mechanisms through which poverty, adverse shocks, loan returns and financial literacy relate to over-indebtedness; how factors relate to the severity of sacrifices; which factors increase the repetition of sacrifices; and which factors are related to specific sacrifices rather than to others. It provides relevant insights for developing policy implications for microfinance and identifying the best responses to address the risk of over-indebtedness in microfinance.

4. Results and discussion

Main regressions

Table 3 displays the results of the logistic regressions on over-indebtedness, with the main model represented by column (4). It confirms that poverty is positively related to over-indebtedness (H1). Average monthly income (H1a) is consistently related to over-indebtedness at a 1% significance level. According to the marginal effects for model (4) as represented in table 4, marginal income increases correspond to a reduction in over-indebtedness risk by 2%. The picture is less clear for a borrower's wealth in terms of assets, but in our main model assets are significant at the 5%-level (H1b). A marginal increase of assets (in thousands) implies that the likelihood of over-indebtedness is lower by 0.2%.

<insert table 3 about here>

<insert table 4 about here>

Aside from the general effects of poverty in terms of low income and little asset ownership, the analysis confirms that adverse economic shocks have an independent effect on over-indebtedness (H2). While the evidence is not strong for unexpected shocks to a borrower's expenses (for example funerals or broken assets that have to be replaced) (H2a), expected shocks to expenses such as lump sum expenses for school fees or marriages are related to over-indebtedness with a 1% significance level (H2b). Surprisingly expected lump sums appear to be more important than unexpected shocks. For each marginal Cedi of expected shock, the likelihood of over-indebtedness increases by 0.1%. The data are even stronger regarding shocks to a borrower's income (H2c). Leaving out the benchmark regression that had not yet taken the common variance effects on the MFI level into account, all models consistently display coefficients for income shocks that are significant at the 1%-level. Similar to expense shocks, a marginal increase in income shocks increases the risk of over-indebtedness by 0.1%.

These regressions also relate returns of investment (H3) to over-indebtedness. They confirm that both loan use (H3a) and the returns on an investment made with the loan (H3b) are related to over-indebtedness, with significance levels at 1%.[10] The results are slightly less consistent for loan use, but the main model shows that for women (when gender is at its reference value of 0 and there is no effect of the interaction term), the likelihood of being

[10] There is no significant multicollinearity between partial non-productive loan use and ROI.

over-indebted increases by 12.2% for those who used a loan, at least in part, for a non-productive purpose. This effect is independent of our measurement of investment returns, potentially because the classification of returns into four categories does not cover the full amount of variation of returns and because having to use debt for non-productive purposes might indicate a lower ex-ante capacity to cover debt instalments that cannot be covered by investment returns from other sources. It could also relate to the reverse effect of over-indebtedness increasing the risk that an individual needs to use part of their loan for non-productive purposes. Moreover, there is a significant interaction effect between loan use and gender. Regarding returns on investments, loan returns that are not sufficient to cover instalments come with a 15.4% higher likelihood of being over-indebted compared to productive loan uses that produce permanent earnings increases at a level sufficient to repay the loan. If there are only impermanent increases in earnings from the productive loan use, this factor increases to 36.5%, and when no returns are possible (i.e., no investment, not even in part) it increases to 42.9%.[11]

For our first hypothesis, the regressions confirm H4c that borrowers with higher debt-specific financial literacy are less likely to be over-indebted. Marginal effects indicate that an infinitesimally small increase of a borrower's score in our debt literacy test corresponds to a 0.2% lower likelihood of over-indebtedness. The result is significant at a 1%-level. Contradicting our prior expectations, the opposite is true for general financial literacy (H4b): while the effect is small, an increase in general financial literacy corresponds to a higher risk of over-indebtedness. Mere numeracy (H4a), the ability to perform simple mathematical operations, is not related to over-indebtedness.

In sum, we find strong confirmation for our hypotheses with the expected signs, except for general financial literacy, for which the relationship to over-indebtedness is positive, and except for numeracy, which has no relationship to over-indebtedness. Concerning asset ownership and unexpected shocks to expenses, the results are not always consistent across models. As Appendix 3 shows, many of our control variables for socio-demographics, economic situation and lenders are also significant. Interestingly, a borrower's level of education is not significant, nor is his amount of savings, his debt amount, the number of MFIs he borrows from, or the lending methodology (group/individual).

[11] The strength of these results may partly be due to the fact that we have measured ROI in four rough categories as reported by borrowers. However, section 3 has shown that borrowers are able to distinguish between repayment difficulties and returns and that both high returns with over-indebtedness (e.g., due to shocks) and low returns without over-indebtedness (e.g. due to other resources) occur in our sample.

While a cross-sectional dataset without an experimental design does not allow for an analysis of causality, for most of the hypotheses tested, there is likely to be a causal chain of the factors impacting over-indebtedness. Over the short time horizon of the study, it is more likely that low income has contributed to over-indebtedness than that income has gone down due to over-indebtedness. Adverse economic shocks have not occurred due to over-indebtedness but are much more likely to have triggered it. The returns on the productive activity financed with the loan are unlikely to be low because a borrower is over-indebted but it is probable that low returns have made repayment more difficult and thus contributed to over-indebtedness. Debt literacy has not changed when over-indebtedness hit, but has probably influenced a borrowers choices in taking on debt. More debt literate individuals seem to make smarter borrowing choices. Further research is required to confirm and analyse the opposing finding for general financial literacy. In terms of assets and loan use, the evidence for causality is less clear. Over-indebtedness might be caused by a lack of assets but might also reduce a borrower's assets (for example, in the case of a seizure or asset sales to repay a debt). Similarly, consumption loan use can create over-indebtedness but if there is an effect that is independent of the ROI this may also be due to a higher likelihood that an over-indebted borrower needs to take on debt for non-productive purposes.

Robustness check

We test the robustness of our findings by replacing the over-indebtedness measure with a general threshold-free score of borrower sacrifices; table 5, column (4) displays the main model. The same results are obtained for income, but not for assets and unexpected expense shocks that were already weaker findings for to over-indebtedness. Out findings also hold true for the following factors: expected expense shocks and income shocks, loan use and the interaction of gender with loan use, ROI, debt literacy, and the lack of a relationship to numeracy. The opposite effect of general financial literacy is confirmed, although weakly. Given that not all variation in borrower sacrifices is necessarily determined by the same factors as over-indebtedness, the robustness check provides confirmation for our main findings. They are not dependent on our specific measurement of over-indebtedness.[12]

[12] The findings are however specific to the customer protection perspective of defining over-indebtedness through the lens of sacrifices. If over-indebtedness was measured as "delinquency", assets, income, expense shocks and loan use would not be significantly related. Nevertheless, income shocks, returns on investment, and financial literacy are also highly significant factors related to delinquency (see Appendix 4). While delinquency can contribute to a borrower's sacrifices, from the

<insert table 5 about here>

Further analyses

To deepen our understanding of how financial literacy, poverty, adverse shocks and loan returns are related to over-indebtedness, we run separate regressions of our main model (4) on each sacrifice to determine which of these factors are related to the incidence of each specific sacrifice.[13] This analysis is independent of the acceptability of a sacrifice; thus, not every sacrifice contributed to a borrower being over-indebted. The analysis allows for a refined approach to developing solutions to over-indebtedness. Table 6 indicates that income is related to all sacrifices except to increases in work efforts and shame. Potentially, the poorest borrowers might already exert their maximum possible work effort and are very accustomed to financial problems, making sacrifices less of a source of shame. In line with its over-all relationship to over-indebtedness, the relationship of income to the various sacrifices is typically negative. Asset ownership is related to exactly those sacrifices where income does not play a role. It prevents extra work and the depletion of savings and has a very small but positive impact on shame. When adverse shocks hit a borrower, the typical responses to unexpected expense shocks appear to delay postponing other expenses, including food costs. Large, expected expenses, in contrast, allow for longer-term coping strategies, such as lining up extra work, using savings and selling assets. They come with a higher likelihood for shame for the borrowers, maybe because they are more foreseeable and solicit less pity from others. When borrowers experience sudden reductions in income, they primarily react by taking on new debt, or by selling or pawning assets, and they tend to suffer from psychological stress. Using one's loan, at least in part, for non-productive purposes is very significantly related to experiences of shame. This may be due to the borrower's bad conscience if he was supposed to fully invest the loan. At a 10% significance level, non-productive loan use is also positively related to psychological stress and, interestingly, to reductions in the education of the borrowers' children. Independent of loan use, the different levels of ROI are jointly related to all sacrifices, except for taking on new debt and experiencing threats. The reason for the former might be that new debt is more difficult to obtain with a business that is not running

customer protection point of view it is a (reinforcing) consequence of over-indebtedness rather than an original influence factor. We therefore do not include this highly endogenous factor in our regressions on over-indebtedness. We did, however, test that doing so would not change our findings.

[13] Marginal effects available upon request.

well. The relationship is consistently positive. Finally, good numeracy reduces the risk of food reductions but increases the risk of reducing one's savings or of relying on external help. Similarly, good general financial literacy is positively related to savings depletion, taking new debt, shame and threats. This provides further detail to our counterintuitive finding that numeracy is positively related to over-indebtedness. Literacy could not only influence the quality of borrowing decisions but could also be related to a borrower's decision to make certain sacrifices. For example, borrowers with higher levels of general literacy may have built more savings that they can deplete. Debt-specific financial literacy is related mainly to reducing food, working harder, and suffering from shame and stress.

<insert table 6 about here>

This analysis of how the factors related to over-indebtedness relate to each of the sacrifices is an early step in identifying how microborrowers cope with debt. More research must be performed but we can already conclude that borrowers with different economic backgrounds, loan uses and levels of financial literacy respond to repayment difficulties in different ways. This impacts the effect of potential measures against over-indebtedness. For example, insurance against unexpected expense shocks such as medical expenses could help borrowers to maintain their general consumption patterns and reduce reductions in food. Different measures would be required to address other sacrifices.

Regarding the acceptability of sacrifices, table 7 shows that for the most common sacrifices, the factors related to over-indebtedness are not only related through a higher or lower likelihood of certain sacrifices occurring, but that they are also related to how acceptable different sacrifices are to the borrowers.[14] For example borrowers in more difficult economic situations might experience the same sacrifices more severely because they have no further buffer for e.g., reductions in consumption, or they may experience more severe forms of these sacrifices. At the same time they could experience some sacrifices as less severe because they are more used to financial difficulties. The data indicate that a lack of income and assets is positively related to the unacceptability of having to work harder, i.e., it reduces acceptability. Expense shocks do not seem to change the acceptability of any of these common sacrifices. Using a portion of a loan for a non-productive purpose equally reduces the acceptability of having to work harder to repay it, perhaps because productive loan use links directly to the expectation to also invest more time in the enterprise. A lack of returns on the investment

[14] Of course cut-off values for the latent variable of acceptability vary significantly between the models.

reduces the acceptability of both extra work and postponed expenses in the household and business. Not having invested the loan at all however comes with a higher acceptability of postponing important expenses, potentially because there were no return expectations linked to the loan and the borrower was willing to postpone other expenses ex ante. In terms of financial literacy, general financial literacy seems related to a higher acceptability to postpone expenses and a lower acceptability to deplete one's savings. Increased debt literacy comes with a higher acceptability for extra work to repay the loan. Future research with larger sample sizes would need to increase the precision of these estimates and extend this analysis to encompass the less common sacrifices.

<insert table 7 about here>

Table 8 analyses how frequently borrowers repeat sacrifices. For those borrowers who have cut down on food consumption, increased work efforts, or depleted their savings to pay a loan instalment, poorer borrowers are likely to repeat these sacrifices more frequently than richer borrowers. In terms of reductions in food and savings, the same is true for borrowers who have experienced unexpected expense or income shocks. Loan use does not impact the frequency of the most common sacrifices. A lack of ROI is negatively related to the frequency of working harder and postponing expenses, i.e., these sacrifices are repeated less frequently. For financial literacy the picture is twofold: a higher score on the numeracy test comes with less repetition of sacrifices three and five. A higher score on general financial literacy seems to correspond to more frequent sacrificing of food and savings, and debt-specific literacy to more frequent food cuts and taking on extra work. The best way to understand these findings would be with qualitative research that can disentangle the reasons behind these effects. For example, literacy can be positively related to the frequency of some sacrifices because borrowers who understand loans better are better able to anticipate repayment challenges and thus identify the necessary coping strategies. At the same time, it can be negatively related to the frequency of other sacrifices because more literate borrowers may get into less severe repayment problems and thus be able to avoid the more severe sacrifice experiences.

<insert table 8 about here>

The analysis of how factors related to over-indebtedness relate to the frequency and acceptability of individual sacrifices is in its nascency, but it sheds some initial light on the complexity of factors related to over-indebtedness through the lens of customer protection. Depending on the situation of the individual borrower and on the trigger for the debt problems, borrowers may experience the same sacrifices as more or less severe or experience

a more or less severe form of them. A borrower's poverty, adverse shocks, loan returns and financial literacy are also related to the question of how frequently borrowers experience specific sacrifices. This provides an indication of more prolonged problems over-indebtedness. While it is too early to deduce clear policy recommendations, our analysis indicates that there may be a means of reducing the customer experience of over-indebtedness by addressing specific levers that reduce the duration of the sacrifices or that help borrowers make their situation more acceptable.

5. Conclusion and Implications

This paper analyses over-indebtedness from a perspective of customer protection. Endangering both MFI sustainability and the social impact of microfinance, over-indebtedness is currently one of the most important challenges in microfinance. Customer protection efforts are one of the industry's top priorities. Nevertheless, to date, over-indebtedness, especially from the customers' perspective, remains highly underresearched. Insights on factors related to over-indebtedness are urgently needed for the development of measures against this phenomenon.

This paper indicates that microborrowers are more likely to be over-indebted when they are living on lower incomes and with lower assets, and when they experience adverse economic shocks to their income and expenses. There are independent effects of over-indebtedness risk being higher for borrowers with low returns on the investment in their microenterprise and for borrowers who, in part, use their loans for non-productive purposes. Borrowers are more likely to be over-indebted when they lack the financial literacy to understand debt products. General financial literacy seems to have an opposite effect, contradicting our expectations. For mere numeracy, there is no statistically significant effect on over-indebtedness.

While cross-sectional regression cannot analyse causality, the factors we identify to be related to over-indebtedness are likely to be the causes of over-indebtedness. The relationships we identify confirm prior expectations concerning causality, and with the exception of asset ownership and loan use a reverse causal relationship is improbable. Based on a unique database from Ghana, this is the first research to confirm these relationships in a microfinance context. By identifying the relationships of factors to over-indebtedness that are likely candidates for causal influence factors, this paper provides an important contribution to our

understanding of over-indebtedness in microfinance and to the development of solutions to this major challenge for the industry.

We further deepen the analysis by breaking down how the above factors relate to the question of which sacrifices borrowers employ as coping strategies for their debt. Borrowers with different economic backgrounds, loan uses, and financial literacy respond to repayment difficulties in different ways. For example, when hit by unexpected shocks to their expenses, borrowers rather react with reductions in their food consumption and with postponing important other expenses, but they tend to employ longer-term coping strategies such as working harder, creating and using savings, and selling household or business assets when faced with lump sum expenses that are expected.

Moreover, this paper provides the first insights into the relationship of economic background, adverse shocks, loan returns and financial literacy to how acceptable the most common sacrifices are to borrowers and how frequently these sacrifices are repeated. For example, low investment returns on a loan are related to a lower acceptability of extra work and of postponing expenses, but having used a loan exclusively for non-productive purposes comes with a higher readiness to work harder to repay it. Regarding the repetition of specific sacrifices, borrowers who are faced with unexpected expenses or with income shocks, for example, sacrifice food and savings more frequently, while other sacrifices remain unaffected.

Our findings have important policy implications. The microfinance industry must identify ways to reduce over-indebtedness among its customers. From a customer protection point of view, it is important to not just reduce default but to reduce the suffering of customers from over-indebtedness, i.e., their sacrifices. Knowing that borrowers are more likely to be over-indebted when they live on lower incomes and own fewer assets, MFIs might be able to reduce over-indebtedness by reducing credit to poorer borrowers, lending smaller amounts, or choosing to not lend to the poorest borrowers.[15] However, it is important to strike a good balance between the inclusion of the poor and avoiding over-indebtedness. Our findings should not lead to a return to financial exclusion but excluding people who would experience harm from debt may be in their interest.[16]

---

[15] The control variables in the Appendix paint a more precise picture of the general socio-demographic and economic characteristics of the borrowers with the highest risk of over-indebtedness. They could contribute to some type of credit scoring but the same limitations apply that apply to the poverty criterion.

[16] Note that our measurement of over-indebtedness does not imply causality. Microdebt may be the cause of the sacrifices but, even if respondents have listed the sacrifices that they experience as being related to their loan, the loans may also have

Similarly, if adverse shocks to income and expenses represent a main cause of over-indebtedness among microborrowers, MFIs should take the likelihood of adverse shocks into account when calculating repayment capacity. Adverse shocks are frequent among the target customers of MFIs and can turn an apparently healthy debt balance into a case of suffering and over-indebtedness. There is, again, reason for caution to avoid financial exclusion. At times, loans can be the best available tool for borrowers to cope with adverse economic shocks. Borrowers will be left with an unmanageable debt burden but may yet benefit, rather than having to face, for example, high medical expenses without access to credit. MFIs should therefore anticipate the occurrence of adverse shocks when determining creditworthiness and deciding on loan amounts and instalment schedules. They may, however, provide emergency loans, knowing that repayment might be difficult for the borrower. In certain cases, instead of reducing access to loans, more flexible instalment schedules could be the best solution to avoid over-indebtedness in borrowers who experience adverse shocks. This includes ex-ante flexibility of repayment conditions as much as ex-post flexibility with renegotiations and rescheduling (Hamp & Laureti, 2011). Promoting savings instead of credit or providing insurance to borrowers could also go a long way toward preventing over-indebtedness.

There is an ongoing debate in microfinance concerning the industry's original requirement that loans be used productively. Our paper confirms that non-productive loan use increases the risk of over-indebtedness. However, these loans are, at times, worthwhile. Repaying a loan for emergency medical expenses is almost automatically more difficult than repaying a loan with good returns on investment. Nevertheless, the emergency loan may be beneficial to the borrower. Similarly, lower ROI on invested loans is related to higher over-indebtedness risks. Our paper confirms that ROI is often not sufficient for borrowers to repay their loans. The high interest rates in microfinance have often been challenged for ethical reasons (Hudon, 2007), but at the same time, they have been justified with high returns on borrower's investments. While arguments concerning the high costs of providing microloans, the sustainability of MFIs and risks of exclusion due to interest rate caps remain valid, our findings challenge the assumption that high returns enable microborrowers to pay high interest rates. Nevertheless, the microenterprise investment may pay off in the long run, even if returns are not sufficient over the short instalment schedule of the typical microloan. Instead of reducing access to credit, the response might again be to better tailor products to

helped the borrowers deal with an otherwise even more unbearable situation. Or the loan may have been useful but an adverse shock can have triggered over-indebtedness ex post.

borrowers' needs and to develop instalment schedules appropriate to the cash flows of microenterprises.

Finally, our paper indicates that improving borrowers' financial literacy can reduce their risk of over-indebtedness. It shows, however, that financial literacy training needs to be specific to debt literacy to have the desired effect. Trainings in computational skills and general financial literacy would not be effective.

Moreover, in developing solutions to over-indebtedness, the industry should be aware of the complexity of the phenomenon. The factors analysed in this paper do not only relate to borrowers' risk of over-indebtedness, but they are equally related to which sacrifices borrowers experience, how frequently they repeat these sacrifices and how acceptable different sacrifices are to them. Further research needs to shed light on the details of these complex relationships for policy measures to effectively take into account the fact that specific measures address only specific sacrifice experiences among borrowers—and that there might be levers tailored to reducing the repetition of sacrifices or to increasing the acceptability of sacrifices to borrowers. This research points to a much broader spectrum of potential policy measures aimed at over-indebtedness, than just a focus on reducing delinquency and default would suggest.

These policy implications promise progress in the fight against over-indebtedness in microfinance but leave substantial room for ambiguity. It will remain a question of judgment, in specific situations, to what extent restricting credit for the poorest customers, being conservative in calculating repayment capacity, limiting loan use, flexibilising loan products, and offering financial literacy trainings is the correct response to over-indebtedness risks. Extreme forms of these solutions could potentially eliminate over-indebtedness but would do so at the cost of excluding many customers from debt who could sincerely benefit, or (in the case of flexibility) at the cost of eroding repayment performance and putting the sustainability of institutions at risk. A certain level of over-indebtedness is probably unavoidable in any lending market. However, over-indebtedness measures should aim to reduce this level to a responsible minimum.

References

Agier, I., Guérin, I., & Szafarz, A. (2012). Child gender and parental borrowing: Evidence from India. Economics Letters, 115, 363–365.

Atkinson, A., McKay, S., Kempson, E., & Collard, S. (2006). Levels of Financial Capability in the UK: Results of a baseline survey, Consumer Research No. 47, London.

Bouquet, E., Wampfler, B., Ralison, E., & Roesch, M. (2007). Trajectoires de crédit et vulnérabilité des ménages ruraux: Le cas des Cecam de Madagascar [Credit trajectories and vulnerability of rural households: the case of Cecam in Madagascar]. Autrepart, 44, 157–172.

Bridges, S., & Disney, R. (2004). Use of Credit and Arrears on Debt among Low-Income Families in the United Kingdom. Fiscal Studies, 25(1), 1–25.

Brown, T. M. (1952). Habit Persistence and Lags in Consumer Behaviour. Econometrica, 20(3), 355–371.

Canner, G. B., & Luckett, C. A. (1991). Payment of household debts. Federal Reserve Bulletin, 77(4), 218.

Collins, D. (2008). Debt and household finance: Evidence from the Financial Diaries. Development Southern Africa, 25(4), 469–479.

Collins, D., Morduch, J., Rutherford, S., & Ruthven, O. (2009). Portfolios of the Poor: How the World's Poor Live on $2 a Day. Princeton, NJ: Princeton Univ. Press.

de Mel, S., McKenzie, D. J., & Woodruff, C. (2008). Returns to Capital in Microenterprises: Evidence from a Field Experiment. Quarterly Journal of Economics, 123(4), 1329–1372.

Del-Río, A. & Young, G. (2005). The impact of unsecured debt on financial distress among British households, Working Paper No. 262, Bank of England, London.

D'Espallier, B., Guérin, I., & Mersland, R. (2011). Women and Repayment in Microfinance: A Global Analysis. World Development, 39(5), 758–772.

Disney, R., Bridges, S., & Gathergood, J. (2008). Drivers of Over-Indebtedness: Report to the Department for Business, Enterprise and Regulatory Reform.

Drentea, P., & Lavrakas, P. J. (2000). Over the Limit: The Association Among Health, Race, and Debt. Social Science & Medicine, 50(4), 517–529.

Duvendack, M., Palmer-Jones, R., Copestake, J., Hooper, L., Loke, Y., & Rao, N. (2011). What is the evidence of the impact of microfinance on the well-being of poor people?, EPPI-Centre, Social Science Research Unit, Institute of Education, University of London, London.

Friedman, M. (1957). A Theory of the Consumption Function. Princeton: Princeton University Press.

Garikipati, S. (2008). The Impact of Lending to Women on Household Vulnerability and Women's Empowerment: Evidence from India, Special Section: Social Movements and the Dynamics of Rural Development in Latin America (pp. 2874-2952). World Development, 36(12), 2620–2642.

Ghatak, M., & Guinnane, T. W. (1999). The economics of lending with joint liability: theory and practice. Journal of Development Economics, 60(1), 195–228.

Godquin, M. (2004). Microfinance Repayment Performance in Bangladesh: How to Improve the Allocation of Loans by MFIs. World Development, 32(11), 1909–1926.

Gonzalez, A. (2008). Microfinance, Incentives to Repay, and Overindebtedness. Evidence from a Household Survey in Bolivia (Doctoral thesis). Ohio State University, Ohio.

Gonzalez, A. (2009). Consumption, Commercial or Mortgage Loans: Does It Matter for MFIs in LAC? The MIX Market, Data Brief No. 3.

Greenwald, B. (1983). A general analysis of bias in the estimated standard errors of least square coefficients. Journal of Econometrics, 22(3), 323–338.

Hamp, M. & Laureti, C. (2011). Balancing flexibility and discipline in microfinance: Innovative financial products that benefit clients and service providers, CEB Working Paper No. 11/044.

Hudon, M. (2007). Fair interest rates when lending to the poor. Ethics and Economics, 5(1).

Hulme, D. (2007). Is microdebt good for poor people? A note on the dark side of microfinance. In T. Dichter & M. Harper (Eds.), What's wrong with Micofinance? (pp. 19–22). Warwickshire: Intermediate Technology Publications.

Karlan, D. & Zinman, J. (2009). Expanding Microenterprise Credit Access: Using Randomized Supply Decisions to Estimate the Impacts in Manila. Cambridge, MA.

Karlan, D., & Goldberg, N. (2011). Microfinance Evaluation Strategies: Notes on Methodology and Findings. In B. Armendáriz & M. Labie (Eds.), The Handbook of Microfinance (pp. 17–58). London, Singapore: World Scientific Publishing.

Laibson, D. (1997). Golden Eggs and Hyperbolic Discounting. Quarterly Journal of Economics, 112(2), 443–477.

Lea, S. E. G., Webley, P., & Levine, R. M. (1993). The Economic Psychology of Consumer Debt. Journal of Economic Psychology, 14(1), 85–119.

Lea, S. E. G., Webley, P., & Walker, C. M. (1995). Psychological Factors in Consumer Debt: Money Management, Economic Socialization, and Credit Use. Journal of Economic Psychology, 16(4), 681–701.

Livingstone, S. M., & Lunt, P. K. (1992). Predicting personal debt and debt repayment: Psychological, social and economic determinants. Journal of Economic Psychology, 13(1), 111–134.

Lusardi, A. & Tufano, P. (2009). Debt Literacy, Financial Experiences, and Overindebtedness, NBER Working Paper Series No. 14808. Cambridge, MA.

Lusardi, A., & Mitchell, O. S. (2007). Baby Boomer retirement security: The roles of planning, financial literacy, and housing wealth. Journal of Monetary Economics, 54(1), 5–224.

Modigliani, F. (1980). The Collected Papers of Franco Modigliani: The Life Cycle Hypothesis of Saving. (Abel, A., Ed.). Cambridge, MA; London: MIT Press.

Moulton, B. (1990). An illustration of a pitfall in estimating the effects of aggregate variables on micro units. Review of Economics and Statistics, 72(2), 334–338.

Paxton, J., Graham, D., & Cameron, T. (2000). Modeling Group Loan Repayment Behavior: New Insights from Burkina Faso. Economic Development and Cultural Change, 48(3), 639–655.

Schicks, J. (in press). Microfinance Over-Indebtedness: Understanding its Drivers and Challenging the Common Myths. Oxford Development Studies.

Schreiner, M. (2004). Scoring Arrears at a Microlender in Bolivia. Journal of Microfinance, 6(2), 65–88.

Sharma, M., & Zeller, M. (1997). Repayment performance in group-based credit programs in Bangladesh: An empirical analysis. World Development, 25(10), 1731–1742.

Stone, B., & Maury, R. V. (2006). Indicators of personal financial debt using a multi-disciplinary behavioral model. Journal of Economic Psychology, 27(4), 543–556.

Thaler, R. (1985). Mental Accounting and Consumer Choice. Marketing Science, 4(3), 199–214.

Tiwari, A., Khandelwal, A., & Ramji, M. (2008). How Do Microfinance Clients Understand their Loans?, Institute for Financial Management and Research, Centre for Micro Finance, Working Paper Series No. 25.

Tokunaga, H. (1993). The use and abuse of consumer credit: Application of psychological theory and research. Journal of Economic Psychology, 14(2), 285–316.

Vogelgesang, U. (2003). Microfinance in Times of Crisis: The Effects of Competition, Rising Indebtedness, and Economic Crisis on Repayment Behavior. World Development, 31(12), 2085–2114.

Webley, P., & Nyhus, E. K. (2001). Life-Cycle and Disproportionate Routes into Problem Debt. British Journal of Psychology, 92, 423–446.

White, H. (1980). A heteroscedasticity-consistent covariance matrix estimator and a direct test for heteroscedasticity. Econometrica, 48(4), 817–830.

Table 1: Descriptive statistics of borrower sample. Metric Variables

Variable	Units	Expected relationship to over-	N	Global Mean	Standard Deviation (SD)	Over-indebted (n= 158) Mean	Over-indebted (n= 158) SD	Not over-indebted (n=373) Mean	Not over-indebted (n=373) SD	T-test[1]
Avg_monthly_income_approx_value[2]	Ghana Cedis	-	530	645.14	575.48	544.81	456.40	687.80	614.83	2.75***
Total_assets_in_thds	Ghana Cedis (thds)	-	524	15.00	21.91	11.38	14.97	16.50	24.07	2.87***
Unexpected_expense_shocks_over_i	% of income	+	531	12.22	31.00	13.81	24.78	11.54	33.29	-0.84
Expected_expense_shocks_over_inc	% of income	+	531	20.84	37.34	22.42	37.19	20.18	37.44	-0.59
Unexpected_income_shocks_over_in	% of income	+	530	11.76	28.35	17.01	35.94	9.53	24.15	-2.27**
Score_numeracy_test	% of correct answers	-	530	80.06	24.86	76.04	27.86	81.75	23.31	2.02**
Score_general_financial_literacy	% of correct answers	-	527	57.31	36.92	51.64	37.79	59.69	36.34	2.05**
Score_debt_literacy_test	% of correct answers	-	527	28.31	29.39	20.17	24.63	31.74	30.57	4.3***
Age	Years	-	520	40.09	8.60	40.31	8.73	40.00	8.55	-0.34
Number_of_children	Number of persons	+	531	2.48	1.57	2.54	1.65	2.45	1.53	-0.59
Household_size	Number of persons	+	531	4.75	2.15	4.94	2.41	4.66	2.02	-1.21
Amount_of_savings_self_reported	Ghana Cedis	-	525	406.80	765.55	286.89	638.45	457.41	808.74	2.31**
Number_of_MFIs_crossborrowing	Number of MFIs	+	531	1.07	0.28	1.09	0.29	1.06	0.28	-0.98
Total_amount_of_debt_disbursed	Ghana Cedis	+	529	1408.70	1286.75	1339.66	1007.79	1437.75	1387.70	0.88
Average_maturity_weighted	Months	+/-	527	8.04	4.12	8.07	4.48	8.02	3.96	-0.12

[1] T-test for equal means between over-indebted and not over-indebted group; *** p<0.01, ** p<0.05, * p<0.1

[2] Income data was collected in categories of 200 Ghana Cedis. The approximate values refer to the middle of each category.

Table 2: Descriptive statistics of borrower sample. Categorical Variables

			Over-indebted (n= 158)		Not over-indebted (n=373)		Chi-Square[1]	
Variable	**N**	**%**	**N**	**%**	**N**	**%**	**χ^2**	**Cramer's V**
Any_non-productive_loan_use							2.23	0.065
Productive only	372	70.2	106	67.0	266	71.6		
At least one non-productive loan use	157	29.8	52	33.0	105	28.4		
Returns_on_investment							36.36***	0.284
Permanent significant increase in earnings	186	41.4	31	22.6	156	49.6		
Increase not sufficient to repay loan	177	39.3	64	46.7	113	36.1		
No permanent increase in earnings	74	16.4	37	27.2	37	11.7		
No investment	13	2.9	5	3.5	8	2.6		
Gender							0.8	0.039
Female	383	72.2	112	71.0	271	72.7		
Male	148	27.8	46	29.1	102	27.3		
Ethnic_background							3.11	0.077
Akan	346	65.1	100	63.2	246	65.9		
Dagbone-Dagomba	21	4.0	5	2.9	16	4.4		
Ewe	73	13.8	22	14.0	51	13.7		
Ga	66	12.4	20	12.9	45	12.2		
Gurma	2	0.4	1	0.4	1	0.3		
Other	23	4.4	10	6.6	13	3.4		
Marital_status							1.8	0.058
Divorced	23	4.2	7	4.4	16	4.2		
Married	382	71.9	108	68.2	274	73.5		
Separated	10	1.8	3	1.8	7	1.8		
Single	87	16.5	32	20.2	56	14.9		
Widowed	30	5.6	9	5.5	21	5.7		
Level_of_education							4.31	0.090
No formal education	30	5.6	10	6.2	20	5.4		
PreSchool	6	1.1	2	1.0	4	1.2		
Primary	70	13.3	27	16.9	44	11.7		
JSS/JHS/Middle School	269	50.6	80	50.4	189	50.8		
Secondary/vocational/technical/commerc	119	22.5	31	19.8	88	23.6		
Tertiary, university graduate	37	6.9	9	5.7	28	7.4		
Health_problems							2.65	0.071
No health problems	408	76.9	116	73.5	292	78.3		
Minor health problems	117	22.0	39	24.4	78	20.9		
Strong heath problems	6	1.2	3	2.1	3	0.8		
Housing_type							2.14	0.064
Living for rent	333	62.7	102	64.7	231	61.9		
Living in family housing for free	75	14.2	20	12.6	56	14.9		
Living in your own house	121	22.7	36	22.8	85	22.7		
Other	2	0.3	0	0.0	2	0.5		
Employment_status							1.85	0.059
Permanent employment	7	1.3	2	1.2	5	1.3		
Self-employed	522	98.2	155	98.0	367	98.3		
Student	1	0.1	0	0.0	1	0.2		
Temporary employment	2	0.4	1	0.8	1	0.2		
Main_occupation							1.99	0.061
Offering services	65	12.3	16	9.9	50	13.3		
On-selling	430	80.9	131	82.9	299	80.1		
Production of goods	35	6.7	11	7.2	24	6.5		
Other	1	0.1	0	0.0	1	0.2		
Income_volatility							1.48	0.053
Stable income	12	2.3	1	0.9	11	2.9		
Little volatility	336	63.2	103	65.0	233	62.5		
Strong volatility	183	34.5	54	34.1	129	34.6		
Group_or_individual_customer							1.44	-0.052
Group	253	47.6	81	51.0	172	46.1		
Individual	278	52.4	77	49.0	201	53.9		
General_fairness_of_MFIs							14.6***	0.166
Strongly disagree	19	3.6	10	6.1	9	2.5		
Somewhat disagree	26	4.8	11	6.8	15	4.0		
Neither agree nor disagree	17	3.3	9	5.5	9	2.3		
Somewhat agree	141	26.7	42	26.9	98	26.6		
Strongly agree	325	61.6	86	54.8	239	64.5		
Main_lender							2.1163	0.064
MFI 1	110	21.0	29	18.6	80	22.0		
MFI 2	166	31.7	51	32.7	115	31.3		
MFI 3	81	15.5	23	14.6	58	15.9		
MFI 4	97	18.5	35	22.2	62	16.9		
MFI 5	70	13.4	19	11.9	51	14.0		

[1] Chi-Square significance levels indicate statistical significance *** p<0.01, ** p<0.05, * p<0.1. Cramer's V indicates strength of association. Contingency analysis in Stata is unweighted. Weighted Chi-Square results imply no substantial changes to results

Table 3: Logistic regression of borrower characteristics on over-indebtedness

Dependent variable: Over-indebtedness (dummy)	**(1)**	**(2)**	**(3)**	**(4)**	**(5)**
Average_monthly_income	0.843**	0.843***	0.856***	0.875***	0.880***
	(0.057)	(0.025)	(0.030)	(0.016)	(0.028)
Total_assets_in_thds	0.988	0.988	0.986	0.987**	0.992*
	(0.008)	(0.009)	(0.009)	(0.007)	(0.004)
Unexpected_expense_shocks	1.002	1.002	1.002*	1.002*	1.001
	(0.003)	(0.002)	(0.001)	(0.001)	(0.002)
Expected_expense_shocks	1.003	1.003***	1.004***	1.005***	1.003**
	(0.004)	(0.001)	(0.001)	(0.002)	(0.001)
Unexpected_income_shocks	1.007	1.007***	1.007***	1.008***	1.006***
	(0.004)	(0.001)	(0.001)	(0.001)	(0.001)
Loan_use:_At_least_one_non-productive_loan_use	1.304	1.304	2.513***	2.089***	1.513**
	(0.440)	(0.238)	(0.658)	(0.287)	(0.284)
Returns:_Increase_not_sufficient_to_repay_loan	2.857***	2.857***	2.824***	2.579***	2.924***
	(1.087)	(0.911)	(0.912)	(0.693)	(0.755)
Returns:_No_permanent_increase_in_earnings	6.150***	6.150***	6.229***	6.073***	5.930***
	(2.761)	(3.983)	(4.210)	(3.798)	(2.770)
Returns:_No_investment	5.160*	5.160***	5.410**	7.089***	5.049***
	(5.024)	(2.921)	(4.103)	(3.547)	(1.314)
Literacy:_Score_numeracy_test	0.995	0.995	0.993	0.997	0.996
	(0.008)	(0.008)	(0.008)	(0.006)	(0.007)
Literacy:_Score_general_financial_literacy	1.005	1.005***	1.005**	1.005**	1.004**
	(0.005)	(0.002)	(0.002)	(0.002)	(0.002)
Literacy:_Score_debt_literacy_test	0.987**	0.987***	0.987**	0.985***	0.985***
	(0.006)	(0.005)	(0.006)	(0.005)	(0.003)
Interaction_gender_with_loan_use			0.364***	0.314***	
			(0.065)	(0.090)	
Interaction_methodology_with_loan_use			0.457		
			(0.290)		
Constant	0.000***	0.000***	0.000***	0.000***	0.380*
	(0.000)	(0.000)	(0.000)	(0.000)	(0.190)
Controls	*Added*	*Added*	*Added*	*Added if relevant*	*Excluded*
Interaction terms	*Excluded*	*Excluded*	*Added*	*Added if relevant*	*Excluded*
Observations (N)	401	401	401	414	417
Pseudo R^2	0.2241	0.2241	0.2347	0.2196	0.1332
Nagelkerke's R^2	0.3370	0.3370	0.3509	0.3311	0.2107

Odds Ratios. Robust Standard Errors in parenthesis. Standard Errors for models 2-4 clustered by Main_lender_among_my_MFIs
, ** and * denote significance at the 10% 5% and 1% level.*
For each categorical variable we have dropped one reference category, i.e. the first category according to table 2.

Table 4: Marginal effects for the parsimonious model (4)

Variable	dy/dx	Std.Err.	z	P>z	95% C.I.		X
Average_monthly_income	-0.020	0.002	-8.670	0.000	-0.025	-0.016	3.540
Total_assets_in_thds	-0.002	0.001	-1.970	0.048	-0.004	0.000	14.845
Unexpected_expense_shocks	0.000	0.000	1.590	0.113	0.000	0.001	13.299
Expected_expense_shocks	0.001	0.000	3.250	0.001	0.000	0.001	21.565
Unexpected_income_shocks	0.001	0.000	7.980	0.000	0.001	0.001	12.941
Loan_use:_At_least_one_non-productive_loan_use[1]	0.122	0.027	4.520	0.000	0.069	0.175	0.318
Returns:_Increase_not_sufficient_to_repay_loan[1]	0.154	0.040	3.890	0.000	0.076	0.232	0.394
Returns:_No_permanent_increase_in_earnings[1]	0.365	0.136	2.690	0.007	0.099	0.631	0.161
Returns:_No_investment[1]	0.429	0.112	3.830	0.000	0.210	0.649	0.026
Literacy:_Score_numeracy_test	0.000	0.001	-0.410	0.681	-0.002	0.001	79.781
Literacy:_Score_general_financial_literacy	0.001	0.000	2.220	0.026	0.000	0.001	56.908
Literacy:_Score_debt_literacy_test	-0.002	0.001	-3.210	0.001	-0.004	-0.001	28.724

1 dy/dx is for discrete change of dummy variable from 0 to 1

Table 5: Robustness check - OLS regression of models 1-5 on a discrete score of sacrifices

Dependent variable: Sacrifice score (0-72)	**(1)**	**(2)**	**(3)**	**(4)**	**(5)**
Average_monthly_income	-0.0248**	-0.0248***	-0.0224**	-0.0204***	-0.0205**
	-0.00985	-0.00455	-0.00513	-0.00332	-0.00514
Total_assets_in_thds	-0.00158	-0.00158	-0.00152	-0.00152	-0.00101*
	-0.00111	-0.00098	-0.000944	-0.000814	-0.000436
Unexpected_expense_shocks	0.000152	0.000152	0.000166	0.00023	0.00000727
	-0.00066	-0.000448	-0.000413	-0.000335	-0.000545
Expected_expense_shocks	0.000553	0.000553*	0.000644*	0.000825**	0.000564
	-0.00073	-0.000248	-0.000241	-0.000287	-0.000331
Unexpected_income_shocks	0.00136*	0.00136***	0.00135***	0.00145***	0.00125***
	-0.000797	-0.000162	-0.000155	-0.000108	-0.000169
Loan_use:_At_least_one_non-productive_loan_use	0.0411	0.0411	0.144**	0.121**	0.0744
	-0.056	-0.0364	-0.0489	-0.0308	-0.0373
Returns:_Increase_not_sufficient_to_repay_loan	0.149**	0.149*	0.149**	0.141**	0.181***
	-0.0603	-0.054	-0.0536	-0.0423	-0.0391
Returns:_No_permanent_increase_in_earnings	0.320***	0.320*	0.321*	0.322**	0.347**
	-0.0791	-0.118	-0.119	-0.104	-0.0937
Returns:_No_investment	0.176	0.176	0.189	0.267**	0.305***
	-0.158	-0.134	-0.142	-0.0634	-0.0626
Literacy:_Score_numeracy_test	-0.000964	-0.000964	-0.00115	-0.000505	-0.000806
	-0.00135	-0.00143	-0.00142	-0.00111	-0.00131
Literacy:_Score_general_financial_literacy	0.000981	0.000981**	0.000912*	0.000823	0.000791*
	-0.000908	-0.000295	-0.00036	-0.000389	-0.000359
Literacy:_Score_debt_literacy_test	-0.00226**	-0.00226**	-0.00219*	-0.00254**	-0.00263***
	-0.000943	-0.000726	-0.000827	-0.000565	-0.000423
Interaction_gender_with_loan_use			-0.153**	-0.180**	
			-0.0509	-0.0518	
Interaction_methodology_with_loan_use			-0.102		
			-0.0916		
Constant	-0.176	-0.176	-0.148	0.0606	0.293**
	-0.314	-0.215	-0.233	-0.189	-0.0966
Controls	*Added*	*Added*	*Added*	*Added if relevant*	*Excluded*
Interaction terms	*Excluded*	*Excluded*	*Added*	*Added if relevant*	*Excluded*
N	401	401	401	414	417
R-sq	0.2350	0.2350	0.2439	0.233	0.1515
adj. R-sq	0.1356	0.1356	0.1407	0.1597	0.1263

Robust Standard Errors in parenthesis. Standard Errors for models 2-4 clustered by Main_lender_among_my_MFIs
, ** and * denote significance at the 10% 5% and 1% level.*
For each categorical variable we have dropped one reference category, i.e. the first category according to table 2.

Table 6: Logistic regressions of factors related to over-indebtedness on individual sacrifices

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(9)	(10)	(11)	(12)
Dependent variable: Sacrifices 1-12 (dummy)	Food	Education	Work	Expenses	Savings	New debt	Sell assets	External help	Shame	Threats	Stress
Average_monthly_income	0.789***	0.864***	0.977	0.789***	1.085*	0.410***	0.343***	0.410***	1.176	1.483**	0.755**
	(0.054)	(0.029)	(0.047)	(0.054)	(0.053)	(0.117)	(0.133)	(0.117)	(0.388)	(0.283)	(0.104)
Total_assets_in_thds	0.989	0.977	0.979***	0.989	0.974***	1.021	0.990	1.021	1.045***	1.008	0.988
	(0.014)	(0.027)	(0.005)	(0.014)	(0.009)	(0.022)	(0.022)	(0.022)	(0.004)	(0.028)	(0.015)
Unexpected_expense_shocks	0.989**	0.982	1.000	0.989**	1.006	0.995	1.013	0.995	1.037	0.972	0.994
	(0.006)	(0.019)	(0.006)	(0.006)	(0.004)	(0.006)	(0.010)	(0.006)	(0.052)	(0.041)	(0.010)
Expected_expense_shocks	1.001	1.002	1.002***	1.001	1.007**	1.006	1.011**	1.006	1.029***	0.984	1.003
	(0.003)	(0.005)	(0.001)	(0.003)	(0.003)	(0.011)	(0.005)	(0.011)	(0.010)	(0.050)	(0.005)
Unexpected_income_shocks	1.005	0.993	1.000	1.005	1.000	1.011**	0.978**	1.011**	1.003	1.007	1.009***
	(0.003)	(0.010)	(0.005)	(0.003)	(0.004)	(0.005)	(0.010)	(0.005)	(0.016)	(0.031)	(0.003)
Loan_use:_At_least_one_non-productive_loan_use	2.057	1.647*	0.984	2.057	1.208	1.971	2.332	1.971	47.422***	2.872	3.416*
	(0.925)	(0.418)	(0.393)	(0.925)	(0.742)	(1.784)	(1.704)	(1.784)	(62.280)	(2.465)	(2.478)
Returns:_Increase_not_sufficient_to_repay_loan	2.206	14.184***	1.237	0.626	1.451***	5.117	293.635**	2.794***	480.398**	1.730	2.447***
	(1.296)	(10.296)	(0.266)	(0.302)	(0.093)	(9.318)	(766.868)	(0.917)	(1429.347)	(2.298)	(0.595)
Returns:_No_permanent_increase_in_earnings	5.495***	55.345***	1.731***	0.967	1.448***	9.951	202.491	0.915	128.608*	4.602	2.724
	(3.535)	(23.852)	(0.190)	(0.325)	(0.126)	(16.103)	(667.616)	(0.468)	(365.289)	(7.541)	(1.790)
Returns:_No_investment	0.227	-	13.001**	0.195**	0.561	40.642	283.411*	2.308*	-	-	2.613***
	(0.525)		(13.300)	(0.123)	(0.619)	(136.967)	(889.877)	(1.061)			(0.884)
Literacy:_Score_numeracy_test	0.992	1.038***	1.002	1.007	1.019***	0.981	0.976	1.020**	0.997	0.963	1.004
	(0.009)	(0.009)	(0.003)	(0.008)	(0.006)	(0.021)	(0.026)	(0.008)	(0.022)	(0.027)	(0.011)
Literacy:_Score_general_financial_literacy	0.996	1.001	1.004	1.006	1.005*	1.024**	1.026	1.007	0.983***	1.045***	1.004
	(0.007)	(0.004)	(0.003)	(0.005)	(0.003)	(0.012)	(0.019)	(0.007)	(0.004)	(0.015)	(0.005)
Literacy:_Score_debt_literacy_test	0.987***	0.984	0.991***	0.998	0.998	0.983	0.998	0.994	0.972**	1.001	0.988**
	(0.003)	(0.014)	(0.001)	(0.002)	(0.003)	(0.019)	(0.010)	(0.010)	(0.012)	(0.031)	(0.006)
Constant	21.643*	0.000***	29.585***	0.027**	1.245	0.000***	0.000***	0.000***	0.062	0.000***	0.051**
	(37.695)	(0.000)	(26.812)	(0.040)	(2.409)	(0.000)	(0.000)	(0.000)	(0.663)	(0.000)	(0.068)
Controls	*Added*	*Added*	*Added*	*Added*	*Added*	*Added*	*Added*	*Added*	*Added*	*Added*	*Added*
Observations (N)	414	301	414	414	414	390	380	372	184	302	367
Pseudo R^2	0.2314	0.3764	0.1742	0.1645	0.1320	0.4177	0.5649	0.3021	0.5249	0.6182	0.2285
Nagelkerke's R^2	0.3154	0.4340	0.2802	0.2688	0.2131	0.4590	0.6100	0.3828	0.5788	0.6581	0.2923

Odds Ratios. Robust Standard Errors in parenthesis. Standard Errors clustered by Main_lender_among_my_MFIs
, ** and * denote significance at the 10% 5% and 1% level.*
For each categorical variable we have dropped one reference category, i.e. the first category according to table 2.
The last category of ROI had to be dropped in three models for reasons of multicollinearity.
Models numbered according to list of sacrifices in Appendix 2.

Table 7: Ordered logit regression on the acceptability of the most common sacrifices

Dependent variable: 4-point scale for acceptability of sacrifices	**(1) Food**	**(3) Work**	**(4) Expenses**	**(5) Savings**
Average_monthly_income	0.388	0.064**	-0.064	0.388
	(0.349)	(0.030)	(0.081)	(0.349)
Total_assets_in_thds	-0.034	0.033**	0.031	-0.034
	(0.027)	(0.014)	(0.021)	(0.027)
Unexpected_expense_shocks	-0.020	-0.011	-0.002	-0.020
	(0.059)	(0.008)	(0.009)	(0.059)
Expected_expense_shocks	0.006	0.004	0.010*	0.006
	(0.011)	(0.009)	(0.006)	(0.011)
Unexpected_income_shocks	0.013	0.007	-0.005	0.013
	(0.029)	(0.008)	(0.003)	(0.029)
Loan_use:_At_least_one_non-productive_loan_use	1.045	0.663**	0.474	1.045
	(1.232)	(0.302)	(0.651)	(1.232)
Returns:_Increase_not_sufficient_to_repay_loan	2.430	1.608**	1.708**	-0.149
	(2.155)	(0.706)	(0.789)	(0.228)
Returns:_No_permanent_increase_in_earnings	1.919	1.574**	2.097***	0.052
	(1.880)	(0.727)	(0.409)	(0.440)
Returns:_No_investment	5.522	0.397	-15.247***	0.607
	(3.742)	(0.572)	(1.275)	(2.475)
Literacy:_Score_numeracy_test	0.028	0.001	0.003	0.014
	(0.034)	(0.007)	(0.009)	(0.009)
Literacy:_Score_general_financial_literacy	-0.004	-0.002	-0.012*	0.008*
	(0.010)	(0.003)	(0.007)	(0.004)
Literacy:_Score_debt_literacy_test	0.017	-0.018***	-0.001	-0.010
	(0.029)	(0.006)	(0.004)	(0.007)
Controls	*Added*	*Added*	*Added*	*Added*
Latent cut-off 1	26.037	4.517	17.553	0.130
	(5.946)	(1.89)	(2.854)	(1.024)
Latent cut-off 2	27.146	5.786	18.527	2.033
	(5.72)	(2.063)	(2.162)	(1.134)
Latent cut-off 3	29.706	7.681	20.816	3.960
	(6.064)	(2.015)	(2.734)	(1.285)
Observations (N)	66	241	187	139
Pseudo R^2	0.2973	0.2690	0.2871	0.1450
Nagelkerke's R^2	0.5778	0.5271	0.5392	0.3406

*Regression coefficients. Robust Standard Errors in parenthesis, clustered by Main_lender_among_my_MFIs. *, ** and *** denote significance at the 10% 5% and 1% level.*
For each categorical variable we have dropped one reference category, i.e. the first according to table 2. Models numbered according to list of sacrifices in Appendix 2.

Table 8: Ordered logit regression on the frequency of the most common sacrifices

Dependent variable: 4-point scale for frequency of sacrifices	**(1) Food**	**(3) Work**	**(4) Expenses**	**(5) Savings**
Average_monthly_income	1.652***	-0.194**	-0.187	1.652***
	(0.411)	(0.089)	(0.118)	(0.411)
Total_assets_in_thds	-0.066	-0.004	-0.010	-0.066
	(0.042)	(0.014)	(0.011)	(0.042)
Unexpected_expense_shocks	0.161**	0.003	0.004	0.161**
	(0.078)	(0.008)	(0.014)	(0.078)
Expected_expense_shocks	0.000	-0.005	-0.006	0.000
	(0.010)	(0.006)	(0.006)	(0.010)
Unexpected_income_shocks	0.070*	0.005	0.003	0.070*
	(0.036)	(0.013)	(0.005)	(0.036)
Loan_use:_At_least_one_non-productive_loan_use	3.503	-0.324	-0.177	3.503
	(2.883)	(0.654)	(0.742)	(2.883)
Returns:_Increase_not_sufficient_to_repay_loan	0.049	-0.806**	-0.998***	0.619
	(3.034)	(0.358)	(0.326)	(0.660)
Returns:_No_permanent_increase_in_earnings	-1.211	-0.449	-0.659**	0.577
	(3.257)	(0.458)	(0.331)	(0.440)
Returns:_No_investment	-1.018	-1.789*	-0.855	-0.488
	(3.000)	(1.058)	(0.575)	(0.733)
Literacy:_Score_numeracy_test	0.020	-0.014*	0.005	-0.028**
	(0.020)	(0.008)	(0.012)	(0.013)
Literacy:_Score_general_financial_literacy	-0.019	0.008*	-0.005	0.009*
	(0.017)	(0.004)	(0.006)	(0.005)
Literacy:_Score_debt_literacy_test	0.061**	0.011**	-0.001	-0.005
	(0.030)	(0.005)	(0.003)	(0.010)
Controls	*Added*	*Added*	*Added*	*Added*
Latent cut-off 1	0.513	-4.509	-19.745	-5.410
	(2.703)	(2.338)	(1.38)	(2.437)
Latent cut-off 2	4.629	-2.288	-18.021	-2.851
	(3.633)	(2.033)	(1.342)	(2.401)
Latent cut-off 3	8.334	-1.116	-17.071	-1.035
	(3.902)	(1.994)	(1.393)	(2.676)
Observations (N)	66	241	187	139
Pseudo R^2	0.5041	0.1622	0.1959	0.1639
Nagelkerke's R^2	0.7902	0.3438	0.4239	0.3604

Regression coefficients. Robust Standard Errors in parenthesis, clustered by Main_lender_among_my_MFIs.
, ** and * denote significance at the 10% 5% and 1% level.*
For each categorical variable we have dropped one reference category, i.e. the first according to table 2.
Models numbered according to list of sacrifices in Appendix 2.

Appendix 1: Survey questions on financial literacy

Numeracy

1. Compute 5+8
2. Compute 7*4
3. If the chance of getting a disease is 10%, how many people out of 100 would be expected to get the disease?
4. If 5 people all have the winning number in the lottery and the prize is 2,000 Cedis, how much will each of them get?

General financial literacy

5. Suppose you had ₵100 in a savings account and the interest rate was 2% per year (2 ₵ in year one). After 5 years, how much do you think you would have in the account if you left the money to grow: A: more than ₵102, B: exactly ₵102, C: less than ₵102?
6. 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 A: buy more than, B: exactly the same as, or C: less than today with the money in this account?
7. Suppose that in the year 2011, your income has doubled and prices of all goods have doubled too. In 2011, how much will you be able to buy with your income: A: more than today, B: the same, or C: less than today?

Debt literacy

8. You owe ₵100 and you are charged 20% interest per year compounded annually. If you never pay anything off, you pay 20₵ interest in the first year. In the second year, do you pay A: less interest, B: the same interest, C: more interest?
9. You owe ₵300 with 1% interest charged each month (i.e. 3₵). You pay an installment of ₵3 each month. How many years would it take to eliminate your debt: A: less than 5 years, B: 5-10 years, or C: never (you will continue to be in debt)?
10. You take a loan of ₵100. To repay, you are given the following two options: 1) Pay 12 monthly installments of ₵10 each; 2) Pay back ₵120 a year from now. Which is the better offer: A: option 1, B: option 2, or C: are they the same?

(Questions were developed based on {Lusardi 2007 #343 /footcit} and {Lusardi 2009 #166 /footcit}).

Appendix 2: List of borrower sacrifices

Interviewers asked each respondent about the following list of sacrifices

1) Reduce food quantity/quality (cut down eating)
2) Reduce education (e.g. taking children out of school)
3) Work more than usual (e.g. take additional labor, work longer hours, on Sundays, and when ill)
4) Postpone important expenses (e.g. for health, housing, business assets etc.)
5) Deplete your financial savings (e.g. money in the house or in a savings account)
6) Borrow anew to repay (take an additional loan from another lender)
7) Sell or pawn assets (e.g. jewelry, cattle, productive or household assets)
8) Seizure of assets (MFI takes property by force to make up for missed payment)
9) Use family/friends' support to repay
10) Suffer from shame or insults (also gossip about you/exclusion from a contract)
11) Feel threatened/harassed by peers/family/loan officer
12) Suffer psychological stress yourself or in your marriage
13) Other

Respondents ranked the acceptability and frequency of each sacrifice on a scale from 1 to 4.

- Easily acceptable, Only just acceptable, Not really acceptable, Not acceptable at all.
- Once in past year, 1-3 times in past year, > 3 times but not often, Frequently in past year

Appendix 3: Full regressions as in table 4, including detailed controls

Dependent variable: Over-indebtedness	(1)	(2)	(3)	(4)	(5)
Average_monthly_income	0.843**	0.843***	0.856***	0.875***	0.880***
	(0.057)	(0.025)	(0.030)	(0.016)	(0.028)
Total_assets_in_thds	0.988	0.988	0.986	0.987**	0.992*
	(0.008)	(0.009)	(0.009)	(0.007)	(0.004)
Unexpected_expense_shocks	1.002	1.002	1.002*	1.002*	1.001
	(0.003)	(0.002)	(0.001)	(0.001)	(0.002)
Expected_expense_shocks	1.003	1.003***	1.004***	1.005***	1.003**
	(0.004)	(0.001)	(0.001)	(0.002)	(0.001)
Unexpected_income_shocks	1.007	1.007***	1.007***	1.008***	1.006***
	(0.004)	(0.001)	(0.001)	(0.001)	(0.001)
Loan_use:_At_least_one_non-productive_loan_use	1.304	1.304	2.513***	2.089***	1.513**
	(0.440)	(0.238)	(0.658)	(0.287)	(0.284)
Returns:_Increase_not_sufficient_to_repay_loan	2.857***	2.857***	2.824***	2.579***	2.924***
	(1.087)	(0.911)	(0.912)	(0.693)	(0.755)
Returns:_No_permanent_increase_in_earnings	6.150***	6.150***	6.229***	6.073***	5.930***
	(2.761)	(3.983)	(4.210)	(3.798)	(2.770)
Returns:_No_investment	5.160*	5.160***	5.410**	7.089***	5.049***
	(5.024)	(2.921)	(4.103)	(3.547)	(1.314)
Literacy:_Score_numeracy_test	0.995	0.995	0.993	0.997	0.996
	(0.008)	(0.008)	(0.008)	(0.006)	(0.007)
Literacy:_Score_general_financial_literacy	1.005	1.005***	1.005**	1.005**	1.004**
	(0.005)	(0.002)	(0.002)	(0.002)	(0.002)
Literacy:_Score_debt_literacy_test	0.987**	0.987***	0.987**	0.985***	0.985***
	(0.006)	(0.005)	(0.006)	(0.005)	(0.003)
Gender	2.073**	2.073*	3.068***	2.618**	
	(0.680)	(0.802)	(1.195)	(1.009)	
Age	1.010	1.010	1.008		
	(0.021)	(0.023)	(0.024)		
Ethnic_background_Dagbone-Dagomba	0.548	0.548	0.645	0.393	
	(0.462)	(0.420)	(0.440)	(0.242)	
Ethnic_background_Ewe	0.786	0.786	0.800	0.928	
	(0.369)	(0.485)	(0.532)	(0.540)	
Ethnic_background_Ga	1.871	1.871***	1.950***	1.959***	
	(0.867)	(0.409)	(0.481)	(0.318)	
Ethnic_background_Gurma/Other	2.331	2.331***	2.527***	2.059***	
	(1.457)	(0.236)	(0.383)	(0.512)	
Marital_status_Married	0.355	0.355**	0.356**	0.297**	
	(0.263)	(0.187)	(0.176)	(0.165)	
Marital_status_Separated	0.265	0.265	0.259	0.234	
	(0.314)	(0.355)	(0.352)	(0.384)	
Marital_status_Single	0.617	0.617	0.577	0.518	
	(0.516)	(0.397)	(0.373)	(0.222)	
Marital_status_Widowed	0.562	0.562	0.617	0.401	
	(0.522)	(0.376)	(0.403)	(0.268)	
Number_of_children	1.017	1.017	1.021		
	(0.144)	(0.194)	(0.193)		
Household_size	1.127	1.127**	1.123**	1.142***	
	(0.102)	(0.066)	(0.062)	(0.030)	
Housing_type_Living in family housing for free	0.464*	0.464*	0.468*	0.376***	
	(0.209)	(0.205)	(0.184)	(0.139)	
Housing_type_Living in your own house/Other	0.998	0.998	1.135	1.165	
	(0.412)	(0.185)	(0.204)	(0.223)	
Employment_status_Not self-employed	1.718	1.718	1.997		
	(1.645)	(2.309)	(2.437)		

Appendix 3 – continued.

Main_occupation_On-selling	2.528*	2.528***	2.603***	1.976**	
	(1.320)	(0.527)	(0.504)	(0.608)	
Main_occupation_Production of goods/Other	2.165	2.165	2.228*	1.695	
	(1.622)	(1.021)	(1.052)	(0.687)	
Health_problems_Minor/Strong heath problems	1.938*	1.938*	2.011*	1.922**	
	(0.698)	(0.722)	(0.765)	(0.593)	
Level_of_education_Primary	1.840	1.840	2.020		
	(1.454)	(2.169)	(2.253)		
Level_of_education_JSS/JHS/Middle School	1.457	1.457	1.601		
	(1.196)	(1.261)	(1.334)		
Level_of_education_Secondary/vocational/technical/com	2.301	2.301	2.585		
	(2.146)	(2.287)	(2.515)		
Level_of_education_Tertiary, university graduate	0.500	0.500	0.722		
	(0.585)	(0.677)	(0.945)		
Income_volatility_Little volatility	9454958.000***	9454958.000***	5827024.000***	5392843.000***	
	(14800000.000)	(9325882.000)	(7143987.000)	(8835741.000)	
Income_volatility_Strong volatility	6031196.000***	6031196.000***	3596522.000***	3798558.000***	
	(9562575.000)	(6412996.000)	(4558067.000)	(6590799.000)	
Amount_of_savings_self_reported	1.000	1.000	1.000		
	(0.000)	(0.000)	(0.000)		
Number_of_MFIs_crossborrowing	1.511	1.511	1.556		
	(0.768)	(0.999)	(0.932)		
Total_amount_of_debt_disbursed	1.000	1.000	1.000		
	(0.000)	(0.000)	(0.000)		
Average_maturity_weighted	1.074*	1.074**	1.056*	1.057	
	(0.045)	(0.035)	(0.034)	(0.041)	
Group_or_individual_customer_ran	0.644	0.644	0.835		
	(0.255)	(0.173)	(0.325)		
General_fairness_of_MFIs_rank	0.783*	0.783	0.770*	0.795*	
	(0.109)	(0.119)	(0.111)	(0.094)	
Interaction_gender_with_loan_use			0.364***	0.314***	
			(0.065)	(0.090)	
Interaction_methodology_with_loan_use			0.457		
			(0.290)		
Main_lender_MFI 2	1.355	1.355**	1.260	1.560***	
	(0.663)	(0.161)	(0.179)	(0.159)	
Main_lender_MFI 3	1.289	1.289	1.240	1.494***	
	(0.753)	(0.293)	(0.239)	(0.222)	
Main_lender_MFI 4	2.082	2.082**	2.091**	1.787***	
	(1.001)	(0.640)	(0.632)	(0.395)	
Main_lender_MFI 5	1.235	1.235	1.260	1.277**	
	(0.593)	(0.281)	(0.290)	(0.159)	
Constant	0.000***	0.000***	0.000***	0.000***	0.380*
	(0.000)	(0.000)	(0.000)	(0.000)	(0.190)
Observations (N)	401	401	401	414	417
Pseudo R^2	0.2241	0.2241	0.2347	0.2196	0.1332
Nagelkerke's R^2	0.3370	0.3370	0.3509	0.3311	0.2107

Odds Ratios. Robust Standard Errors in parenthesis. Standard Errors for models 2-4 clustered by Main_lender_among_my_MFIs
, ** and * denote significance at the 10% 5% and 1% level.*
For each categorical variable we have dropped one reference category, i.e. the first category according to table 2.

Appendix 4: Logistic regression on a binary indicator of delinquency

Dependent variable: Delinquency (dummy)	**(1)**	**(2)**	**(3)**	**(4)**	**(5)**
Average_monthly_income	1.077	1.077	1.060	1.077	0.962
	(0.111)	(0.124)	(0.108)	(0.111)	(0.060)
Total_assets_in_thds	0.981	0.981	0.979	0.981	0.991
	(0.017)	(0.017)	(0.019)	(0.017)	(0.009)
Unexpected_expense_shocks	0.990	0.990	0.991	0.990	0.996
	(0.007)	(0.010)	(0.010)	(0.007)	(0.003)
Expected_expense_shocks	1.002	1.002	1.002	1.002	0.999
	(0.008)	(0.006)	(0.006)	(0.008)	(0.003)
Unexpected_income_shocks	1.017***	1.017***	1.018***	1.017***	1.010***
	(0.005)	(0.006)	(0.006)	(0.005)	(0.001)
Loan_use:_At_least_one_non-productive_loan_use	1.291	1.291	1.083	1.291	1.139
	(0.621)	(0.702)	(0.760)	(0.621)	(0.376)
Returns:_Increase_not_sufficient_to_repay_loan	10.384**	10.384***	10.850***	10.717***	3.857***
	(10.793)	(4.615)	(4.797)	(5.046)	(0.903)
Returns:_No_permanent_increase_in_earnings	25.337***	25.337***	27.580***	20.623***	10.189***
	(25.580)	(21.229)	(21.263)	(13.022)	(7.691)
Returns:_No_investment	1.275	1.275	1.082	2.304	2.064
	(3.361)	(4.804)	(4.472)	(5.315)	(3.202)
Literacy:_Score_numeracy_test	1.045**	1.045***	1.046***	1.041**	1.031**
	(0.018)	(0.011)	(0.011)	(0.017)	(0.013)
Literacy:_Score_general_financial_literacy	0.978**	0.978*	0.979*	0.989	0.990
	(0.009)	(0.012)	(0.012)	(0.018)	(0.008)
Literacy:_Score_debt_literacy_test	0.980**	0.980***	0.980***	0.980***	0.991
	(0.009)	(0.007)	(0.006)	(0.006)	(0.005)
Constant	0.004*	0.004**	0.002**	0.003***	0.004***
	(0.013)	(0.010)	(0.006)	(0.003)	(0.004)
Controls	*Added*	*Added*	*Added*	*Added*	*Added*
Observations (N)	386	386	386	413	410
Pseudo R^2	0.4158	0.4158	0.4180	0.3069	0.1560
Nagelkerke's R^2	0.4781	0.4781	0.4804	0.3652	0.1919

Odds Ratios. Robust Standard Errors in parenthesis, for models 2-4 clustered by Main_lender_among_my_MFIs
, ** and * denote significance at the 10% 5% and 1% level.*
For each categorical variable we have dropped one reference category, i.e. the first category according to table 2.
Delinquency is a binary variable if a respondent was at least 1 day late on a loan at the day of the survey.