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

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**THE SACRIFICES OF MICROBORROWERS IN GHANA –
A CUSTOMER-PROTECTION PERSPECTIVE ON MEASURING OVER-INDEBTEDNESS**

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This paper measures the over-indebtedness of microborrowers in Ghana. It defines over-indebtedness from a customer-protection perspective, considering borrowers over-indebted if they continuously struggle with repayment and experience unacceptable sacrifices related to their debt. We find that 30% of borrowers in our urban African population of microborrowers are over-indebted. The paper provides a detailed analysis of the sacrifices borrowers experience. In a second step, it tests the risk-management indicators of debt problems as predictors of the customer-protection measurement of over-indebtedness. Over-indebtedness is strongly related to delinquency and to the debt-to-income ratio but not to total debt amounts or to multiple borrowing. We construct a model that correctly predicts 72.6% of cases. However, even the best indicators for over-indebtedness identify only a small portion of cases of over-indebtedness. To protect customers from unacceptable struggles, the industry needs to measure customer experiences directly. Sound risk management is not enough to protect customers against over-indebtedness.

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1. Introduction

Microfinance – the provision of financial services to the poor – has been celebrated for its potential to reduce poverty while simultaneously being financially sustainable or even profitable. However, a number of crises in the industry have recently threatened both financial sustainability and the industry’s social reputation.

There are concerns about microfinance institutions drifting away from their original social mission (Armendáriz & Szafarz, 2011; Labie, 2007; Mersland & Strøm, 2010). Increasingly rigorous impact studies are questioning the original impact and poverty alleviation claims of microfinance (Banerjee, Duflo, Glennerster, & Kinnan, 2009; Karlan & Zinman, 2010). Some microfinance markets have clearly overheated (Chen & Rasmussen, 2010), with Andhra Pradesh in India representing the most blatant example. After a decade of focusing on commercialization, the microfinance industry is currently undergoing a turn-around: client-focused products and services have moved back into the spotlight and customer protection has become the industry’s primary concern. Given the risks to the social impact of microfinance as well as to institutional sustainability, protecting customers against over-indebtedness has become the top priority.

However, there is no data on the extent of over-indebtedness. Although some national or sub-national markets in India, Bosnia, Pakistan, Nicaragua and Morocco (and earlier, Bolivia) have clearly suffered from client over-indebtedness, there remains immense uncertainty regarding the extent of over-indebtedness in global microfinance. Moreover, there is no accepted indicator to measure over-indebtedness. While previous over-indebtedness indicators come mainly from the risk management perspective of avoiding delinquency, for purposes of customer protection the industry needs to develop indicators that recognize debt problems before customers become delinquent, but rather when they struggle with their debt to an unacceptable extent.

Therefore, this paper deploys a definition of over-indebtedness that is appropriate for customer protection purposes: “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”.¹ This is the first study to measure over-indebtedness from the customer protection perspective, i.e. a welfare perspective rather than an economic perspective. It pin-points the debt struggles of microborrowers in an urban African setting, and it reveals that even in markets with

¹ See Schicks (forthcoming) for the details of this definition and for how to measure it in practice. Also see figure 1 in section 2.

good repayment performance, microborrowers might suffer from excessive struggles to repay their debt.

Additionally, this study evaluates the relationship between existing risk management indicators of over-indebtedness and over-indebtedness based on customer sacrifices. It evaluates the measurements of over-indebtedness that are commonly used in consumer finance in developed countries (Betti, Dourmashkin, Rossi, & Yin, 2007; Vandone, 2009), examining the relationship of delinquency, debt amounts and the debt-to-income ratio to excessive sacrifices. It also considers indicators specifically suggested in microfinance (Guérin, Roesch, Héliès, & Venkatasubramanian, 2009; Krishnaswamy, 2011; Morvant-Roux, 2009; Roesch & Héliès, 2007), exploring the correlation between cross-borrowing and undue sacrifices.

The research is based on an extensive customer survey of 531 microborrowers in the Ghanaian microfinance market of Accra. The respondents represent a random sample of microdebtors from five of Ghana's most important microfinance institutions (MFIs). The survey includes demographic and loan data, as well as detailed information on the experience of borrowers with their loans. In addition, the participating MFIs have contributed loan information from their MIS. 10 qualitative interviews with over-indebted borrowers contribute detailed insights into the experiences of microborrowers who are struggling with their debt.

This study is the first to quantify over-indebtedness in Ghana. It reveals that 30% of the sampled microborrowers in Ghana experience unacceptable sacrifices related to their debt. The paper develops a model of over-indebtedness that correctly predicts 72.6% of the cases.² On the respondent level, the best risk management indicators of extreme borrower sacrifices are delinquency and the debt-to-income ratio. On an aggregate level, a debt-to-income ratio of 50% is the best indicator predicting the level of over-indebtedness in the sample. However, as expected, the predictive power of even the best indicators remains limited. Because there are many borrowers that make unacceptable sacrifices to avoid delinquency, debt problems do not always manifest in arrears. A delinquency indicator alone recognizes only around 5% of the over-indebted cases. A debt-to-income ratio of 50% correctly recognizes only 11% of the over-indebted cases.

Our findings challenge conventional wisdom concerning over-indebtedness. The common risk management indicators for over-indebtedness are not appropriate to indicate the suffering of

² In this paper, the term "prediction" refers to the ability of easily available indicators to foretell, i.e., "predict", how much over-indebtedness one would find in a sample if the survey data was available that is required to measure over-indebtedness precisely. The paper takes the perspective of MFIs and regulators that have access to data as commonly provided by the lenders' MIS. Prediction does not refer to an inter-temporal prediction of trends but to the prediction of the results a more precise measurement would deliver.

borrowers. From a customer protection perspective, the argument that high repayment rates or low levels of multiple borrowing prove the absence of over-indebtedness is invalid. Sound risk management by MFIs does not guarantee strong customer protection.

The following section develops the hypotheses which common risk management indicators might predict borrower sacrifices. Section 3 presents the empirical data. Section 4 provides unprecedented insight into the sacrifices that microborrowers make related to their loans. It analyzes the frequency of each sacrifice and describes how microborrowers perceive that burden. Section 5 develops the quantitative methodology. This section regresses the indicators that are potential predictors of over-indebtedness on the sacrifice-based over-indebtedness measurement. Section 6 offers a conclusion and develops recommendations.

2. Predicting over-indebtedness

This paper responds to the need to measure over-indebtedness from a customer protection perspective. It acknowledges that client protection must understand over-indebtedness in terms of harm to borrowers. We cannot reduce over-indebtedness to issues of repayment performance and thus harm to lending institutions. There is a need for an interdisciplinary rather than purely economic approach.

However, measuring borrower sacrifices requires survey work. If the customer protection and thus welfare perspective and the risk management and thus economic perspective correspond sufficiently, then risk management indicators that are easier to track for MFIs and policy makers can act as predictors of the sacrifice-based over-indebtedness concept. If the two perspectives are substantially different, this entails policy implications for regulators as well as investors and MFIs that want to avoid harm to clients but have so far looked at over-indebtedness through the lens of risk management indicators. In the latter case, investors and MFIs have not been measuring what they are trying to manage.

A priori, borrower sacrifices being a form of debt problems, we expect the common indicators of debt problems in the literature to at least partially predict over-indebtedness in terms of borrower sacrifices. The most basic indicator of debt problems in the literature is the amount of debt a borrower holds. Sharma and Zeller (1997) and Godquin (2004) in Bangladesh and Vogelgesang (2003) in Bolivia all find that larger loans per microborrower are positively related to repayment irregularities. Betti, Dourmashkin, Rossi, and Yin (2007) list the stock of debt per capita as one of the main indicators of consumer over-indebtedness in developed countries. Moreover, a study by

Brown, Taylor, and Wheatley Price (2005) indicates that in Britain higher amounts of debt are negatively related to an individual's level of psychological well-being. This finding could also apply to microfinance environments, and psychological well-being is most likely related to borrower sacrifices. Hypothesis 1 therefore postulates a relationship between absolute debt amounts and over-indebtedness. As the total burden of the loan is more likely to have caused sacrifices than the remaining loan balance at the time of the interview (which might have taken place at the end of the repayment schedule), we measure debt amounts in terms of the original loan size at disbursement.³

H1: Larger absolute debt amounts are positively related to over-indebtedness.

Depending on their financial and household situation, borrowers vary significantly in their capacity to handle debt. The indicators of absolute debt amounts do not take these differences into account. It is therefore common in the consumer finance literature to use the ratio of a borrower's debt burden relative to his or her financial capacity as an indicator of debt and repayment problems. The most common measure is a borrower's monthly repayment burden related to monthly income (Betti et al., 2007; Rinaldi & Sanchis-Arellano, 2006). One study even finds a relationship of the relative debt burden to subjective measures of debt as a burden (Del-Río & Young, 2005). Microfinance-specific research equally uses debt-to-income ratios as measures of over-indebtedness (Collins, 2008; Maurer & Pytkowska, 2011) and confirms that the debt-service ratio is correlated with subjective debt stress (Krishnaswamy, 2011).⁴

H2: The debt-to-income ratio as a measure of debt burden relative to financial capacity is positively related to over-indebtedness.

In microfinance, where credit bureaus are rare and MFIs often do not know if their loan applicants already have other outstanding loans, scholars assume that over-indebtedness is related to the number of loans a borrower holds (Chaudhury & Matin, 2002; Matin, 1997; McIntosh & Wydick, 2005; Paxton, Graham, & Cameron, 2000; Vogelgesang, 2003). The phenomenon of one borrower holding several debt contracts at the same time is called "multiple borrowing". Over-indebtedness is especially likely to be linked to cases where borrowers exploit information asymmetries to borrow

³ Disbursement information is also more correct and complete as many borrowers do not know the current amount of their outstanding debt.

⁴ Another measure of relative debt burden would be the debt-to-asset ratio. However, this measure is less relevant in a low-asset environment such as microfinance. Also, assets are mostly illiquid and do not facilitate repayment. We have tested the indicator in our main model and while it does not change the other findings the debt-to-asset ratio itself is not significant.

from several lenders in parallel, rather than to cases of one MFI extending e.g. an investment loan and a working capital loan to the same person. While scholars do not always distinguish between the two, the phenomenon of one person accumulating debt from several institutions at the same time is more precisely termed “cross-borrowing”.

H3: Cross-borrowing is positively related to over-indebtedness.

Finally, delinquency is a common indicator of debt problems, the fact of repaying a loan later than it is due or in the worst case not repaying all or part of it at all (Godquin, 2004; Kappel, Krauss, & Lontzek, 2010; Vogelgesang, 2003). Delinquency or default represent the usual risk management definition of over-indebtedness, and a standard criterion of over-indebtedness in regulatory frameworks. Given that the sacrifices borrowers make due to difficulties in meeting their repayment obligations are not always sufficient to ensure repayment, the sacrifices are likely related to actual delinquency evident in the portfolio quality of MFIs. Delinquency represents a late stage manifestation of debt problems.

H4: Delinquency is positively related to over-indebtedness.

Each of the above indicators has its challenges. Absolute amounts do not consider the variations in borrowers’ repayment capacity. The ratios of debt burden to income hardly take into account the wide range of individual circumstances that determine the share of income a borrower can free up for repayment purposes. Cross-borrowing may not necessarily be a sign of over-indebtedness but also result e.g., from the usual liquidity management practices of the poor or from product limitations and credit rationing at MFIs (Gonzalez, 2008; Guérin, Roesch, Venkatasubramanian, & Kumar, 2011; Krishnaswamy, 2011). The relationship of cross-borrowing to debt problems might therefore only be significant at high (and thus unhealthy) levels of cross-borrowing. Delinquency can result from fraudulent behavior rather than from over-indebtedness. At the same time, over-indebted borrowers might incur significant suffering in repaying their loans and, as a result of these struggles, might manage to avoid delinquency. Section 4 reveals that many more customers suffer in making their loan repayments than actually pay late.

Also, so far, the above indicators have mostly been used and tested from a risk management perspective. They have not yet been tested as predictors of over-indebtedness in the form of borrower sacrifices. As a result, this paper expects the quality of risk management indicators in approximating over-indebtedness to be limited. In fact, the literature that views debt problems

through the lens of repayment performance is likely to have created an over-reliance on the indicators tested in this paper. These indicators might very well explain part of the phenomenon of borrower struggles, but they have probably underrepresented the dimension of customer protection in the favor of risk management.

H5: The risk-management indicators of over-indebtedness tested in H1 to H4 have a low predictive power of over-indebtedness defined through a customer protection lens of borrower sacrifices.

The following sections will use our unique data set from Ghana to empirically test the above hypothesis. They will reveal to what extent the existing risk management indicators are sufficient to represent the customer protection perspective of avoiding unacceptable levels of sacrifice among microborrowers.

3. The data: An in-depth survey in urban Ghana

According to the MIX market⁵, the Ghanaian microfinance sector experienced a major growth period between 2001 and 2007, with a Compound Annual Growth Rate (CAGR) of 173% on gross loan portfolio and 48% in terms of active borrowers. With time, concerns about increasing competition between microlenders and potential over-indebtedness risks started to emerge (Grammling, 2009; Steel, 2010). However, growth slowed down and became negative for the period 2007 to 2010, with a -19% CAGR on gross loan portfolio and -14% on the number of borrowers. As of 2010, the industry served 194,786 active borrowers with a gross loan portfolio of USD 71.7 million. In addition, Ghana has an active microsavings offer, with a total of 488.633 million depositors and USD 62.0 million in deposits outstanding in 2010.

Compared to other countries, the market penetration of microfinance in Ghana is still low. Even at the industry's peak in 2009, only 9% of Ghana's working age population below the poverty line were using microloans, compared to 13% in Mexico, 14% in Kenya, 21% in Ecuador, and 51% in Mongolia or Azerbaijan.⁶ A study comparing 12 countries for the purposes of developing an over-

⁵ www.mixmarket.org. This website provides self-reports of limited liability but, given the lack of more reliable data sources, is sufficient for the purposes of this sector overview. Part of the decline in recent years might be due to a reduction of MFIs reporting their data to the MIX Market.

⁶ Rough estimates based on MIX market and CIA World Fact Book data. They do not take into account the coverage of a population by the formal financial sector, nor adjust for the borrower overlap between reporting institutions.

indebtedness early warning index finds that Ghana has the lowest microfinance market penetration rate of all countries in the sample (Kappel et al., 2010). A recent representative survey on financial access in Ghana finds that 44% of Ghanaians older than 18 use no financial products, neither formal nor informal. In the area of Greater Accra, where our study was conducted, this group of the unbanked still amounts to 31% of the population (Finmark Trust, 2010). The overall financial access in Ghana (including informal access) is thus lower than in Namibia or Botswana but higher than in Nigeria, Kenya or Uganda.⁷

In spite of the growth and chances for saturation at some point, Steel (2010) concludes that there is still a demand gap and ample room left for growth in the Ghanaian microfinance industry. Finally, the MFIs in our sample are the best institutions in the market.⁸ They are following careful and restrictive lending practices, routinely reducing loan sizes compared to applications. Moreover, they mostly stick to the old paradigm of (officially) lending for productive use only. As a result, our sample can be considered roughly representative of a ‘normal’ microfinance market that is experiencing competition but is not in crisis at the moment.

In cooperation with the Smart Campaign hosted by ACCION International, a global effort to unite microfinance leaders around a common set of client protection principles, and with the Independent Evaluation Department of KfW Entwicklungsbank, the German development bank, we have conducted an in-depth survey among 531 microdebtors. Borrowers were sampled from five of Ghana’s leading microfinance institutions: ProCredit Ghana, Opportunity International Ghana, Sinapi Aba Trust, EB-ACCION and Advans Ghana. Among all the MFIs reporting to the MIX Market in 2010, these MFIs account for 83% of microborrowers in Ghana (43% in 2009) and for 95% of Ghana’s gross microloan portfolio (43% in 2009). The respondents represent a random sample from the institutions’ microborrowers in Accra, the heart of Ghana’s microfinance industry.⁹ To balance their expected lower response rate and to ensure sufficient data points and variation of customers in serious problems with their loans, we oversampled delinquent customers.¹⁰ We used sample weights to correct for this bias and for a variation in response rates between lending institutions, delinquency status, and lending methodology. There were no corrections required for

⁷ Data from Ghana and Nigeria are from 2010. For Botswana, Kenya and Uganda data is from 2009, and for Namibia from 2007.

⁸ Given the high quality of the lending institutions that contributed to our sample, we consider the amount of over-indebtedness identified by this study as a lower estimate. Customers of weaker MFIs are likely to be selected less carefully and to experience more multiple borrowing, delinquency and sacrifices.

⁹ To apply a common threshold for micro- and SME-borrowers across all MFIs, we consider as microborrowers all customers with active personal loans below 5000 Ghana Cedis (GHC; 1 GHC=0.7 USD). For most MFIs in the sample, all of their borrowers fall into this category. In the sample, 87% of the disbursed loan amounts are less than 2000 GHC.

¹⁰ With some MFIs, over-sampling for groups implied over-sampling delinquent groups rather than individuals.

disparities in gender. Table 1 provides an overview of the sample characteristics.¹¹ To encourage honest replies, interviews were conducted anonymously at a site of the respondent's convenience, independent of the MFIs.

<insert table 1 about here>

In addition to socio-demographic and economic information, as well as the details of all the respondents' formal or informal loans that were outstanding at the time of the interview, the questionnaire obtained information on the sacrifices the borrowers experienced related to their loans over the course of one year. Without any influence of the interviewer, respondents answered first with the sacrifices that came to their mind. In a second step, the interviewers checked for additional sacrifices using a pre-defined list based on sacrifices identified in the interdisciplinary literature by e.g., (Brett, 2006), Corbett (1988) and (Rahman, 1999), and then piloted in Ghana (see Appendix for list of sacrifices). On an individual basis, the respondents indicated how many times they experienced each of the sacrifices¹², and they weighted sacrifices subjectively by how acceptable the experience was, given the purpose of the loan.¹³ 'Cutting down on food' could therefore be acceptable for one person (e.g., if it meant substituting meat for cheaper food), while for another borrower it would be unacceptable (e.g. because it implied going hungry on a single meal per day).

Based on this sacrifice data, all respondents enter the funnel displayed in figure 1. Borrowers are considered over-indebted only if they meet all criteria in our sacrifice-based over-indebtedness definition, i.e., they struggle to repay on time, they make unacceptable sacrifices and these unacceptable sacrifices occur repeatedly. Given the short-term orientation of microloans and the severe consequences of sacrifices even over short periods of time, we employ repetition as the criterion for debt problems being of a structural nature. For severe sacrifices such as assets seizures, loan recycling, and selling or pawning one's assets, a single unacceptable experience is a sign of structural debt problems. These sacrifices typically occur only once per loan, but they nevertheless have effects that persist over a longer time. A seizure occurs only after permanent delinquency;

¹¹ As the research methodology relies on self-reports, the statistical data regarding the borrowers' economic situation is subject to limitations. Besides questions of honesty, the respondents often experience difficulty estimating the monetary value of their assets and their average incomes, given the volatility of such 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. We have analyzed the key variables such as debt-to-income ratio, total assets and debt outstanding for outliers and there are no outliers to be excluded.

¹² "Once in past year", "1-3 times in past year", ">3 times but not often", or "Frequently in past year". 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.

¹³ "Easily acceptable", "Only just acceptable", "Not really acceptable", or "Not acceptable". In this paper we summarize the first two categories under "acceptable" and the latter two under "unacceptable" or "not acceptable".

taking new loans to repay old ones or selling assets usually augments repayment capacity for several installments and represents a long-term cost for the borrower.¹⁴

<insert Figure 1 about here>

To avoid the possibility that the econometric results in section 5 might depend on the threshold set by our over-indebtedness definition, we develop an alternative measure of borrower sacrifices as a robustness check that is free of any threshold. We construct a discrete score of sacrifices from zero to 71: Each sacrifice a borrower has experienced is recorded with two to eight points, depending on the frequency and acceptability of the experience. The harder a sacrifice was to accept and the more frequent the experience, the more it increases the score. This measurement of sacrifices is independent of any definition of over-indebtedness. The downside of the sacrifice score is that it does not differentiate between loans that require an acceptable level of sacrifice from borrowers and those that require serious debt struggles. Customer protection does not aim to prevent any sacrifice but to prevent unacceptable levels of sacrifice. Even if working with a binary variable entails losing information, the sacrifice score therefore remains a robustness check only.

4. The sacrifices of microborrowers

This section reveals to what extent the microborrowers in our urban Ghanaian sample struggle with their debt. It quantifies the level of over-indebtedness according to our customer protection definition of over-indebtedness. The section provides a detailed analysis of the sacrifices borrowers encounter and of the frequency of the various sacrifice experiences. It shows which sacrifices the average borrower perceives as most severe.

In spite of the low level of delinquency (see table 1), repayment struggles are very common among Ghanaian microborrowers. In our sample, only a quarter (26%) of the microborrowers report that they are not struggling with their loan repayments. Some of these respondents report that they make certain sacrifices for their repayments but they do not consider them a serious struggle. 31% of borrowers struggle with an installment once in a while, and 43% struggle regularly or at (almost) every single installment. According to the detail of sacrifices that respondents described during the

¹⁴ The measurement only counts unacceptable sacrifices and thus does not include assets sales or loan swaps that borrowers simply employ as liquidity management tools. Nevertheless, the calibration of this measurement might have to be different in a different cultural context.

interviews, respondents on average did not overstate their struggles or sacrifices but rather had a high tolerance for sacrifice and a tendency to underreport their personal hardships.¹⁵

Struggles with debt as such are not a sufficient indicator of over-indebtedness. However the sacrifices of borrowers in our sample indicate that, according to the customer-protection definition of over-indebtedness, over-indebtedness in Ghana is substantial. One third of microborrowers meet all three criteria of over-indebtedness as specified in our sacrifice-based definition: they struggle to repay their loans on time, they experience unacceptable sacrifices, and this experience can be considered structural on the grounds of repetition or of the sacrifices' longer-term impact (as in the case of seizures, assets sales and loan recycling). As seen in table 2, the level of over-indebtedness among the microborrowers in our urban Ghanaian sample is at 30%.

<Insert Table 2 around here>

This confirms the implicit knowledge of MFI managers and loan officers in Ghana who have indicated their impression that there might be over-indebtedness in the Ghanaian microfinance market. However, their concerns had never been confirmed or quantified to date. Our empirical findings also highlight that the phenomenon of over-indebtedness is not limited to crisis markets. From a customer protection perspective, over-indebtedness also exists in non-crisis environments such as Ghana.

These findings relate to but do not measure the impact of microcredit. The borrowers report only sacrifices that they perceive as related to their repayment obligations. However, this does not automatically imply causality. It is normal for cash demands to represent a difficulty for the poor, yet loan impact may still be positive.

<Insert Figure 2 around here>

Analyzing the sacrifices of microborrowers in more detail, we find that, collectively and on average, microborrowers act according to the assumptions of rational behavior: most frequently, they make those sacrifices that they experience as the least costly. Figure 2 displays this almost linear relationship between the prevalence of the various sacrifices among microborrowers and the perceived acceptability of sacrifices. On the X-axis sacrifices appear ranked by their prevalence among all respondents in the sample. The most prevalent sacrifices are those that only a few of those borrowers who experience the respective sacrifices perceive as unacceptable. The more sacrifices seem unacceptable to the average borrower, the less common they are; this is most likely because

¹⁵ In addition, triangulating the survey data on delinquency and multiple borrowing with the objective information from the participating MFIs' management information systems (MIS) indicates that borrowers' self-reports were mostly honest.

borrowers first prefer to employ easier coping strategies first and avoid the hardest sacrifices by all means.

Table 3 presents the sacrifices of microborrowers in more detail. The sacrifices are again ranked by their prevalence in the total sample. This reveals the distinction of four categories of sacrifices grouped according to their prevalence and acceptability. Borrowers most frequently work more than usual (61% of total sample), postpone important expenses (45%) and, if available, deplete their savings (34%). Only a little more than a third of the borrowers who make these sacrifices consider them unacceptable. These are probably the more severe cases of these sacrifices, such as working at times of serious illness or in dangerous environments or where fundamental expenses for housing and daily survival cannot be met. Apart from these exceptions the borrowers are very willing to sacrifice for example some free time or some consumption for the purpose of repaying their loans. Thus, these minor sacrifices, when acceptable, represent adequate coping strategies and do not constitute signs of over-indebtedness. The sacrifice-based definition of over-indebtedness only takes unacceptable and structural sacrifices into account.

With the exception of the depletion of savings (29%), sacrifices in this first category usually become frequent experiences to those that go through them once. They represent the typical coping strategies that borrowers employ on a regular basis (71% for working more and 60% for postponing expenses). The frequency of depleting savings is probably simply limited by the lack of savings once depleted.

<Insert Table 3 around here>

The second category of sacrifices consists of those sacrifices that each affect between 10 and 20% of borrowers and that are unacceptable to most respondents. Microborrowers reduce their food (18%), rely on friends or family to help them out (13%) and suffer from psychological stress (10%). Between 70 and 80% of borrowers who experience these sacrifices rate them as unacceptable. Nevertheless, once this stage of debt problems is attained, food reductions (62%) and psychological stress (52%) tend to become repeated experiences. The frequency of relying on external support (21%) is most likely limited by the support's availability. Guérin, Roesch, Venkatasubramanian, and Kumar (2011) note the high cost of family support in India, where kin debts form part of the most severe debts. The low acceptability of the sacrifice of relying on support by friends and family in Ghana confirms the findings of Guérin et al. in the Ghanaian cultural context.

A third category of sacrifices is much less prevalent, but is unacceptable to almost all borrowers (80%-90%) if it occurs. These sacrifices are reductions in education, e.g., removing children from school (5% of borrowers), trying to keep up repayments on one loan by taking on a new debt

obligation (4%), and selling or pawning assets (4%). Once this stage of sacrifice is reached, for some but not for the majority of borrowers, loan recycling or assets sales become repeated experiences (49% and 38% respectively). Probably, single experiences of these sacrifices already facilitate several periods of repayment at once. The cuts to education rarely occur more than three times (13%).

Finally, the most severe experiences from the perspective of borrowers are experiences of threats or harassment (3% of borrowers), of shame or insult (3%) and of asset seizures (1%). These sacrifices are unacceptable to all borrowers who have experienced them. This subjective evaluation of the severity of sacrifices indicates that a borrower's reputation and personal honor might be more important than monetary privation and material sacrifices. The numbers of observations for these items are too low to make qualified statements about their repetition, but they tend to occur less frequently than most other sacrifices. A repeated seizure happened in only a single case.

The data also allows us to analyze how the borrowing experiences of women differ from the sacrifices of men (table 4), and how group lending customers differ from borrowers in the individual lending methodology (table 5). The sample size and the high number of sacrifices do not always allow for statistically significant findings. However, based on a chi-square contingency analysis of gender differences, Cramer's-V (Backhaus, Erichson, Plinke, & Weiber, 2011) as a measure of association between sacrifices and gender is statistically significant with regards to loan recycling (8% of male borrowers experiences this sacrifice versus 3% of female borrowers), the selling or pawning assets (7% versus 3%), and the depletion of savings (39% versus 31%). Men resort to these solutions more often than women, which might be due to better economic/borrowing opportunities and to men's greater control of assets. Additionally, fewer women report experiences of threats and harassment (7% male versus 2% female). However, this difference in reporting might simply derive from women's different perception of their rights towards loan officers. In all cases, Cramer's-V is approximately 0.1, which indicates a relevant but rather low influence of gender on the prevalence of these sacrifices.

<Insert Table 4 around here>

Research on the effects and incentives of peer pressure suggests that group customers make high sacrifices to avoid being responsible for the delinquency of their group. In our sample, compared to individual borrowers, group customers are significantly more prone to depleting their savings (41% versus 28%), relying on the support of friends and family (18% versus 7%), and suffering psychological stress (11% versus 7%). They also sell or pawn their assets more often (7% versus 3%). Cramer's-V is low to moderate and the strongest influence of the lending methodology exists

with regards to support by family and friends (-0.17). While the enhanced prevalence of psychological stress rather points to the downsides of the group lending methodology of enhancing pressure on borrowers (rather as an incentive mechanism than as an advantage to customers), the higher reliance of group borrowers on support by friends and family might result inter alia from the better availability of support within the groups. To the extent that borrowers assess this support as acceptable it might thus partially be a positive effect of group lending.

<Insert Table 5 around here>

In sum, this section has revealed insights into the borrowing experiences of microfinance borrowers in urban Ghana. It identifies which sacrifices are most prevalent among microborrowers, which are most severe from the subjective perspective of the debtors and how frequently the average borrower experiences the various sacrifices. The majority of microborrowers work harder than usual to repay their loans. Many postpone important expenses. They usually consider these efforts absolutely acceptable. However, there are also borrowers who experience more severe sacrifices, from going hungry over taking their children out of school to selling their assets. The most painful and least frequent experiences are those of threats or harassment, shame or insults, and asset seizures. A few sacrifices differ in prevalence by gender and by lending methodology. Women reduce their food more often, while men more often result to external mechanisms such as asset sales and repeat borrowing. Group customers deplete their savings more often, suffer from psychological stress and rely on the help of friends or family.

The section finds that, from a customer protection perspective, 30% of borrowers in our urban Ghanaian sample are over-indebted. They struggle to repay their loans on time, and they make sacrifices that they experience as unacceptable, and that can be considered of a structural nature. The sample consists of borrowers from five of Ghana's largest and most professional MFIs. The over-indebtedness in our sample is therefore likely to represent a lower bound estimate for the total microfinance market of Accra.

5. Estimation and empirical results

The previous section has shown that a relevant share of microborrowers in Ghana experiences severe sacrifices related to their repayment obligations. Measuring over-indebtedness in terms of borrower experiences is therefore an important practical requirement to protect microborrowers. This section tests the hypotheses developed in section 2 to identify potential predictors for the sacrifice-based measurement of over-indebtedness that do not require survey work. It analyzes how the customer

protection (and thus welfare) perspective of over-indebtedness relates to the risk management (and thus economic) perspective.

Estimations

To test our hypotheses on the potential over-indebtedness predictors, we construct a logistic regression model that predicts our binary indicator of over-indebtedness based on severe sacrifices. We control for borrower characteristics and the main features of the respondents' loans. Asset, gender, maturity and lender controls follow the repayment focused regression analysis of Godquin (2004). Because Godquin had group borrowers only, we introduce an additional control for the lending methodology. As common determinants of repayment capacity in developed countries (Bridges & Disney, 2004), we add controls for age, household size, and income. Loan characteristics such as variations in interest rates, the type of group lending methodology, and the repayment schedule tend to vary on the institutional level. We therefore capture the influence of these loan features on over-indebtedness by means of our lender dummies.

For reasons of multicollinearity with our cross-borrowing indicator, we exclude control dummies for lenders other than our five partner MFIs. Instead, we use dummies only for the main lenders among our partner institutions in terms of loan size. This difference is negligible because only 3.6% of our sample indicated larger loans from non-partner institutions than from the partner MFIs. There is a risk of endogeneity with regards to delinquency in so far as delinquency can trigger sacrifices for borrowers but at the same time it may be the unbearable amount of sacrifices experienced that triggers an over-indebted borrower's decision to no longer pay on time. However, we do not analyze causality but are testing the quality of indicators as predictors of over-indebtedness. Neither endogeneity nor omitted variable bias affect our interpretation regarding the use of risk management indicators as predictors for over-indebtedness.

We test hypothesis 1 to 5 by estimating the following logit model:

$$O_i = \beta_0 + \beta_1 DA_i + \beta_2 DIR_i + \beta_3 CB_i + \beta_4 DE_i + \beta_5 Z_i + \beta_6 X_i + u_i \quad (1)$$

where for each respondent i , O_i is our binary measurement of over-indebtedness according to the sacrifice-based definition, DA_i is the amount of debt disbursed, DIR_i is the debt-to-income ratio, CB_i is cross-borrowing i.e., the number of loans from different lenders, and DE_i is delinquency, i.e. a dummy that takes the value one for a borrower who is in arrears of at least one day on an outstanding loan at the time of the survey. Z_i is a matrix of borrower-specific controls, and X_i represents the loan specific controls.

<insert table 6 about here>

Table 6 displays the logistic regression results in the form of odds ratios and robust standard errors in parenthesis. Column 4 shows the results for the main model including all controls. Across all models, the debt-to-income ratio (H2) is consistently significant and positive. In terms of marginal effects, a 1% increase in debt-to-income ratio for an average borrower corresponds to an increase of the probability of over-indebtedness by 0.002.¹⁶ Similarly, delinquency is positive and highly significant at the 1%-level in all models (H4). With all other factors equal at their means, the probability of over-indebtedness is by 0.313 higher if a borrower is delinquent. The number of lenders a borrower is indebted to (H3) is not a significant predictor of over-indebtedness. The absolute amount of debt disbursed to a borrower (H1) is only significant in the models without borrower controls. In the main model in column 4 and in the parsimonious model in column 5, the effect disappears. In sum, the debt-to-income ratio and delinquency (Hypotheses 2 and 4) are confirmed as significant predictors of over-indebtedness. Debt amounts and numbers of loans are not confirmed (Hypotheses 1 and 3). Further research should analyze however, to what extent debt amounts could work as predictors from the perspective of regulators and MFIs who may not have the data for borrower specific controls.

The main model in column 4 correctly predicts 72.6% of all cases. This is significantly greater than the 55 to 60% of cases that random selection predicts correctly at a predetermined level of 30% over-indebtedness. However, it is only marginally greater than the maximum random probability of 70% (Backhaus et al., 2011), and confirming Hypothesis 5, the predictive power of the models remains low with Nagelkerke's R^2 at approximately 10%. The sensitivity analysis below sheds more light on the schism between a highly significant correlation of predictors to over-indebtedness but low predictive power.

Robustness checks and further analyses

Additionally, we analyze the differences between male and female borrowers on the one hand and individual and group borrowers on the other. Table 7 indicates that both the gender and the lending methodology display differences. While high-level results remain the same, delinquency is a better predictor for female borrowers than for men, and the debt-to-income ratio is a better predictor for male borrowers. Also, for male borrowers the amount of debt disbursed becomes significant. According to the data in section 4, men resort to external sacrifices that require control over assets more often and may thus have more options to avoid delinquency. In line with these findings, the

¹⁶ See Appendix 2 for the marginal effects table that corresponds to the main model displayed in column (4).

link to economic indicators such as debt amounts and income may be more direct for men. Column 2 indicates similar differences between group and individual borrowers. Again, the findings of our main model remain robust. However, the debt-to-income ratio and total amount of debt are predictors only for group customers and delinquency is a significant predictor only for individual borrowers. The link between delinquency and over-indebtedness in groups might be weakened by the intermediation of group members. In cases of group solidarity or forced joint liability, the contributions of other group members might avoid formal arrears when a borrower is in trouble but the pressure on the borrower to reimburse his peers remains and can trigger additional sacrifices. Future research should further examine the differences identified in this section.

<insert table 7 about here>

As there are no standardized measurements for delinquency, we test the robustness of our findings to several alternative measurements for delinquency (see table 8). The most obvious delinquency measurement and the one we use in our main model, is that a borrower is currently in arrears: At the time of the survey he/she is at least one day late with at least one installment on an outstanding debt. We measure this indicator as a binary variable. However, the sacrifices a borrower reports might have been related to an instant of delinquency in the recent past. Therefore we also test a measure of delinquency over time rather than a spot indicator at the time of the interviews: We introduce an alternative binary variable if the respondent has been delinquent at any point over the course of their current loans. Finally, we test intensity measures of delinquency, i.e., being in arrears for a longer time or having been delinquent more frequently. As the latest stage and most severe indicator, we test default, approximated by experiences of assets seizures or forgiven loans.¹⁷

<insert table 8 about here>

Table 9 displays the effects of varying the measure of delinquency. In all models, the debt-to-income ratio and delinquency remain highly significant predictors of over-indebtedness. Cross-borrowing remains without effect. The total amount of debt remains insignificant with the exception of the model that uses default as the most severe delinquency measurement. Moreover, in column 2 of table 9 we cluster standard errors by lending institutions. Clustering standard errors has no impact on our findings and all results remain robust as discussed above.

¹⁷ Information for delinquency >30 days is not available but would be situated between the 1 week late and default indicator.

<insert table 9 about here>

Finally, to test the sensitivity of the above analysis to the dependent variable over-indebtedness, we run an ordinary least square regression of our predictors on a threshold-free score of sacrifices as a robustness check (2).

$$S_i = \beta_0 + \beta_1 DA_i + \beta_2 DIR_i + \beta_3 CB_i + \beta_4 IR_i + \beta_5 Z_i + \beta_6 X_i + u_i \quad (2)$$

where S_i is a discrete score of sacrifices from zero to 71, the score increasing with each additional sacrifice, with more frequent repetition of sacrifices, and with the subjective severity of sacrifices. The score of sacrifices makes it trivial to interpret coefficients because an increase of the score by one is a meaningless measurement to the reader. However, it avoids any potential arbitrariness of the over-indebtedness threshold and therefore provides a useful robustness check.

<insert table 10 about here>

Table 10 confirms that the debt-to-income ratio and delinquency are consistently highly significant across all models. Additionally, the total amount of debt disbursed to a borrower is now significant even in the full model although at a low level of confidence, and not in the parsimonious model. Interestingly, its coefficient is negative, which might indicate sound lending decisions at MFIs: larger absolute amounts are lent to those customers who have a higher capacity to repay and who will struggle less with installments. There is a need for further research to analyze the differences in the logit and OLS models with regards to debt amounts. Cross-borrowing remains insignificant and the predictive power of the model remains low.

Sensitivity analysis

Given that delinquency and the debt-to-income ratio have proven the best predictors of over-indebtedness among the tested indicators, even if their predictive power remains limited, we analyze the use of these indicators in practice. The next paragraphs analyze the number of cases each of these predictors individually can predict correctly. As all indicators of delinquency in table 9 provided similar results, we test the sensitivity of results to the alternative indicators. –Because delinquency in the sample is rather low, the various measurements of delinquency recognize only a small share of over-indebtedness – even if almost all delinquents and defaulters are rightly classified as over-indebted. Table 11 demonstrates that none of the indicators recognizes more than 21% over-indebtedness in the sample; in fact most measurements recognize significantly less than 10%. Most

measurements recognize only 1 to 5% of the over-indebted respondents correctly (maximum 9%). The correct prediction of approximately 70% of cases in the full sample is thus due to the large group of borrowers who are not over-indebted and to the high probability that a delinquent borrower is over-indebted. The majority of the over-indebted in contrast are not delinquent and the indicator does not recognize them.

<insert table 11 about here>

For the debt-to-income ratio, the threshold is more flexible. Table 12 indicates that a 10% threshold of the debt-to-income ratio recognizes a third of the over-indebted. However, because it does so by classifying a total of 89% of all borrowers as over-indebted, the threshold is not useful. The higher the threshold gets, the lower the share of the over-indebted that is correctly identified. At a threshold of 60%, only 7% of borrowers are still correctly classified as over-indebted, compared to approximately 30% that should be in this category. The best indicator to predict the overall level of over-indebtedness in the sample is a debt-to-income ratio of 50%. Considering every borrower with a higher than 50% debt-to-income ratio to be over-indebted approximates the level of over-indebtedness in the sample rather well at 28%. Nevertheless, in recognizing only 11% of those borrowers that are over-indebted correctly, this indicator does not work well to categorize individuals. Given the low effectiveness on the individual level, this threshold might not hold in other markets or future situations, even on the over-all sample level. More research is required to determine if a 50% debt-to-income ratio holds as a policy recommendation for regulators to determine the average level of over-indebtedness in a market.

<insert table 12 about here>

The empirical results in this section indicate that the debt-to-income ratio and delinquency are highly significant predictors of over-indebtedness from the customer protection point of view. In contrast, a borrowers' number of loans outstanding are not significant. Neither is the amount of debt disbursed to a borrower a consistently significant predictor of over-indebtedness. Based on the debt-to-income ratio, delinquency, and several controls on the borrower and institutional level we can correctly predict the over-indebtedness status of 72.6% of respondents. However, good prediction relies mainly on the large group of borrowers that are not over-indebted. It is improved by the small group of over-indebted borrowers who are already delinquent. Beyond that, on an individual level, neither the debt-to-income ratio nor delinquency are good measurements to identify who the over-indebted borrowers in the sample are. On an aggregate level, a debt-to-income ratio of 50% recognizes the

correct level of over-indebtedness in the population. This indicator requires further research. Further research is also required into the gender differences and the differences between group and individual borrowers.

6. Conclusion

Over-indebtedness is one of the major risks for the microfinance industry but there is hardly any research on its prevalence in microfinance markets, nor are there accepted indicators for measuring it. This paper has measured the over-indebtedness of microborrowers in urban Ghana, defining over-indebtedness from a perspective of customer protection, i.e., as an unacceptable level of sacrifices that borrowers experience related to their debt. It revealed that, in Accra, 30% of the borrowers of Ghana's top five microlenders are over-indebted, i.e., they structurally suffer from their debt at a level that they consider unacceptable. The study provided unprecedented insights into the sacrifices of these borrowers. It highlighted the most common and the most frequent sacrifices and it identified which sacrifices are the most difficult for borrowers to bear.

Additionally, the paper tested four potential predictors of this perspective on over-indebtedness, borrowing from the microfinance and consumer finance literature on debt problems. We consistently found that the debt-to-income ratio and delinquency are highly significant predictors of sacrifice-based over-indebtedness (H2 and H4 confirmed). The amount of disbursed debt is not consistently significant, and in our robustness check debt disbursed has a negative coefficient, possibly as a sign of the MFIs' sound lending decisions (H1 not confirmed). Cross-borrowing is not related to our measure of over-indebtedness (no confirmation for H3). Note that multiple and cross-borrowing are not significant predictors of delinquency either. It is possible that the relationship only comes into effect at extreme levels of multiple borrowing as in Maurer and Pytkowska (2011).

Our model correctly predicts 72.6% of cases. Nevertheless, we find hypothesis 5 confirmed that even those predictors that are highly significant at a one percent level recognize only a low share of over-indebtedness through the customer protection lens. A debt-to-income ratio of 50% is the best predictor of the aggregate level of over-indebtedness in a market. However, on an individual respondent level, it recognizes only 11% of the borrowers that are over-indebted correctly. Similarly, while almost all borrowers that are delinquent are equally suffering from severe sacrifices, the reverse does not hold true: there are many struggling borrowers who have not (yet) reached the stage of delinquency. Due to extensive sacrifice, many might never get to that stage. This analysis refutes the common argument that good repayment statistics prove the benefits of microloans to poor

borrowers and that they defy allegations of over-indebtedness in the sense of severe borrower sacrifices.

Over-indebtedness harms microborrowers before it affects the portfolio quality of lending institutions. The current focus of over-indebtedness research on risk management indicators is therefore inappropriate for customer protection purposes. The welfare perspective and the economic perspective of over-indebtedness are closely related but clearly separate. The microfinance methodology, praised for reducing the risk of lending to the poor and thus making them bankable, has not made risk disappear; it has shifted it from the portfolios of institutions to their vulnerable customers. To act on its claims of protecting clients, the microfinance industry needs to directly take the welfare perspective, the customer's point of view into account.

These findings result in policy recommendations for all actors involved in client protection-related activities, from MFIs to investors to regulators. The most basic and most important recommendation refers to the actors' frame of attention: risk management and portfolio quality measures do not represent an appropriate frame of attention for customer protection purposes. In the future, actors with a customer protection responsibility should measure over-indebtedness in terms of borrower experiences, even if that will require survey work. Future research should continue to identify predictors of the customer protection perspective on over-indebtedness that are less costly to measure. According to the Attention Based View (Ocasio, 1997), management's mere awareness of this schism is likely to have a significant impact on the everyday lives of customers on the ground. Examples of possible actions include a reduction in inappropriate marketing activities with regards to debt, and a relaxation of the zero-tolerance policy, thus increasing the flexibility in restructuring loans for borrowers undergoing honest temporary difficulties. Similarly, awareness of over-indebtedness risks might entail more careful lending decisions in cases where a borrower is likely to repay the lender (and thus contribute to his profit) but can most likely do so only at an unacceptable personal cost.

To balance the pressures for high disbursements and harsh collections, MFIs may introduce a customer satisfaction element to loan officer incentives. Loan officers should be incentivized not to hide borrowers' problems, but to reveal them before they reach the stage of delinquency. For details on the requirements of such incentives in terms of monitoring and hiring policies, see Agier and Szafarz (2011), who recommend similar incentives to counter borrower discrimination by loan officers. Consistent with the South African National Credit Act, by which lenders cannot collect on loans if they have not conducted an affordability assessment and their loan falls in the category of "reckless lending", MFIs could introduce ex-post bonus reductions for troubled loans: penalties

would apply to loans for which the loan officer could have anticipated that repayment would become too difficult for the borrower. Even though such individual measures may be useful, the Attention Based View suggests that complex phenomena such as client protection are best addressed by focusing attention on the phenomenon at hand. For example, MFIs could try to promote a strong organizational culture, which in our case would consist of a welfare orientation above economic efficiency and profits.

Similarly, regulators and investors should understand the need for customer protection that goes beyond ensuring stable financial institutions. A mix of regulation and self-regulatory codes of conduct is likely to be most effective. Donors should put as much focus on promoting the measurement of impact, of the welfare perspective, as they have put on economic self-sustainability and reliable economic performance measurements in the past. This study makes clear that in measuring the welfare perspective, the focus should not only be on positive impact. Instead impact measurement should explicitly consider the potential downsides of debt.

Government and regulators could also play an important role in developing systems of debt relief and personal insolvency. Such safety nets reduce borrower sacrifices. Even if, because of the potential for reasons of abuse, a legal over-indebtedness threshold cannot be based on the subjective borrower perspective, our study also has implications for the indicators regulators use for over-indebtedness. While delinquency and the debt-to-income ratio are the best indicators we identified, they do not represent the customer-protection perspective very well. Our sensitivity analysis of these predictors indicates that they correctly predict only a small share of over-indebted borrowers. A debt-to-income ratio of 50% predicts the aggregate level of over-indebtedness in a market, but this threshold might vary in other markets and it does not work reliably on an individual borrower level. It requires further research as do the differences between men and women and between group and individual borrowers.

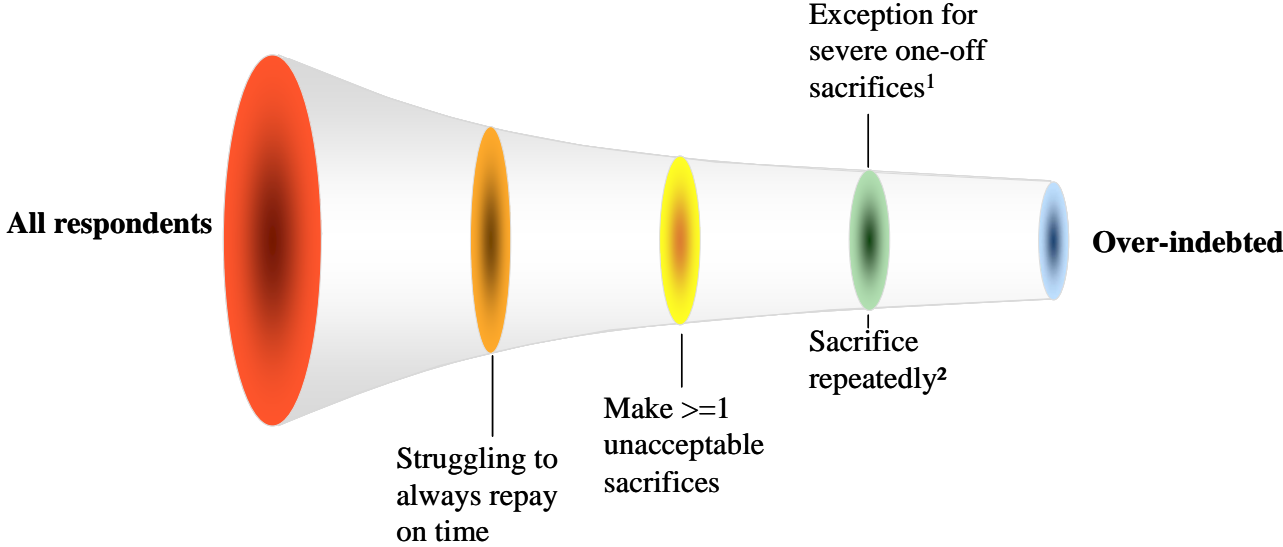
In general, the microfinance industry should measure customer satisfaction and impact as a standard management tool and place the same importance on these factors as it places on economic indicators. For more precise recommendations and for a better generalization of findings, similar studies should be repeated in other market environments. More potential indicators for over-indebtedness might have to be developed and tested.

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Figure 1: Measuring over-indebtedness by customer protection standards



1 No repeated experience required for unacceptable sacrifices of suffering an asset seizure, taking a new loan to repay, or selling/pawning assets
 2 Either >3 unacceptable sacrifices, or ≥ 1 unacceptable sacrifice made >3 times

Source: Schicks (forthcoming)

Figure 2: Prevalence and acceptability of sacrifices among microborrowers

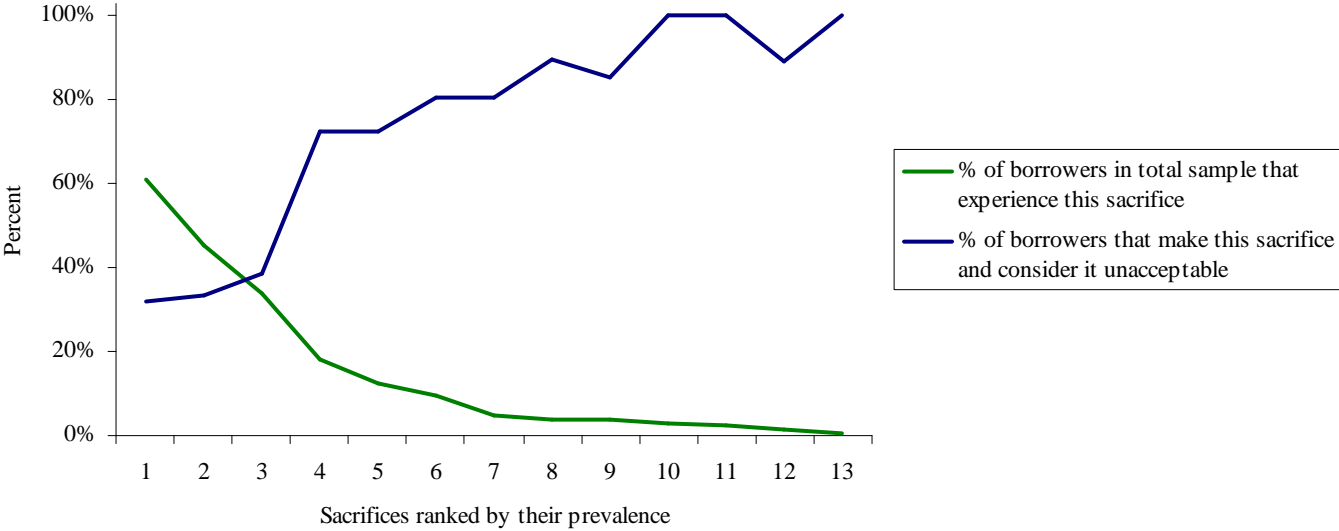


Table 1: Descriptive statistics of borrower sample

Variable	Units	Observations	Global Mean	Standard Deviation	Mean		T-test*	Chi-Square**
					Over-indebted	Not Over-Indebted		Cramer's V
Gender (F%)	Percent female	531	72.2	0.449	71.0	72.7	-	0.04
Age	Years	520	40.1	8.596	40.3	40.0	-0.34	-
Household_size	Number of persons	531	4.7	2.148	4.9	4.7	-1.21	-
Avg_monthly_income_approx_value	Ghana Cedis	530	645.1	575.481	544.8	687.8	2.75***	-
Total_assets	Ghana Cedis	524	14,997.1	21,908.090	11375.8	16500.2	2.87***	-
Average_maturity_weighted	Months	527	8.0	4.118	8.1	8.0	-0.12	-
Lending methodology (Group%)	Percent group	531	47.6	0.500	51.0	46.1	-	-0.05
Total_amount_of_debt_disbursed	Ghana Cedis	529	1,408.7	1,286.748	1339.7	1437.8	0.88	-
Debttoincome_ratio_flow	Percent	509	41.6	37.075	48.0	38.8	-2.32**	-
Number_of_MFIs_crossborrowing	Number of MFIs	531	1.1	0.282	1.1	1.1	-0.98	-
Delinquency_status_spot (Delinquent%)	Percent delinquent	518	7.0	0.256	13.8	4.2	-	0.16***
Delinquency_status_weeks	Weeks	518	0.2	1.243	0.6	0.1	-2.83***	-
Delinquency_status_whole_loan_term (Delinquent%)	Percent delinquent	522	21.3	0.410	31.4	17.2	-	0.16***
Aggregate_number_of_late_payments_all_loans	Number of payments	522	0.4	0.928	0.6	0.3	-3.34***	-
Default_over_year_rough_proxy (Default%)	Percent defaulted	529	0.9	0.096	2.7	0.2	-	0.15***

* T-test for equal means between over-indebted and not over-indebted group

** Contingency analysis in Stata is unweighted. We have checked weighted Chi-Square results with SPSS which implies no substantial changes to results

Table 2: The struggles and over-indebtedness of Ghanaian micro-borrowers

	Not struggling	Struggling but not over-indebted	Over-indebted	Total
Numbers of borrowers	137	236	158	531
Percent of borrowers	26%	44%	30%	100%

Table 3: Analysis of the sacrifices of microborrowers by prevalence, acceptability and frequency

Sacrifices	Numbers of borrowers	Percentage of borrowers in sample	Percentage of borrowers among those making this sacrifice that find it unacceptable	Percentage of borrowers among those making this sacrifice, that experience it more than 3 times
Work more than usual	325	61%	32%	71%
Postpone important expenses	240	45%	33%	60%
Deplete savings	179	34%	38%	29%
Reduce food quantity/quality	96	18%	73%	62%
Use family/friends' support	67	13%	72%	21%
Suffer psychological stress	51	10%	80%	52%
Reduce education	26	5%	80%	13%
Sell or pawn assets	21	4%	90%	38%
Borrow anew to repay	20	4%	85%	49%
Feel threatened/harassed	15	3%	100%	44%
Suffer from shame or insults	14	3%	100%	24%
<i>Other</i>	6	1%	89%	51%
Seizure of assets	4	1%	100%	24%

Table 4: Differences in sacrifices between male and female microborrowers

Sacrifices	% of Male	% of Female	Cramer's-V*
Work more than usual	57.4	60.1	-0.02
Postpone important expenses	41.3	45.5	-0.04
Deplete savings	38.7	31.1	0.07*
Reduce food quantity/quality	13.6	18.4	-0.06
Use family/friends' support	9.7	12.5	-0.04
Suffer psychological stress	10.3	8.2	0.03
Reduce education	3.9	4.8	-0.02
Sell or pawn assets	6.5	2.7	0.09**
Borrow anew to repay	7.7	2.9	0.11**
Feel threatened/harassed	7.1	1.9	0.13***
Suffer from shame or insults	3.9	2.7	0.03
<i>Other</i>	<i>1.3</i>	<i>1.1</i>	<i>0.01</i>
Seizure of assets	1.3	0.8	0.02

* Unweighted contingency analysis. We have checked weighted Chi-Square results with SPSS. The only relevant difference is that the difference for reducing food quantity/quality becomes significant at a 10% level. In turn, the difference in depleting savings is not significant.

Table 5: Differences in sacrifices between group lending customers and individual borrowers

Sacrifices	% of Individual	% of Group	Cramer's-V*
Work more than usual	58.3	60.7	-0.02
Postpone important expenses	42.6	46.6	-0.04
Deplete savings	27.9	41.1	-0.14***
Reduce food quantity/quality	16.4	17.8	-0.02
Use family/friends' support	7.1	18.3	-0.17***
Suffer psychological stress	7.1	11.4	-0.08*
Reduce education	3.5	5.9	-0.06
Sell or pawn assets	6.5	2.7	0.09**
Borrow anew to repay	4.8	3.7	0.03
Feel threatened/harassed	3.9	2.7	0.03
Suffer from shame or insults	2.6	3.7	-0.03
<i>Other</i>	<i>1.0</i>	<i>1.4</i>	<i>-0.02</i>
Seizure of assets	1.3	0.5	0.04

* Unweighted contingency analysis. We have checked weighted Chi-Square results with SPSS. The only relevant difference is that the difference for selling/pawning assets is not significant.

Table 6: Logistic regression on over-indebtedness

Dep. Var. Over-indebtedness	1	2	3	4	5
Total_amount_of_debt_di_in_hds	0.979** (0.010)	0.980 (0.015)	0.974** (0.010)	0.977 (0.015)	0.988 (0.010)
Debttoincome_ratio_flow	1.009*** (0.003)	1.011*** (0.004)	1.009*** (0.003)	1.011** (0.004)	1.010*** (0.003)
Number_of_MFIs_crossborrowing	1.552 (0.595)	1.294 (0.514)	1.877 (0.777)	1.406 (0.565)	
Delinquency_status_rank	3.453*** (1.213)	3.646*** (1.439)	3.583*** (1.231)	3.819*** (1.500)	3.599*** (1.289)
<i>Controls</i>					
Gender_rank		1.042 (0.273)		1.087 (0.284)	
Age		0.999 (0.014)		0.998 (0.014)	
Household_size		1.109* (0.061)		1.098* (0.060)	1.097* (0.054)
Avg_monthly_income_ran		0.997 (0.057)		0.992 (0.060)	
Total_assets_in_thds		0.988** (0.006)		0.988** (0.006)	0.986** (0.006)
Average_maturity_weighted		1.033 (0.026)		1.036 (0.027)	
Group_or_individual_customer_ran		0.820 (0.204)		0.712 (0.229)	
_IMain_lend_2			0.975 (0.285)	0.844 (0.335)	1.015 (0.301)
_IMain_lend_3			1.075 (0.402)	1.018 (0.468)	1.088 (0.419)
_IMain_lend_5			1.753* (0.596)	1.537 (0.612)	1.481 (0.520)
_IMain_lend_6			0.861 (0.291)	0.942 (0.348)	0.862 (0.296)
_cons	0.224*** (0.091)	0.150** (0.118)	0.179*** (0.083)	0.157** (0.140)	0.214*** (0.077)
Controls	<i>Excluded</i>	<i>Borrower controls</i>	<i>Lender controls</i>	<i>Added</i>	<i>Added</i>
Nagelkerke's R ²	0.070	0.105	0.085	0.113	0.100
Observations (N)	498	462	494	460	489
Cases correctly predicted	71.5%	71.9%	72.1%	72.6%	71.3%

Odds Ratios. Robust Standard Errors in parenthesis.

** ** and *** denote significance at the 10% 5% and 1% level.*

Table 7: Logistic regression split by gender and lending methodology

Dep. Var. Over-indebtedness	1		2	
	Female	Male	Group	Individual
Total_amount_of_debt_di_in_hds	0.985 (0.020)	0.932** (0.031)	0.936* (0.033)	0.994 (0.015)
Debttoincome_ratio_flow	1.007 (0.005)	1.035*** (0.011)	1.022*** (0.008)	1.004 (0.005)
Number_of_MFIs_crossborrowing	1.376 (0.661)	2.213 (3.391)	1.821 (1.107)	1.149 (0.714)
Delinquency_status_rank	5.218*** (3.089)	2.755 (1.772)	2.643 (1.652)	4.033*** (2.155)
<i>Controls</i>				
Gender_rank			1.440 (0.601)	0.755 (0.267)
Age	0.993 (0.017)	1.019 (0.032)	0.997 (0.024)	0.995 (0.019)
Household_size	1.092 (0.074)	1.054 (0.106)	0.981 (0.092)	1.252*** (0.098)
Avg_monthly_income_ran	0.998 (0.074)	1.087 (0.119)	1.072 (0.106)	0.952 (0.074)
Total_assets_in_thds	0.984** (0.008)	1.004 (0.012)	0.984 (0.011)	0.988* (0.007)
Average_maturity_weighted	0.985 (0.052)	1.094** (0.045)	1.106** (0.050)	0.982 (0.036)
Group_or_individual_customer_ran	1.070 (0.417)	0.218** (0.156)		
_IMain_lend_2	1.168 (0.594)	0.210* (0.174)	3.147 (3.397)	0.395 (0.269)
_IMain_lend_3	1.423 (0.837)	0.257 (0.285)	3.960 (4.374)	1.325 (1.104)
_IMain_lend_5	1.893 (0.952)	0.794 (0.621)	4.552 (6.147)	1.124 (0.488)
_IMain_lend_6	1.211 (0.569)	0.378 (0.254)	3.870 (4.480)	0.763 (0.327)
_cons	0.218 (0.232)	0.076 (0.169)	0.029** (0.044)	0.212 (0.278)
Controls	<i>Added</i>	<i>Added</i>	<i>Added</i>	<i>Added</i>
Nagelkerke's R ²	0.108	0.280	0.177	0.139
Observations (N)	324	136	191	269

Odds Ratios. Robust Standard Errors in parenthesis.

** ** and *** denote significance at the 10% 5% and 1% level.*

Table 8: Alternative measurements of delinquency

Measurements for repayment irregularities	Time horizon	Definition	Units
Delinquency_status_rank	At time of survey	Respondent is at least 1 day late on any outstanding loan	Dummy
Delinquency_status_whole_loan_term	Over loan term	Respondent was at least 1 day late on any outstanding loan	Dummy
Delinquency_status_weeks	At time of survey	Number of weeks respondent was late on currently outstanding loans	Weeks
Aggregate_number_of_late_payments_all_loans	Over loan term	Number of times the respondent was late on currently outstanding loans	Number of payments
Default_rough_proxy	Over last year	Respondent has experienced an assets seizure or was forgiven a loan	Number of defaults

Table 9: Clustered standard errors and alternative indicators of delinquency

Dep. Var. Over-indebtedness	1	2	3	4	5	6
Total_amount_of_debt_di_in_hds	0.977 (0.015)	0.977 (0.015)	0.977 (0.015)	0.976 (0.015)	0.977 (0.015)	0.968** (0.016)
Debttoincome_ratio_flow	1.011** (0.004)	1.011** (0.005)	1.011** (0.004)	1.012*** (0.004)	1.012*** (0.004)	1.012*** (0.004)
Number_of_MFIs_crossborrowing	1.406 (0.565)	1.406 (0.614)	1.361 (0.537)	1.471 (0.592)	1.363 (0.594)	1.345 (0.528)
Delinquency_status_rank	3.819*** (1.500)	3.819*** (1.604)				
Delinquency_status_weeks			1.309*** (0.120)			
Delinquency_status_whole_loan_te				2.153*** (0.561)		
Aggregate_number_of_late_payment					1.446*** (0.180)	
Default_over_year_rough_proxy						23.193*** (19.890)
<i>Controls</i>						
Gender_rank	1.087 (0.284)	1.087 (0.253)	1.160 (0.301)	1.279 (0.326)	1.241 (0.320)	1.340 (0.339)
Age	0.998 (0.014)	0.998 (0.008)	1.001 (0.015)	1.002 (0.015)	1.002 (0.015)	1.003 (0.015)
Household_size	1.098* (0.060)	1.098*** (0.033)	1.095 (0.060)	1.096 (0.062)	1.097 (0.062)	1.087 (0.060)
Avg_monthly_income_ran	0.992 (0.060)	0.992 (0.065)	0.992 (0.059)	0.999 (0.059)	1.005 (0.059)	1.000 (0.060)
Total_assets_in_thds	0.988** (0.006)	0.988** (0.006)	0.988** (0.006)	0.988** (0.006)	0.988** (0.006)	0.987** (0.006)
Average_maturity_weighted	1.036 (0.027)	1.036 (0.030)	1.033 (0.028)	1.029 (0.025)	1.028 (0.025)	1.044* (0.026)
Group_or_individual_customer_ran	0.712 (0.229)	0.712 (0.178)	0.695 (0.225)	0.672 (0.208)	0.687 (0.218)	0.745 (0.238)
_IMain_lend_2	0.844 (0.335)	0.844 (0.216)	0.812 (0.322)	0.795 (0.302)	0.789 (0.308)	0.943 (0.368)
_IMain_lend_3	1.018 (0.468)	1.018 (0.306)	0.934 (0.432)	0.883 (0.388)	0.928 (0.407)	1.022 (0.458)
_IMain_lend_5	1.537 (0.612)	1.537** (0.288)	1.449 (0.582)	1.490 (0.585)	1.474 (0.576)	1.563 (0.625)
_IMain_lend_6	0.942 (0.348)	0.942 (0.152)	0.879 (0.325)	0.911 (0.329)	0.943 (0.338)	0.900 (0.327)
_cons	0.157** (0.140)	0.157** (0.116)	0.162** (0.147)	0.122** (0.109)	0.130** (0.118)	0.142** (0.127)
Controls	<i>Added</i>	<i>Added</i>	<i>Added</i>	<i>Added</i>	<i>Added</i>	<i>Added</i>
Nagelkerke's R ²	0.113	0.113	0.108	0.106	0.113	0.106
Observations (N)	460	460	460	462	462	467

*Odds Ratios. Robust standard errors in parenthesis. In regression 2, standard errors are clustered by lending institutions. * ** and *** denote significance at the 10% 5% and 1% level.*

Table 10: OLS regression on a threshold-free sacrifice score

Dep. Var. Sacrifice Score	1	2	3	4	5
Total_amount_of_debt_di_in_hds	-0.00388** (-0.00154)	-0.00366* (-0.00215)	-0.00478*** (-0.00165)	-0.00408* (-0.00218)	-0.002 (-0.00157)
Debttoincome_ratio_flow	0.00179*** (-0.000567)	0.00216*** (-0.000789)	0.00178*** (-0.000577)	0.00210*** (-0.000797)	0.00195*** (-0.000559)
Number_of_MFIs_crossborrowing	0.095 (-0.0851)	0.052 (-0.0834)	0.132 (-0.0907)	0.068 (-0.0838)	
Delinquency_status_rank	0.287*** (-0.0826)	0.295*** (-0.0907)	0.292*** (-0.0808)	0.303*** (-0.0902)	0.291*** (-0.0848)
<i>Controls</i>					
Gender_rank		0.007 (-0.0498)		0.016 (-0.0503)	
Age		0.000 (-0.00274)		0.000 (-0.00276)	
Household_size		0.0206* (-0.0109)		0.0186* (-0.0111)	0.0205** (-0.0101)
Avg_monthly_income_ran		0.001 (-0.00951)		0.000 (-0.0101)	
Total_assets_in_thds		-0.00194** (-0.000785)		-0.00191** (-0.000801)	-0.00224*** (-0.000742)
Average_maturity_weighted		0.006 (-0.00527)		0.007 (-0.00576)	
Group_or_individual_customer_ran		-0.039 (-0.0495)		-0.067 (-0.063)	
_IMain_lend_2			-0.006 (-0.0565)	-0.030 (-0.0767)	
_IMain_lend_3			0.014 (-0.073)	0.000 (-0.0904)	
_IMain_lend_5			0.115 (-0.0716)	0.084 (-0.0804)	
_IMain_lend_6			-0.030 (-0.0635)	-0.011 (-0.0704)	
_cons	0.160* (-0.0879)	0.082 (-0.154)	0.118 (-0.0963)	0.088 (-0.177)	0.160*** (-0.0567)
Controls		<i>Excluded</i>	<i>Borrower controls</i>	<i>Lender controls</i>	<i>Added</i>
R ²	0.050	0.080	0.060	0.080	0.070
Adjusted R ²	0.040	0.050	0.050	0.050	0.060
Observations (N)	498	462	494	460	492

Robust Standard Errors in parenthesis.

** ** and *** denote significance at the 10% 5% and 1% level.*

Table 11: Sensitivity analysis on repayment irregularities as an indicator of over-indebtedness

	Indicator of repayment irregularities				
	Delinquency_status_rank	Delinquent_more_than_1_week	Delinquency_status_whole_loan_term	Aggregate_late_payments_more_than_2	Default_over_year_rough_proxy
Correct over-indebtedness status	72%	71%	68%	71%	71%
Correctly classified IF over-indebted	4%	2%	9%	2%	1%
% over-indebtedness in sample	7%	4%	21%	4%	1%

Table 12: Sensitivity analysis on debt-to-income ratio as an indicator of over-indebtedness

	Threshold for debt-to-income ratio					
	10%	20%	30%	40%	50%	60%
Correct over-indebtedness status	36%	47%	52%	57%	63%	65%
Correctly classified IF over-indebted	28%	24%	17%	13%	11%	7%
% over-indebtedness in sample	89%	71%	52%	39%	28%	19%

Appendix 1: 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.

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

Appendix 2: Marginal effects for full sample logistic regression

Variable	dy/dx	Std.Err.	z	P> z	95% C.I.		X
Total_amount_of_debt_di_in_hds	-0.005	0.003	-1.490	0.136	-0.011	0.001	14.265
Debttoincome_ratio_flow	0.002	0.001	2.590	0.010	0.001	0.004	42.761
Number_of_MFIs_crossborrowing	0.068	0.081	0.850	0.397	-0.090	0.226	1.069
Delinquency_status_rank*	0.313	0.094	3.320	0.001	0.128	0.498	0.065
Gender_rank*	0.017	0.053	0.320	0.751	-0.087	0.121	0.282
Age	0.000	0.003	-0.100	0.917	-0.006	0.005	40.209
Household_size	0.019	0.011	1.700	0.090	-0.003	0.040	4.750
Avg_monthly_income_ran	-0.002	0.012	-0.140	0.887	-0.025	0.022	3.688
Total_assets_in_thds	-0.003	0.001	-2.140	0.033	-0.005	0.000	15.025
Average_maturity_weighted	0.007	0.005	1.350	0.177	-0.003	0.017	8.042
Group_or_individual_customer_ran*	-0.068	0.065	-1.050	0.293	-0.196	0.059	0.516
_IMain_lend_2*	-0.034	0.077	-0.430	0.664	-0.185	0.118	0.306
_IMain_lend_3*	0.004	0.093	0.040	0.968	-0.178	0.185	0.161
_IMain_lend_5*	0.091	0.089	1.030	0.305	-0.083	0.266	0.179
_IMain_lend_6*	-0.012	0.073	-0.160	0.870	-0.155	0.131	0.146

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