

# A Customer-Protection Perspective on Measuring Over-indebtedness

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## Abstract:

*Over-indebtedness is one of the biggest current risks in microfinance. However, data on over-indebtedness is extremely scarce and the limited data that exists comes from a risk management perspective. There is no appropriate research to represent the perspective of clients and contribute to customer protection. This paper fills that gap and uses a customer-protection oriented definition of over-indebtedness based on the sacrifices that microborrowers experience. The definition is based on an interdisciplinary literature from sociology, psychology and economics. The data reveals the sacrifices that microborrowers experience and allows us to quantify over-indebtedness from a customer protection perspective. It reveals insights about the relationship of customer protection and risk management that challenge previous thinking in the industry. We have collected a unique database of 531 quantitative interviews among microborrowers. The methodology combines subjective information on the experiences and perceptions of microborrowers with econometric regression analysis. This innovative interdisciplinary approach allows us to represent the customer protection perspective on over-indebtedness, while at the same time providing quantifiable results and statistically significant findings about the relationship of risk management indicators and customer protection indicators of over-indebtedness.*

*We find that 30% of borrowers in our urban African population of microborrowers are over-indebted. The paper provides a detailed analysis of which sacrifices borrowers go through, how frequently the respective sacrifices occur and how acceptable they are to borrowers. In a second step, the paper tests the most common risk-management indicators of debt problems, that are often used as proxies for over-indebtedness, as predictors of the customer-protection measurement of over-indebtedness. Over-indebtedness is strongly related to delinquency and to the debt-to-income ratio. It is not significantly related to a borrower's total amount of debt or to multiple borrowing. We construct a model that correctly predicts 72.6% of cases. However, even the best indicators for over-indebtedness correctly identify only a small portion of the cases of over-indebtedness. For example, many more borrowers are over-indebted than are delinquent. The paper therefore reveals the common argumentation that "microborrowers are not over-indebted as long as delinquency in MFI portfolios is low" as flawed. 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. While the case study uses data from Ghana, the innovative approach applies to the microfinance industry in general. The protection of microborrowers from over-indebtedness is also important in Europe.*

## Subheadings:

1. Introduction,
2. Predicting over-indebtedness,
3. The data,
4. The sacrifices of Micro-borrowers.
5. Estimation and empirical results,
6. Conclusion

Keywords: Over-Indebtedness; Customer Protection; Sacrifices; Risk Management

\* The author is grateful to the Marie-Christine-Adam Foundation for its financial support. She 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 that made this data collection possible by sharing their data and access to clients. Valuable comments were provided by Prof. Oscar Bernal, Prof. Marek Hudon, Prof. Marc Labie, Prof. Silvia Prina, Prof. Francois Rycx, Prof. Khalid Sekkat, and Prof. Ariane Szafarz. Further thanks go to the seminar and conference participants at the 2nd European Research Conference in Microfinance, the Academy of Management Annual Meeting, the Global Microcredit Summit, the University of Namur, Université Protestante du Congo, and ULB.

## 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 (Labie, 2007; Mersland and Strøm, 2010; Armendáriz and Szafarz, 2011). Increasingly rigorous impact studies are questioning the original impact and poverty alleviation claims of microfinance (Banerjee et al., 2009; Karlan and Zinman, 2010). Some microfinance markets have clearly overheated (Chen and 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 for microcredit in developing countries. Although some national or sub-national markets in India, Bosnia, Pakistan, Nicaragua and Morocco (and earlier, Bolivia) have clearly displayed 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* (Schicks, 2013, elaborates and discusses measurement; see also Figure 1 below). This is the first academic study to measure over-indebtedness from the customer protection perspective (a client welfare rather than an economic performance perspective). It pin-points the debt distress of micro-borrowers in an urban African setting, and it reveals that even in markets with good repayment performance, micro-borrowers might experience excessive distress to repay their debt.

Leveraging the power of subjective measures limits claims to universality. Borrower perceptions of what constitutes a sacrifice and how acceptable sacrifices are depend on local contexts and individual borrower characteristics. This reduces the comparability of over-indebtedness across settings and the validity of findings for the microfinance industry in general. Nevertheless, the subjective measure allows for important insights into the nature of over-indebtedness that remain obscured by more objective measures of over-indebtedness. The more universal and inter-culturally comparable a measurement is, the less it reflects local realities (Copestake, 2008). Subjective approaches that account for suffering as a subjective experience are in line with the academic literature on subjective, self-reported measures of well-being and happiness (see Dolan et al., 2008; Oshio and Kobayashi, 2010; Angner, 2010).

Additionally, this study evaluates the relationship between indicators of over-indebtedness based on customer sacrifices and on risk management. It evaluates the measurements of over-indebtedness that are commonly used in the geographical and historical context of consumer finance in developed countries (Betti et al., 2007; Vandone, 2009), examining the relationship of delinquency, debt amounts and the debt-to-income ratio (that is monthly repayment obligations over monthly income) to excessive sacrifices. It also considers indicators specifically suggested for microfinance environments (Krishnaswamy, 2007; Roesch and Héliers, 2007; Guérin et al., 2009; Morvant-Roux, 2009), exploring the correlation between cross-borrowing and undue sacrifices.

The research is based on an extensive customer survey of 531 micro-borrowers in the Ghanaian microfinance market of Accra. The respondents represent a random sample of micro-debtors 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 management information system (MIS). Ten qualitative interviews with over-indebted borrowers contribute background information on borrowers' perceptions and local circumstances that helped calibrate the researcher's approach to analysis.

This is the first academic study that quantifies over-indebtedness in Ghana. It reveals that 30 per cent of the sampled micro-borrowers in Ghana experience unacceptable sacrifices related to their debt. The paper develops a model of over-indebtedness that correctly predicts 72.6 per cent of the cases.<sup>1</sup> 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 per cent 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 per cent of the over-indebted cases. A debt-to-income ratio of 50 per cent correctly recognizes only 11 per cent 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 distress of 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 theory on over-indebtedness needs to be expanded to take the two different perspectives on over-indebtedness into account and recognize that the customer protection perspective and the risk management perspective on over-indebtedness do not measure the same phenomenon. Future research must be explicit about which perspective to over-indebtedness it is applying. Especially, research with a customer protection motivation should avoid measuring over-indebtedness by using the indicators of the risk management perspective.

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

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<sup>1</sup> In this paper, the term "prediction" refers to the ability of easily available indicators to foretell, that is, "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.

## 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 client 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.

Although over-indebtedness is context specific, as borrower sacrifices are 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 micro-borrower are positively related to repayment irregularities. Betti et al. (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 et al. (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. This includes all outstanding loans from both formal and informal lenders.

***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 the debt-to-income ratio, a borrower's monthly repayment burden related to monthly income (Rinaldi and Sanchis-Arellano, 2006; Betti et al., 2007). One study even finds a relationship of the relative debt load to subjective measures of debt as a burden (Del-Río and Young, 2005). Microfinance-specific research equally uses debt-to-income ratios as measures of over-indebtedness (Collins, 2008; Maurer and Pytkowska, 2011) and confirms that the debt-service ratio is correlated with subjective debt stress (Krishnaswamy and Ponce, 2010).<sup>2</sup>

***H2: The debt-to-income ratio as a measure of repayment 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

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<sup>2</sup> 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.

loans a borrower holds (Matin, 1997; Paxton et al., 2000; Chaudhury and Matin, 2002; Vogelgesang, 2003; McIntosh and Wydick, 2005). 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 from several lenders in parallel, rather than to cases of one MFI extending for example 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 (Vogelgesang, 2003; Godquin, 2004; Kappel et al., 2010). Delinquency or default represents 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 for example from the usual liquidity management practices of the poor or from product limitations and credit rationing at MFIs (Krishnaswamy, 2007; Gonzalez, 2008; Guérin et al., 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 distress in repaying their loans and manage to avoid delinquency only as the result of excessive efforts. Section 4 reveals that many more customers sacrifice to make their loan repayments than actually pay late.

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 distress, but they have probably underrepresented the dimension of customer protection in 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 hypotheses. 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 micro-borrowers.

### 3. The data

This paper is based on a unique primary data set from 531 interviews of micro-borrowers in Accra, Ghana. For details on the Ghanaian context and the data collection process see Appendix 1. We collected 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. Table 1 provides an overview of the sample characteristics.

**Table 1: Descriptive statistics of borrower sample**

Variable	Units	N	Mean	Standard Deviation	Mean		T-test*	Chi <sup>2</sup> ** Cramer's V
					Over- indebted	Over- Indebted		
Gender	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	N. of persons	531	4,7	2,148	4,9	4,7	-1,21	-
Avg_monthly_income	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	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	Percent	518	7,0	0,256	13,8	4,2	-	0,16***

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

\*\* Contingency analysis in Stata is unweighted. Weighting Chi-Square results with SPSS implies no substantial changes to results

In addition, the questionnaire obtained information on the sacrifices the borrowers experienced related to their loans over the course of one year (see table 3 for list of sacrifices). On an individual basis, the respondents indicated how many times they experienced each of the sacrifices<sup>3</sup>, and they weighted sacrifices subjectively by how acceptable the experience was, given the purpose of the loan.<sup>4</sup> 'Cutting down on food' could therefore be acceptable for one person (for example if it meant substituting meat for cheaper food), while for another borrower it would be unacceptable (for example 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 - they struggle to repay on time, they make unacceptable sacrifices and these unacceptable sacrifices occur repeatedly.

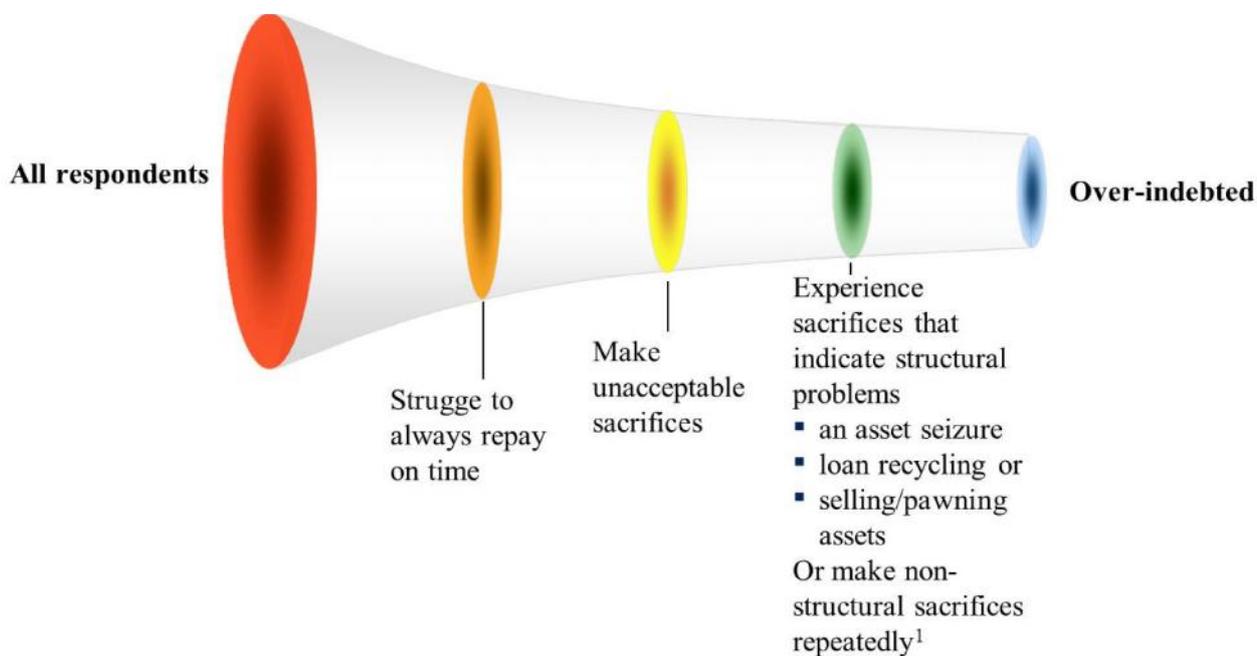
Given the short-term orientation of microloans and the severe consequences of sacrifices even over short periods of time, we employ repetition as the criterion for debt problems being of a structural nature. However, for severe sacrifices such as assets seizures, loan recycling, and selling or pawning one's assets, even 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. 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

<sup>3</sup> "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.

<sup>4</sup> "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".

borrower.<sup>5</sup> The next section presents our detailed findings based on this sacrifice data and reveals the amount of over-indebtedness according to the funnel in Figure 1.

**Figure 1: Measuring over-indebtedness by customer protection standards**



<sup>1</sup> Either >3 unacceptable sacrifices, or >= 1 unacceptable sacrifice made >3 times

Source: Based on Schicks (2013).

#### 4. The sacrifices of Micro-borrowers

This section reveals to what extent the micro-borrowers in our Accra sample experience debt distress. 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 distress is very common among Ghanaian micro-borrowers. In our sample, only a quarter (26%) of the micro-borrowers 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 per cent of borrowers struggle with an installment once in a while, and 43 per cent struggle regularly or at (almost) every single installment. According to the detail of sacrifices that respondents described during the 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.

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<sup>5</sup> 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.

Distress with debt as such is 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 micro-borrowers in our sample is at 30 per cent.

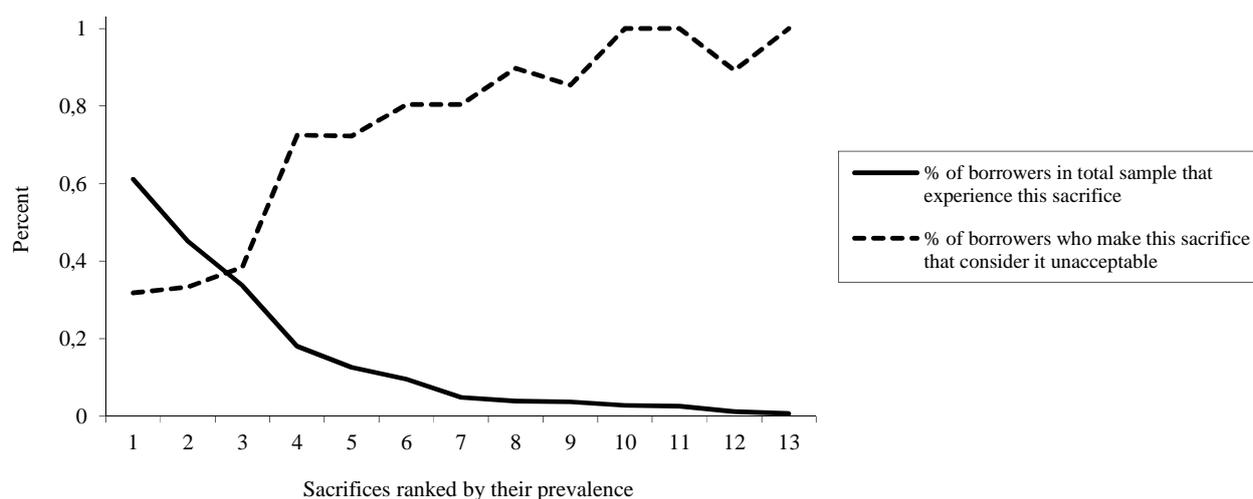
**Table 2: The struggles and over-indebtedness of Ghanaian micro-borrowers**

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

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, it is normal for cash demands to represent a difficulty for the poor and loan impact may still be positive.<sup>6</sup> Also, the data does not permit to compare how micro-borrowers fare compared to borrowers from other lenders. They could be worse off than they would be with more flexible informal loans, or they might have chosen a microloan explicitly because it implied lower levels of distress than alternative debt sources.

**Figure 2: Prevalence and acceptability of sacrifices among microborrowers**



Analyzing the sacrifices in more detail, we find that, collectively and on average, micro-borrowers act according to the assumptions of rational behavior: most frequently, they make those sacrifices that they

<sup>6</sup> For details on the relationship between over-indebtedness and negative loan impact see Schicks (2013).

experience as the least costly. Figure 2 displays this almost linear relationship between the prevalence of the various sacrifices 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 borrowers prefer to employ easier coping strategies first and avoid the hardest sacrifices by all means.

Table 3 presents the sacrifices 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.

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

<b>Sacrifices</b>	<b>Borrowers making sacrifice</b>	<b>% making sacrifice*</b>	<b>% finding sacrifice unacceptable**</b>	<b>% experiencing sacrifice &gt;3 times**</b>
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%

1 Out of all borrowers in the sample

2 Out of the borrowers who made each respective sacrifice

The second category of sacrifices consists of those sacrifices that each affect between 10 and 20 per cent of borrowers and that are unacceptable to most respondents. Micro-borrowers reduce their food (18%), rely on friends or family to help them out (13%) and suffer from psychological stress (10%). Between 70 and 80 per cent 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 availability. Guérin et al. (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 Accra confirms these findings 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, for example 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 sacrifice experiences of women differ from the sacrifices of men, and how group lending customers differ from borrowers under the individual lending methodology (details on these split sample analyses are available on request). According to Chi-Square contingency analysis, male borrowers resort to several sacrifices (loan recycling, selling or pawning assets, and depleting savings) more often than female borrowers. They also report threats and harassment more frequently. In line with research on peer pressure, group customers are more likely than individual borrowers to deplete their savings, rely on the support of friends and family, suffer psychological stress and sell or pawn their assets.

In sum, this section has revealed insights into the borrowing experiences of microfinance borrowers in Accra. It identifies which sacrifices are most prevalent among micro-borrowers, which are most severe from the subjective perspective of the debtors and how frequently the average borrower experiences the various sacrifices. The majority of micro-borrowers work harder than usual to repay their loans and 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.

The section finds that, from a customer protection perspective, 30 per cent 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 micro-borrowers 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 micro-borrowers. 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 client welfare) perspective of over-indebtedness relates to the risk management (and thus economic) perspective.

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 and 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 per cent 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 affects our interpretation regarding the use of risk management indicators as predictors for over-indebtedness.

We test hypotheses H1 to H5 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 total amount of debt disbursed from any formal or informal lender,  $DIR_i$  is the debt-to-income ratio,  $CB_i$  is cross-borrowing that is the number of loans from different formal or informal lenders, and  $DE_i$  is delinquency, that is 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.

Table 4 displays the logistic regression results in the form of odds ratios (robust standard errors in parentheses). 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 one per cent increase in debt-to-income ratio for an average borrower corresponds to an increase of the probability of over-indebtedness by 0.002.<sup>7</sup> 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 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.

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<sup>7</sup> Details on marginal effects corresponding to column (4) are available on request.

**Table 4: Logistic regression on over-indebtedness**

<b>Dep. Var. Over-indebtedness</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>
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 if relevant</i>
Nagelkerke's R <sup>2</sup>	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.*

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 (H2 and H4) are confirmed as significant predictors of over-indebtedness. Debt amounts and numbers of loans are not confirmed (H1 and H3). Further research should analyze 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 per cent of all cases. This is significantly greater than the 55 to 60 per cent of cases that random selection predicts correctly at a predetermined level of 30 per cent over-indebtedness. However, it is only marginally greater than the maximum random probability of 70 per cent (Backhaus et al., 2011), and confirming Hypothesis 5, the predictive power of the models remains low with Nagelkerke's  $R^2$  at approximately 10 per cent. The evaluation of predictors below sheds more light on the schism between a highly significant correlation of predictors to over-indebtedness but low predictive power.

#### *Further analyses and robustness checks*

We also analyzed the differences between male and female borrowers on the one hand and individual and group borrowers on the other. Our findings remain largely unaffected (details are available on request). However, delinquency is a better predictor for women borrowers than for men, and the debt-to-income ratio works better for male borrowers. For men, the amount of debt disbursed is significant. Similarly, the total amount of debt and the debt-to-income ratio predict over-indebtedness only for group borrowers while delinquency is a significant predictor only for individual clients.

To test the robustness of the regression analysis to the dependent variable over-indebtedness, we run an ordinary least squares (OLS) regression on a threshold-free score of sacrifices (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 irrelevant to interpret coefficients because an increase of the score by one is a meaningless measurement. However, it avoids any potential arbitrariness of the over-indebtedness threshold and therefore provides a useful robustness check (see Appendix 1).

Table 5 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, the coefficient is negative, which might indicate sound lending decisions by 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.

Given the lack of standardized measurements for delinquency, we run further robustness checks by replacing our binary measurement of delinquency by alternative measures (details available on request). They cover the repetition and duration of delinquency, as well as the comparison of long-term indicators and spot indicators. As the harshest measurement of delinquency, we test "default" as a predictor of over-indebtedness. Except for the model that uses default as the indicator of delinquency, the total amount of debt remains insignificant in all robustness checks. The debt-to-income ratio and delinquency remain highly significant predictors of over-indebtedness across all models, and cross-borrowing remains without effect. We also test the robustness of our findings to clustering standard errors on the level of lending institutions; all results remain robust.

**Table 5: OLS regression on a threshold-free sacrifice score**

<b>Dep. Var. Sacrifice Score</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>
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>	<i>Added if relevant</i>
R <sup>2</sup>	0,050	0,080	0,060	0,080	0,070
Adjusted R <sup>2</sup>	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.*

## Evaluation of predictors

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 to assess the number of cases in which each of these predictors individually can predict correctly. As all measures of delinquency provided similar results (above), we test the sensitivity of results to the alternative indicators. Because delinquency in the sample is rather low, the various indicators of delinquency recognize only a small share of over-indebtedness – even if almost all delinquents and defaulters are rightly classified as over-indebted. Table 6 demonstrates that none of the measures recognizes more than 21 per cent over-indebtedness in the sample; in fact most indicators recognize significantly less than 10 per cent. Most measures recognize only one to five per cent of the over-indebted respondents correctly (maximum 9%). The correct prediction of approximately 70 per cent 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.

**Table 6: Evaluation of delinquency as an indicator of over-indebtedness**

	<b>Indicator of repayment irregularities</b>				<b>Default</b>
	<b>Delinquency &gt;1 week</b>	<b>Delinquency over loan term</b>	<b>&gt;2 late payments</b>		
<b>Correct over-indebtedness status</b>	72%	71%	68%	71%	71%
<b>Correctly classified IF over-indebted</b>	4%	2%	9%	2%	1%
<b>% over-indebtedness in sample</b>	7%	4%	21%	4%	1%

For the debt-to-income ratio, the threshold is more flexible. Table 7 indicates that a 10 per cent 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 per cent 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 per cent, only 7 per cent of borrowers are still correctly classified as over-indebted, compared to approximately 30 per cent 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 per cent. Considering every borrower with a higher than 50 per cent debt-to-income ratio to be over-indebted does approximate the level of over-indebtedness in the sample rather well at 28 per cent but, in recognizing only 11 per cent 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 per cent debt-to-income ratio holds as a policy recommendation for regulators to determine the average level of over-indebtedness in a market.

**Table 7: Evaluation of the debt-to-income ratio as an indicator of over-indebtedness**

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

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 is 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 per cent 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 is a good measure to identify who the over-indebted borrowers in the sample are. On an aggregate level, a debt-to-income ratio of 50 per cent 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 little research on its prevalence in microfinance markets and no accepted indicators for measuring it have been developed. This paper measures the over-indebtedness of micro-borrowers in Accra, defining over-indebtedness from a perspective of customer protection as an unacceptable level of sacrifices that borrowers experience related to their debt. It reveals that, in Accra, 30 per cent of the sample of borrowers from Ghana's top five micro-lenders are over-indebted, that is they experience structural debt distress 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.

The paper tested four potential predictors of this perspective on over-indebtedness, borrowing from the microfinance and high-income country consumer finance literature on debt problems. We consistently found that the debt-to-income ratio (the monthly repayment burden over income) and delinquency are highly significant predictors of sacrifice-based over-indebtedness. 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. Cross-borrowing is not related to our measure of over-indebtedness. 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 per cent of cases. Nevertheless, even those predictors that are highly significant recognize only a low share of over-indebtedness through the customer protection lens. A debt-to-income ratio of 50 per cent is the best predictor of the aggregate level of over-indebtedness in a market. However, on an individual respondent level, it recognizes only 11 per cent of the borrowers that are over-indebted correctly. Similarly, while almost all borrowers that are delinquent equally experience severe sacrifices, the reverse does not hold true: there are many distressed borrowers who have not (yet) reached the stage of delinquency. Due to extensive sacrifice, many might never get to that stage. As a late stage of over-indebtedness, delinquency is strongly related but not very useful for prediction. 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 Ghanaian micro-borrowers 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 client 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 client welfare perspective, the customer's point of view into account.

The theory on over-indebtedness needs to reveal the divide between the customer protection and risk management perspective on over-indebtedness. Past research tends to be unclear about the perspective it applies, sometimes using the concept over-indebtedness without a clear definition, and often using risk management indicators of over-indebtedness to argue from a customer protection motivation. As this paper shows, using risk management indicators of over-indebtedness can lead to different results than measurement from the customer protection perspective. Future research on over-indebtedness should therefore distinguish between these two perspectives and, if arguing from the view point of customer protection, should not use for example delinquency as an indicator of over-indebtedness but should use indicators that are appropriate for the customer protection perspective.

These findings, to the extent that they hold for other microfinance contexts, 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 client 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 client 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 per cent 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. While data based on subjective perceptions implies limitations to external validity, it can reveal a perspective on microlending that the industry has long ignored. For more precise recommendations and for a better generalization of findings, similar studies should be repeated in other market environments. Over-indebtedness, especially if measured according to subjective sacrifices, is highly context dependent and it is unclear to what extent the above findings would hold in other geographical, cultural and

historical contexts. Also, more potential indicators for over-indebtedness might have to be developed and tested.

So far, research on borrower sacrifices and over-indebtedness is scarce, but a practitioner-oriented study by Krishnaswamy and Ponce (2010) confirms substantial sacrifices among micro-borrowers in India. Equally, a practitioner study from 2012 in Kosovo that is also based on the framework by Schicks (2013), confirms that many borrowers perceive their debt as a large burden (Pytkowska and Spannuth, 2012). Without offering a comparable measurement of sacrifices, they find confirmed that the perceived debt burden is not related to the amount of debt but that it is related to delinquency. Using a net debt-to-income ratio where all household expenses are deducted from income, they do not find a relationship between perceived debt burden and the debt-to-income ratio. Further studies in Mexico, Cambodia, Kirgizstan, and Tajikistan that will replicate large parts of our study and provide data for comparison are currently underway.

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## **Appendix 1: The data – An in-depth survey in urban Ghana**

### *Ghanaian context*

According to the MIX market ([www.mixmarket.org](http://www.mixmarket.org)), the Ghanaian microfinance sector experienced a major growth period between 2001 and 2007, with a Compound Annual Growth Rate (CAGR) of 173 per cent on gross loan portfolio and 48 per cent 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 per cent CAGR on gross loan portfolio and -14 per cent on the number of borrowers (part of the decline might be due to a reduction of MFIs reporting their data to the MIX Market). 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. We calculate rough estimates based on MIX market and CIA World Fact Book data excluding the formal financial sector and unadjusted for multiple borrowing: Even at the industry's peak in 2009, only 9 per cent of Ghana's working age population below the poverty line were using microloans, compared to 13 per cent in Mexico, 14 per cent in Kenya, 21 per cent in Ecuador, and 51 per cent in Mongolia or Azerbaijan. A study comparing 12 countries for the purposes of developing an over-indebtedness early warning index finds that Ghana has the lowest microfinance market penetration rate of all countries in the sample (Kappel, Krauss and Lontzek, 2010). A recent representative survey on financial access in Ghana finds that 44 per cent 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 per cent 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 (2010 data for Ghana and Nigeria, 2009 for Botswana, Kenya and Uganda, and 1007 for Namibia).

In spite of the growth and chances for saturation at some point, Steel (2010) concludes that there is still a supply gap, that is unserved demand, and ample room left for growth in the Ghanaian microfinance industry. Finally, the MFIs in our sample are the best institutions in the market. 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.

### *Data collection*

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. Using MIS and credit bureau data, borrowers were sampled from five of Ghana's leading microfinance institutions: ProCredit Ghana, Opportunity International Ghana, Sinapi Aba Trust, EB-ACCION and Advans Ghana. Working under strict confidentiality requirements and with the support of the Ghanaian Central Bank, we were able to use MIS data from the MFIs as a population list and for triangulation with survey data. As far as data quality permitted, we matched borrower lists across institutions according to a sophisticated algorithm in Microsoft Access that took names, birthdates and phone numbers into account. It excluded obvious data errors by default, and was calibrated to deal with spelling differences as well as cases of same names but different phone numbers etc.

Among all the MFIs reporting to the MIX Market in 2010, our five partner MFIs account for 83 per cent of microborrowers in Ghana (43% in 2009) and for 95 per cent 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. 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 per cent of the disbursed loan amounts are less than 2000 GHC.

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 by factor 2 (for some MFIs that implied over-sampling delinquent groups rather than individuals). 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 disparities in gender. As a result all major subgroups such as borrowers from the different MFIs, delinquent and non-delinquent borrowers, and group and individual borrowers were represented in our analysis according to their shares in the borrower population according to the MIS data.

To encourage honest replies, interviews were conducted anonymously at a site of the respondent's convenience, independent of the MFIs. 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, we worked with experienced interviewers that were used to estimating this kind of economic information with low-income respondents. 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. In addition, triangulating the survey data on delinquency and multiple borrowing with the objective information from the participating MFIs' MIS indicates that borrowers' self-reports were mostly honest.

In collecting data on the respondent's sacrifices related to their loans, respondents answered first with the sacrifices that came to their mind without any influence of the interviewer. In a second step, the interviewers checked for additional sacrifices using a pre-defined list based on sacrifices identified in the interdisciplinary literature by for example Brett (2006), Corbett (1988) and Rahman (1999), and then piloted in Ghana (see table 3 for list of sacrifices).

#### *Construction of variables*

There are four key explanatory variables required for hypothesis 1-4 as developed in section 2. For H1, the amount of debt represents the sum of all a respondent's current loans, including loans from both formal and informal lenders. As the total burden of the loans 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. Disbursement information is also more correct and complete than data on outstanding loan balances as many borrowers do not know the current amount of their outstanding debt.

The debt-to-income ratio for H2 is a flow variable, not a stock variable. Rather than using static loan amounts, it is a debt-service ratio based on the sum of all installments per month, across all outstanding loans. As installment data is usually the information that borrowers are most knowledgeable about (rather than interest rates or amounts outstanding), borrowers reported their installments directly on a loan by loan basis. Interviewers were allowed to help borrowers add up for example weekly installments to a monthly total. Then the ratio was calculated as the total amount of installments per month divided by monthly income.

The number of loans per borrower for the cross-borrowing indicator according to H3 counts the loan a borrower had outstanding with different lenders at the time of the interview. As in all other measurements, we included all lending sources, formal or informal to the extent revealed by the respondent. We triangulated the data from the respondents' loan tables with the MIS data and the

matching of the participating lenders according to the above matching algorithm. At the given low level of multiple borrowing in the sample, the data quality proved extremely high, respondents having indicated all loans with the institutions that participated in our study correctly even if they did not know of which of their loans our interviewers could have up front information. (Actually, interviewers could only partially tell from their contact information, which institution had provided a borrower's data and were not able to insist on higher data quality with regards to multiple borrowing from our partner institutions than with regards to other lenders outside of our study.) The minimal discrepancies between survey data and MIS data on cross-borrowing are easily explained with the short time lag between the MIS sampling and the actual interviews in the field, some loans having run out in the mean time and new ones having started.

Finally, the delinquency indicator for H4 is a binary variable that takes the value 1 for a respondent who was in arrears of at least one day on an outstanding loan at the time of the survey. Again, this information is based on the respondents' self reports according to the survey but proved reliable in cross-checks with survey data. Theoretically there could be differences between soft measures of delinquency such as the 1-day measurement and measures of delinquency based on higher thresholds (that is longer delinquency/repeated arrears/actual default). Therefore, section 5 tests several alternative measurements for delinquency in a robustness check.

Finally, figure 1 explains our binary over-indebtedness variable in detail. To avoid the possibility that the econometric results in section 5 might depend on the threshold set by our over-indebtedness definition and the measurement according to figure 1, 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.