

# Microfinance, Poverty and Education\*

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## Abstract

We use an RCT to analyze the impact of microcredit on poverty reduction, child and teenage labour supply, and education in Bosnia and Herzegovina. The study population consists of loan applicants that regular screening would have marginally rejected. Access to credit allowed borrowers to start and expand small-scale businesses. Households that already had a business and where the borrower had more education, ran down savings, presumably to complement the loan and achieve the minimum investment amount. However, in less-educated households consumption went down. A key new finding is a substantial increase in the labor supply of children aged 16-19 year old together with a reduction in their school attendance, raising important questions about the unintended intergenerational consequences of relaxing liquidity constraints for self-employment and business creation or expansion.

*Keywords:* Microfinance; liquidity constraints; human capital; randomized controlled trial

*JEL Codes:* 016, G21, D21, I32

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A substantial part of the world's poor has only limited, if any, access to formal sources of borrowing. Instead, they depend on informal sources of credit such as moneylenders that may be less reliable and relatively expensive (Collins et al., 2009) or networks of family and friends. Such credit rationing may constrain entrepreneurship and growth, leading to increased levels of poverty. The introduction of microfinance, pioneered by the Bangladeshi Grameen Bank, aimed at dealing with this issue in a sustainable fashion and has led to the proliferation of microfinance institutions (MFIs) that are often based on funding from international organizations. The original model was to offer joint-liability loans to groups of individuals (often women) without collateral; more recently there has been a move to small, individual liability loans against collateral or guarantees by others. The key research and policy question is whether the availability of finance for the more disadvantaged can lead to a reduction of poverty and promote growth.

Our paper addresses this question by analyzing the results of an experiment where we randomly allocated loans to a subset of applicants considered too risky and “unreliable” to be offered loans as regular borrowers of a well established MFI in Bosnia. Our group is poorer and generally more disadvantaged than regular borrowers. What is particularly interesting is that they have applied for the loan and thus believe they have a profitable investment opportunity; however, they were turned down. This is exactly the group we need to analyze if we are to understand whether alleviating liquidity constraints in this way can be an effective anti-poverty tool.

Following some initial work based on observational (non-experimental) data,<sup>1</sup> important progress towards understanding the impact of microfinance has been made by a number of randomized controlled trials (RCTs - see Banerjee, Duflo, Glennerster, and Kinnan, 2010 for India, and Crépon, Devoto, Duflo and Parienté, 2011 for Morocco amongst others) and by quasi-experimental evidence (see Kaboski and Townsend, 2011, 2012 for Thailand). These studies have found evidence of increased self-employment activity; however, there

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<sup>1</sup>An early observational study of microcredit is Pitt and Khandker (1998). The results and analysis in that paper are critically discussed in Morduch (1998), Morduch and Roodman (2009), and Roodman (2012). See Ghatak and Guinnane (1999) for an early summary of the theoretical literature and Giné, Jakiela, Karlan, and Morduch (2010) for recent experimental evidence on the mechanisms through which joint liability affects loan repayment.

is still ambiguity on their impact on poverty.<sup>2</sup> For example, the two RCTs above find a decline in consumption for those who established a business (the India study) and for those who expanded a business (the Moroccan study) while consumption went up for the non-entrepreneurs. Kaboski and Townsend find an increase in consumption.<sup>3</sup>

The focus of the above papers has been on the introduction of microcredit in contexts where no such formal financial institutions existed before. Moreover, they consider either joint-liability lending or lending with guarantors. Our paper offers new evidence in two ways. First, we consider the impact of extending loans to poor individuals in a context where micro-lending is already well established for individuals with a solid background and good quality collateral. In this respect our design is similar to that of Karlan and Zinman (2010 and 2011) although the type of loans they considered was quite different, one being a four-month high-interest consumption loan and the other a four-month business loan, both with a much higher interest rate than in our case.<sup>4</sup>

Second, while adding to the evidence on outcomes for households' standard of living and business start-up and growth (such as self-employment, income, consumption, savings, profits, etc.) we also consider the effects of microcredit on child and teenage labor supply and educational participation. This is of key importance because it is a channel through which the intervention can have intergenerational impacts. Moreover, the direction of the effect cannot be predicted theoretically, implying that microfinance can lead to an increase but also to a reduction in child schooling with possible negative longer-term effects.

Some of our findings have a similar flavor to those of Banerjee et al. (2010) and Crépon

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<sup>2</sup>The impact of microfinance can be quite complex since it can also crowd out informal networks of credit and insurance.

<sup>3</sup>There have been a number of other studies recently. These include Attanasio, Augsburg, De Haas, and Harmgart (2011) who present evidence from an RCT in Mongolia, where group lending increased enterprise ownership by 10 percentage points relative to the control group. Other microcredit RCTs analyze more specific issues, such as the impact of contract design on repayment rates. For example, Giné and Karlan (2010) analyze how repayment rates differ between individual and joint-liability loans while others look at the impact of the frequency of mandatory meetings on repayment (Field and Pande, 2008) and informal risk sharing (Feigenberg, Field, and Pande, 2010). Finally, De Mel, McKenzie and Woodruff (2009) and Fafchamps, McKenzie, Quinn, and Woodruff (2011) use RCTs to study the impact of providing micro-entrepreneurs with grants instead of microcredit and show that relaxing capital constraints through cash grants boosts business profits of men but not women.

<sup>4</sup>In the Karlan and Zinman (2010) South African consumer loan study the interest rate was 200% APR; in the 2011 study in the Philippines the rate was 60%. This compares to 22% for our study.

et al. (2011) thus strengthening the existing evidence: the loans increased levels of business activity and self-employment. This did not translate into increased profits or household income in the 14 months of our observation period. It may of course be the case that income will increase later as the new or expanded businesses mature, although the type of activities undertaken are not such that one would expect longer term realization of benefits. Those without savings - mainly the less-educated - reduced consumption while those with a prior business and some savings ran down their savings. These facts are consistent with investments being lumpy and with the loans being too small in themselves to start or expand a business. It seems that households, in anticipation of future returns, used their own resources to top up the loan to reach an amount of funds that was sufficient to make an investment of a certain minimum size.

Beyond these results we break new ground by showing that the loans led to a large decline in school participation and an increase in labor supply of children aged 16 to 19.<sup>5</sup> However, the labor supply and schooling of children below 16 was not affected. The increased labor supply of the 16-19 year olds may at first sound surprising if one believes that the loan would have alleviated a liquidity constraint, allowing children to increase schooling. However, the other force at play is the new opportunity to start or expand a business. Without enough liquidity the household will have to muster resources from elsewhere if the loan brings the business opportunity within reach. The children can wait for their pay until liquidity permits or can be paid more easily in kind. Internal labor may also be cheaper than hiring someone from the outside market either because of regulatory or supervisory costs.<sup>6</sup> So there is both a price and a liquidity effect pushing in favor of internal labor and a reduction in schooling. The inefficiency can be magnified if the parents, who are the funding source for education, care more about their utility than their child's and thus undervalue the future benefits of education relative to the value that the child would attach to it. In this case an unintended consequence of the microcredit intervention is to worsen the outcomes

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<sup>5</sup>Recent observational studies have also presented evidence of such behavior in other countries (see Menon (2005) for Pakistan, Nelson (2011) for Thailand and also Jacoby (1994) and Wydick (1999)). Jacoby and Skoufias (1997) show that seasonal fluctuations in school attendance act as a form of self-insurance in rural India. Likewise, Beegle, Dehejia, and Gatti (2006) study household enterprises in rural Tanzania and find that credit-constrained households use child labor to smooth income.

<sup>6</sup>See Wydick (1999) for example.

for children, while transferring resources to the parents. On the other hand the inefficiency is mitigated if only those children with a low return to education are pulled from school now that an employment opportunity has arisen where there was none before.<sup>7</sup> However, the effect is rather large and in all likelihood one would expect future returns to education to be quite high for many of these children in an economy with still very high potential for growth and catch-up with the rest of Europe.

Finally, our experimental study came at a particularly interesting point, namely at the height of the 2008-09 financial crisis, which strongly affected Bosnia.<sup>8</sup> After years of rapid credit expansion, various Bosnian MFIs experienced an increase in non- and late repayment (Maurer and Pytkowska, 2011). Our paper is one of the first to study the impact of microcredit on borrowers during an economic downturn and amid widespread concerns about over-indebtedness.

The paper proceeds as follows. We first describe the loan and the experimental design and then discuss the data collection and the target population. Following a brief discussion of some theoretical considerations, we then discuss the results. We complete the paper with our conclusions.

## **I. The loan and the experimental design**

### **A. The loan**

We conducted our field experiment with the collaboration of a large Bosnian MFI.<sup>9</sup> At the start of our experiment Bosnia had an active market for microcredit. Our experiment extends microcredit to a poorer segment of the population that was originally turned down by

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<sup>7</sup>The share of the Bosnian labor force younger than 25 that was unemployed was 48.7 per cent in 2009 (European Commission, 2010, p.63).

<sup>8</sup>There have been some non-experimental studies in Bosnia. Hartarska and Nadolnyak (2007) find that access to microcredit has alleviated Bosnian firms' financing constraints. Demirgüç-Kunt, Klapper, and Panos (2011) find similar results for financing constraints at the household level. Their findings suggest that households that received microcredit were more often able to make a successful switch from informal to viable, formal entrepreneurs over the period 2001-04.

<sup>9</sup>The MFI was established in the mid nineties and had about 36,000 clients at the time of the baseline survey across both the Federation Bosnia i Herzegovina and the Republika Srpska.

our MFI on the basis of the loan officers' assessment. The exclusion was frequently due to the quality of the collateral, although, the collaborating MFI, has a number of different requirements that the loan officers use. The loan offered to these marginal clients had an interest rate of 22% APR paid on the declining balance,<sup>10</sup> so that the planned monthly repayments were fixed over time, with an increasing proportion of the payment being capital. The rate for regular clients was 21% over the same time period. The amounts loaned varied depending on the business plan and ranged from BAM 300 to BAM 3,000 with a mean of 1,653 (~US\$ 1,012) and median of 1,500 (~US\$ 920).<sup>11</sup> The maturity was also flexible and averaged 57 weeks. 77% of the loans ended up being collateralized. However, as we document in the last section of the paper, those who offered some collateral and despite that were still classified as marginal (and thus failed to be part of the regular client pool) were adversely selected and ended up having an erratic repayment history.

In Table 1 we describe for outstanding loans the kind of investments people make with them. Most of these loans, which have a median size of BAM 2,000 (~US\$ 1,223) and average of BAM 2,107 (~US\$ 1,293), are used for purchasing livestock - 139 marginal clients (24 percent of all clients) report this use (columns 1 and 2). The average amount used for this purpose was BAM 1,636 (~US\$ 1,000) (column 3) or about 77 percent of the average loan amount (column 5).

Table 1: Main loan use

Amount used for	Obs.	% clients	Mean	Std.Dev.	% of loan amount	Main use of remaining: amount %
	(1)	(2)	(3)	(4)	(5)	(6)
(a) Purchase of livestock	139	23.6	1,636	1,151	77.1	(b) 85%
(b) Investment in seed, fertilizer, etc.	85	14.4	1,193	864	66.2	(a) 86%
(c) Purchase of engine, tools, etc.	73	12.4	1,588	1,007	82.2	(i) 81%
(d) Investment in developing own work	55	9.3	1,983	1,359	82.1	(i) 77%
(e) Purchase of goods	50	8.5	1,790	1,266	90.2	(i) 100%
(f) Private purpose	50	8.5	1,258	805	73.5	(a) 72%
(g) Investment in real estate	15	2.5	3,133	2,395	88.3	(a) 75%
(h) Buying and maintaining cars/fuel	14	2.4	1,550	1,491	68.7	(a) 50%
(i) Other	109	18.5	1,552	1,349	68.4	(a) 87%

Categories with less than five respondents, such as 'purchase of computer/laptop', are omitted.

<sup>10</sup>All but two people paid an interest of 22%

<sup>11</sup>The exchange rate at baseline was US\$ 1 to BAM 1.63 approximately.

## **B. Experimental design and its motivation**

At the start of the experiment, loan officers in all branches of our collaborating MFI (which operates across all of Bosnia) were asked to identify potential marginal clients from the population of loan applicants over a period of several months, until the desired sample size was achieved. During training sessions officers were instructed to find clients that they would normally reject, but to whom they would consider lending if they were to accept slightly more risk.<sup>12</sup> For example, a loan applicant could possess insufficient collateral, be less-educated or poorer than average, or be perceived as somewhat more risky for other reasons.<sup>13</sup> The training stressed that marginal clients were not applicants with a poor credit history, that were over-indebted, or that were expected to be fraudulent.

Our MFI's loan officers receive a bonus depending on the performance of their portfolio. To counteract this disincentive for taking additional risk and to reward the additional effort needed to identify marginal clients, loan officers received a fee of 10 BAM (~\$6) for each marginal client to whom a loan was disbursed. While one may be concerned that loan officers would divert regular clients to the marginal group, this concern is mitigated by the fact that they would not want to take the 50 percent risk of having to turn down a solid client due to the randomization process.

Online Appendix A1 reports some characteristics of marginal clients as collected from a questionnaire to loan officers. In summary, we find that the average marginal applicant did not meet 2.6 out of the six main requirements of our MFI for regular loans: 77 percent did not possess sufficient collateral or did not meet one or more of the other requirements, which include an assessment of the applicant's character.<sup>14</sup> About one in three marginal clients were judged to have a weak business proposal while loan officers worried about repayment capacity in about a quarter of the marginal applications.

Once a loan officer identified a potential marginal client, and following a short vetting

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<sup>12</sup>Our MFI did not use an automated credit-scoring system.

<sup>13</sup>The loans offered as part of the experiment were similar to our MFI's regular loan product in terms of interest rate and maturity.

<sup>14</sup>Of those who did provide collateral, the distribution of collateral types was as follows: house 7%; machinery 4%; own salary 19%; spouse's salary 3%; family member's salary/co-signer 62%; other 19%. Note that more than one type of collateral could be pledged.

process from the loan committee, they would explain the aim of the study. On condition of participating in the survey now and in a year's time the potential clients were offered a 50 percent chance of a loan.<sup>15</sup>

Following a pilot in November 2008 in two branches in Gradacac and Bijeljina the experiment was extended two months later to all 14 branches of our MFI.<sup>16</sup> This process continued until a total of 1,241 “marginal applications” were submitted to the loan committee. In total 1,198 of these marginal loan applicants were approved and interviewed.<sup>17</sup> This baseline survey was conducted *after* the individual was judged to be eligible for participation in the program but *before* the randomization took place. This ensured that responses were not correlated with the outcome of the randomization process. We also made every effort to ensure that respondents were aware that their answers would in no way influence the probability of receiving a loan.

At the end of each week, the research team in London would allocate these newly interviewed applicants randomly with a 50 percent probability to either the treatment (receiving a loan) or the control group (no loan).<sup>18</sup> Successful applicants received the loan within a week. Applicants that were allocated to the control group did not receive a loan from our MFI for the duration of the study. The last interview and loan disbursement took place in May 2009. During February-July 2010, 14 months after the baseline survey, all RCT participants - both those who received a loan and those who did not - were called back and invited to be re-interviewed. We returned to those who declined to respond and offered them an incentive to do so (a mobile phone SIM card). This improved the final response

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<sup>15</sup>Obviously this conditionality would not and could not be enforced for the second round of data collection. The clients were not asked to sign an explicit agreement. The loan officer also explained that on the basis of the results of the study, the MFI may decide to expand lending to this new client group on a permanent basis, meaning that the current marginal clients could eventually continue to borrow as regular. Our MFI indeed continued to lend to a significant number of marginal clients who repaid on time during the experiment.

<sup>16</sup>Figure A1a (A1b) in the Appendix displays the geographical distribution of the branches (respondents).

<sup>17</sup>The interview lasted up to 60 minutes and was conducted by a professional survey company using computer-assisted telephone interviews (CATI).

<sup>18</sup>The chance of obtaining a loan was slightly higher than 50 per cent (ex post 52.8 percent) as we allocated randomly to the treatment group either half of each weekly batch containing an even number of applicants ( $N/2$ ) or  $(N+1)/2$  in all odd-numbered batches. For example, if at the time of a weekly randomization round 11 marginal clients had been interviewed, six would be randomly allocated to the treatment group and the rest to the control group. Alternatively, we could have just applied a 50 percent chance on each applicant, but we wanted to avoid occasional batches with too many rejections.



rate substantially.

Our experiment extends microcredit to a poorer segment of the population in a context where there is a well established microfinance market. This begs the question as to why such credit was not available before and what effects we can expect. In the absence of any market failure microcredit may be seen as a way of implementing a social welfare program in an economy with high levels of informality. For example, microcredit may be an effective alternative to in-work benefit programs such as tax credits (e.g. the Earned Income Tax Credit in the US). However, another possibility is that informational externalities cause some individuals to be excluded from credit. For example, suppose there is asymmetric information with respect to the ability to carry out a successful business and repay the loan. In this case there may be a payoff to offering a “get-to-know-you” loan, with future client relationships depending on past performance and with interest rates set so that on average zero expected profits are achieved over time.<sup>19</sup> However, this will only work for the MFI in the presence of competition if the performance signal does not become public. Otherwise the lender will not be able to recover the costs of initial experimentation from the better surviving clients: competition will ensure the good clients just pay the market rate. Such an informational externality, which is similar to the mechanism outlined by Acemoglu and Pischke (1999) for general skills training by firms, may indeed reduce the scope for lending to clients that seem to be lower quality on the basis of their observables. In this case a program that promotes loans to this population may also be socially desirable and not obviously provided by the private market. Longer-run follow-up data, with repeat loan activity would allow us to distinguish between these alternatives. At present we will be able to evaluate the extent to which this first loan is profitable for the MFI involved and to understand the shorter-term effects on the clients.

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<sup>19</sup>This point was suggested by Joe Altonji and draws from Altonji (2005).

## **II. Data**

### **A. Sample description**

We collected detailed data during the baseline and follow-up interview rounds on the applicant's household structure, entrepreneurial activities and other sources of income, income expectations, household consumption and savings, asset ownership, outstanding debt, exposure to shocks, and stress levels. Table 2 below and Table A2 in the Appendix present summary statistics for the main characteristics of the marginal clients and their households. In each case we first present the variable mean for the control group and then the value for the average difference between the control and the treatment groups (with the standard error reported below this difference). In both tables, columns 1 and 2 provide statistics for the full baseline sample, while columns 3 and 4 provide statistics for the sub-population of households that we re-interviewed at follow-up.

Table 2 shows that almost 60 percent of the (potential) marginal clients are male and that their average age is 37 years. Just over 60 percent of the potential clients are married and slightly more than half of them were employed at the time of the baseline survey. The average respondent worked 49 hours a week, of which 34 hours were spent in a small-scale business. A third of the marginal clients only attended primary school while five percent of the sample went to university. We also show information on household income of the marginal clients. The average income was BAM 18,175 (US\$ 11,123) in the year prior to the baseline survey, of which on average 7,128 (US\$ 4,362) was earned through self-employment and BAM 267 (US\$ 163) as wages from agricultural activities.

The last rows of Table 2 give information on the debt that marginal clients had outstanding at the time of the baseline survey. On average marginal clients had fewer than one loan outstanding (43 percent had no loan outstanding and 42 percent one loan). In 44 percent of the cases these loans were provided by a bank and in 41 percent by another MFI. While this indicates that our sample had not been completely cut-off from borrowing in the past, we note that in comparison to the typical microfinance borrower in Bosnia and Herzegovina the number of loans is very low. Mauer and Pytkowska (2010) in a random sample of 887

microcredit borrowers in Bosnia at the same time as our study found that 58 percent had more than one active credit contract, the average was 2.021 per client, and the maximum number of loans was 14.<sup>20</sup>

Columns 5 and 6 in Table 2 allow us to compare the average marginal client to the population of Bosnia and Herzegovina as a whole and to regular first-time clients of our MFI. In column 5, we use 2010 data from the Life in Transition Survey (LiTS) in which 1,000 Bosnian households were interviewed, a nationally representative sample. LiTS sampled two types of respondents. The first is the household head or another household member with sufficient knowledge about the household. The second (if different from the first) is the person aged 18 years and over who last had a birthday in the household. We compare our marginal clients to these latter, randomly sampled persons and constrain the sample to the same age range we observe for our marginal clients. We find that compared with this population the average marginal client is younger and more likely to be male and married. On average the marginal client is less educated as relatively many of them completed at most primary education. We also find that male marginal clients age 20-60 have approximately the same likelihood of being employed, whereas female marginal clients of that same age range are more likely to be employed compared to the Bosnia reference population. Comparing the marginal client to regular first-time borrowers of our MFI shows that they are younger, less likely to be married, and have less education. Marginal clients are also less likely to be full-time employed.

## **B. Randomization and treatment-control balance**

As the allocation of marginal applicants into the treatment and the control group was random, we expect no systematic differences between both groups. To check whether this is indeed the case, column 2 in Table 2 and in Table A4 show for a large number of variables the difference in means between the treatment and the control group as well as the corresponding standard error. There are no statistically significant differences between the

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<sup>20</sup>Of course the survey will give a biased outcome in favor of more loans just because of stock sampling; so this comparison is just indicative.

Table 2: Treatment-control balance, attrition and comparison with the population

Variable	Baseline sample				Population (LITS '10)	Regular client of our MFI
	Full		Re-interviewed			
	Mean C	Diff. C-T (std. err.)	Mean C	Diff. C-T (std. err.)		
	(1)	(2)	(3)	(4)	(5)	(6)
Age	37.373 (12.31)	-0.479 (0.708)	37.097 (11.97)	-1.290 (0.767)	45.26 (17.04)	40.29 (12.22)
Female	0.392	-0.014 (0.028)	0.405	-0.008 (0.031)	0.52	0.40
Married	0.612	0.024 (0.028)	0.619	0.008 (0.031)	0.57	0.67
Employment (ALL Age 18-70)	0.559	-0.013 (0.029)	0.564	0.007 (0.032)	0.38	0.77
Employment Male 20-60	0.659	-0.030 (0.037)	0.667	-0.031 (0.041)	0.66	0.83
Employment Female 20-60	0.426	-0.025 (0.048)	0.449	0.023 (0.052)	0.39	0.76
Highest education						
Primary	0.308	-0.030 (0.027)	0.315	-0.031 (0.030)	0.19	0.10
Secondary	0.641	0.020 (0.028)	0.633	0.018 (0.031)	0.63	0.85
University	0.051	0.007 (0.012)	0.052	0.010 (0.014)	0.09	0.041
Working hours per week - Total	49.117 (27.66)	0.902 (1.572)	49.191 (28.17)	1.553 (1.765)		
Working hours per week - Business	33.527 (27.62)	-0.317 (1.706)	32.743 (28.12)	-0.735 (1.913)		
Household income Total	18,191 (16,032)	717.9 (838.5)	17,716 (15,204)	592.8 (880.4)		
Household income Self-empl.	8,066 (14,616)	834.0 (724.6)	7,452.9 (31,189)	598.2 (726.4)		
Household Income Agriculture	330.1 (1,422)	30.4 (77.42)	368.5 (1,505)	74.8 (88.91)		
Number of loans outstanding	0.759 (0.837)	0.006 (0.049)	0.802 (0.864)	0.030 (0.055)		
Value (BAM) of main three loans	4,967 (12,294)	392 (686)	5,248 (12,350)	810 (746)		
No of observations		T: 637 C: 569		T: 551 C: 443		

Notes: Diff. C-T represents the difference between control (C) and treatment (T) with the standard error in parentheses. LITS '10: EBRD-World Bank Life in Transition Survey 2010 representative of Bosnian population (standard deviation in parentheses). Column 6: regular first-time borrowers based on data from our MFI's database. BAM: Local currency. The exchange rate at baseline was USD 1 to BAM 1.634. For variable definitions see Table A9 in the Appendix.

means of the two groups except a 0.11 difference in the number of children (Table A4). When we conduct a joint significance test for all variables together we find no systematic overall difference between the two groups.<sup>21</sup> We conclude that the randomization process was successful in that there is no evidence of imbalance between treatment and control.

### C. Attrition

A total of 1,206 individuals were interviewed before the program and 995 of these were re-interviewed as part of the follow-up survey representing an attrition rate of 17%.<sup>22</sup> Among other efforts to reinterview,<sup>23</sup> people who initially declined were called back later by a senior interviewer and asked once more to participate and were also offered a EUR 10 phone card.<sup>24</sup>

In the end, the response rate among the control group was about ten percent lower than in the treatment group. Importantly, however, when we analyze the observed baseline characteristics of only those who were surveyed at follow-up, we find that these characteristics are still balanced between the treatment and control group (see column 4 in Tables 2 and A4).<sup>25</sup> Thus, this differential non-response is not correlated with any of the observable characteristics we consider. To reinforce this, we regress the indicator variable of whether the marginal client was re-interviewed at follow-up on the soft characteristics as provided by the loan officers. The results are presented in Table A4 in the Appendix and show that these characteristics are not jointly significant in determining attrition and this is true independently of whether we account for other covariates or not. We conclude that it is

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<sup>21</sup>Table A3 in the Appendix contains the full regression results for this test.

<sup>22</sup>Eight baseline respondents decided not to borrow after all (thus reducing the original baseline sample to 1,198). Thirteen of the 995 interviews were not fully completed. Table A5 in the Appendix provides more details on the targeted and actual number of interviews at baseline and follow-up.

<sup>23</sup>In order to limit attrition, interviewers were trained to encourage participation and the survey company sent all participants a reminder letter at the beginning of the follow-up survey. This letter also announced a raffle in which all who completed the survey could take part.

<sup>24</sup>The average annual income of potential marginal clients was BAM 13,381 at baseline. EUR 10 (BAM 19) therefore corresponds to 54 percent of average daily earnings.

<sup>25</sup>We also checked that pre-treatment characteristics are balanced across treatment and control groups in the following sub-samples: business ownership at baseline or not, high versus low education level, and gender of the respondent. Finally, we ran a regression in which the attrition dummy was regressed on treatment status, a set of baseline characteristics, as well as the interaction terms between treatment status and the baseline covariates. These interaction terms are jointly not statistically significant from zero.

unlikely that attrition undermined the balanced nature of the treatment and control samples and introduced bias in the reported results.

### **III. Choice of outcome variables**

Our outcome variables include business start-up, household income and consumption. Given the type of self-employment activities that our population is engaged in (e.g. agriculture and services) we expect income to respond fast and certainly within our observation period. Hence, given our interest in poverty alleviation these are natural outcomes to consider. We will then consider education and labor supply of children, which reflect some of the inter-generational impacts of the intervention. We discuss these outcomes in turn below.

Consumption is a particularly interesting outcome to consider. Liquidity constrained borrowers who do not invest the loan, will increase consumption. But other effects are also possible: as has been pointed out by many others starting with Friedman (1957), consumption can reflect the longer-term outlook. Hence one could see increases in consumption even with no liquidity constraints and even in the absence of an immediate increase in income due to the newly financed business activity, if this activity implies an increase in permanent income. Thus consumption can be a useful indicator of the longer term impact of the program. However, this argument is no longer necessarily valid for households who decide to invest and who are liquidity constrained. In an unpublished working paper version<sup>26</sup> we show that for households facing minimum investment amounts (such as start-up costs) consumption and accumulated savings may decline if the loan amount is insufficient to cover the required capital. In other words, the household will crowd-in resources by running down other assets and/or reducing consumption to take advantage of a now feasible investment opportunity. Households that still do not invest (and take up the loan) or who are able to make marginal investments will increase their consumption.

Unfortunately the data is not detailed enough to fully establish the lumpiness of investments. Nevertheless, column 5 in Table 1 shows that about 77 percent of the average

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<sup>26</sup>Microfinance at the Margin: Experimental Evidence from Bosnia and Herzegovina by Britta Augsburg, Ralph De Haas, Heike Harmgart and Costas Meghir, EBRD Working Paper No. 146, September 2012.

loan amount was used for the main investment purpose. The remainder of these loans were almost completely put towards buying auxiliary agricultural inputs such as seed, fertilizer, and fodder (column 6). A further indication of lumpy investments is that thirty percent of the loans have been used exclusively for one single purpose.<sup>27</sup>

Microfinance can also affect educational outcomes for children through a number of channels. This is particularly important to consider if we are to start understanding the longer-term and intergenerational impacts. One possibility is that microfinance, through the loan and the expanded business activity, alleviates liquidity constraints and leads to an expansion of school attendance and a decrease in child labor. However, it is also possible that schooling gets *reduced* as we show in our working paper.<sup>28</sup>

For schooling to decline as a result of microfinance a number of factors need to be at play. First, it must be the case that in the absence of the family business the return to attending school relative to working in the open labor market is high enough; otherwise the control group children will be working and not attending school just as much as the treatment group, except that the controls would be working in the open labor market. The tendency to attend school rather than work in the absence of a family business is reinforced by the fact that youth unemployment was close to 50% at that time in Bosnia, implying very poor labor market opportunities for 16-19 year old children. The wedge in the returns to working at home and in the open labor market can occur if the cost of hiring outside labor is more expensive than hiring internal labor say because of regulatory, informational or supervisory costs of hiring non-family workers. Moreover, using family labor can further alleviate liquidity constraints because payments to labor can thus be delayed or made more easily in kind. In other words, given the loan, using internal labor further enhances the possibility of starting a business. These factors will increase the returns to working in the family business rather than attending school, at least from the perspective of the parents. This will be more so for children who have (or are perceived to have) low returns to education. If in addition parents, who are funding education, do not fully internalize the future

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<sup>27</sup>It is of course possible that the individuals report using the loan to buy say livestock, while the reduction in consumption is used for other capital equipment.

<sup>28</sup>Education in Bosnia is free and compulsory for all children aged 7 to 15, while secondary education remains free but is voluntary.

benefits of education to their children (since the latter cannot commit to repay educational costs) then child labor can increase even more. The arguments made above concern both startup and existing businesses, particularly with lumpy investments.

While the negative effect of the loans on consumption should only be temporary, the reduction in schooling may persist to an extent even for established businesses due to the wedge between the costs of hiring internal versus external labor.<sup>29</sup> The reduction in schooling can be inefficient if it is due to this cost wedge and/or to liquidity constraints and/or if parents care about their children less than they do about themselves. This is an example where a policy that looks beneficial (alleviation of liquidity constraints for small-scale entrepreneurship) can have unintended negative effects in the presence of other distortions. To test this with our data, we will consider schooling and labor supply of the children at various ages as further outcome variables.

## **IV. Results**

We estimate separate treatment effects according to whether the household had a business at baseline or not and according to the level of education of the borrower. For the latter, we define “low education” as having obtained no higher than primary education and “high education” as any grade completed above primary education. In estimating the treatment effects we improve precision by conditioning on baseline covariates including the respondent’s age, gender, and marital, educational, and economic status. We also include household composition and the economic status of the individual household members.

### **A. The intervention and access to liquidity**

As we show in Table 2 the loan applicants did have access to some finance before we interviewed them at baseline. Applicants had on average 0.8 loans outstanding with a median and average value of BAM 1,500 and BAM 5,224 respectively. As a result of the intervention all applicants who were randomized in obtained a loan at an interest rate of 22% (a

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<sup>29</sup>If the family business is successful the liquidity constraint element will disappear, implying that child labor partially returns towards pre-loan levels.



1%-point higher rate than the regular clients). The average maturity was 57 weeks and the median and average loan amount were BAM 1,500 and BAM 1,653 respectively. Those randomized out were excluded from borrowing from our MFI, but could apply elsewhere. The data does not contain a complete history of loan activity. However, at follow up the treatment group was 20 percentage points more likely to have an outstanding loan (st. error (se) 2.6 pp) and on average they had 0.43 loans more (se 0.065) than the control group. The excess outstanding loans for the treatment group is an indicator of better access to liquidity relative to the control group for a number of reasons. First, the treated may have been now more successful at raising funds (including our loan). Second, given that the controls were turned down for a loan by our MFI (through the randomization process) and thus at least delayed from obtaining a loan elsewhere, the implication of the above numbers is that the controls were less successful in raising further funds and/or whenever the controls managed to get a loan from an alternative lender this would have been at a shorter maturity (thus providing less liquidity), otherwise they would have had more loans outstanding. This is consistent with them being classified as marginal clients by our MFI. We conclude from this that the treatment group did indeed have better access to liquidity than the control group.

## **B. Impact on business creation and self-employment**

We first look at the effect on enterprise creation and growth. Note that our MFI did not monitor the use of the loans and there were no sanctions of any sort if the loans were used for purposes such as consumption. To put the results in context we report descriptive statistics for the outcome variables in Table 3. Estimated effects are presented in Table 4. Column 1 shows that while we do not find any differences in the employment status at the household level on average, the likelihood of employment for the marginal clients increased compared to the control group.

Households of marginal borrowers are 6 percentage points (pp) more likely to receive income from self-employment than households in the control group. We also find that marginal clients are 6 percent more likely to own a business. Column 3 shows that the

Table 3: Descriptive baseline statistics: Employment and Business

	Overall		Business at baseline		By education		Diff C-T
	(1)	(2)	(3)	(4)	(5)	(6)	
At least 1 HH memb empl.	0.739	0.729	0.755	0.647	0.785	-0.04 (0.028)	
At least 1 HH memb unempl.	0.481	0.479	0.485	0.52	0.462	0.010 (0.032)	
Respondent is employed	0.564	0.585	0.528	0.438	0.627	0.010 (0.032)	
Respondent is unemployed	0.264	0.282	0.235	0.287	0.253	-0.010 (0.028)	
Income from Self-emp. (HH)	0.771	0.961	0.456	0.777	0.773	-0.001 (0.027)	
Business ownership	0.623	1.000		0.619	0.625	-0.020 (0.031)	
Business in services	0.176	0.282		0.103	0.212	-0.040 (0.024)	
Business in agriculture	0.239	0.384		0.320	0.199	-0.020 (0.027)	
Ownership of inventory	0.200	0.292	0.048	0.190	0.205	0.020 (0.026)	
	BAM	USD					
Business profit	4,930 (13,825)	3,025	7,940 (16,850)	3,585 (10,348)	5,594 (15,211)	-767 (876)	
Business expenses	3,046 (13,139)	1,869	4,895 (16,386)	2,551 (9,646)	3,293 (14,570)	-975 (837)	
Business revenue	7,932 (22,869)	4,866	12,744 (27,918)	6,323 (18,125)	8,736 (24,878)	-1748 (1,413)	

Notes: See notes in earlier tables. Control-treatment differences in the last column relate to the overall sample.

impact on self-employment and business creation is mainly driven by the highly educated. Those with higher education are 7 pp more likely to own a business at follow-up than the better educated in the control group; this is a first indication that this intervention does not benefit the poorest group. There is no significant difference between those that did and did not have a business at baseline, so we have not reported the results. The incidence of inventory holding goes up for both groups by similar amounts: 0.057 (se 0.0290) for those with a business at baseline and 0.041 (se 0.024) .

We also observe some interesting heterogeneity by education level in terms of the types of businesses that are created. Those with not more than primary education are more likely

Table 4: Impact on business creation and development

	Overall	By education	
		Low	High
	(1)	(2)	(3)
At least 1 HH member employed	-0.018 (0.025)	-0.075 (0.046)	0.009 (0.029)
At least 1 HH member unemployed	-0.020 (0.032)	0.069 (0.056)	-0.063* (0.038)
Respondent is employment	0.017* (0.009)	0.023 (0.017)	0.013 (0.011)
Respondent is unemployment	-0.009 (0.029)	-0.066 (0.053)	0.017 (0.035)
Income from Self-employment (HH)	0.060** (0.029)	0.048 (0.052)	0.067* (0.036)
Business ownership	0.058* (0.031)	0.037 (0.055)	0.069* (0.038)
Business in services	0.031 (0.025)	-0.052 (0.042)	0.071** (0.030)
Business in agriculture	0.035 (0.028)	0.094* (0.053)	0.008 (0.032)
Ownership of inventory	0.053*** (0.021)	0.072** (0.032)	0.045* (0.026)
Business profit (BAM)	672 (541)	234 (979)	893 (667)
Business expenses (BAM)	601 (593)	-23.3 (530)	864 (811)
Business revenue (BAM)	1,384 (981)	499 (1,296)	1,780 (1,298)

Notes: Estimated impacts for the whole sample and by ownership of business at baseline (columns 2 & 3) and by borrower's education (columns 4 & 5). Standard errors in parentheses. Baseline covariates included in all regressions. \* significant at a 10 percent significance level; \*\* at the 5 percent level. See notes in earlier tables.

to start up agricultural activities than the control group. In contrast, those with a higher education level are more likely to start up an enterprise in the services sector. Finally, we note that the likelihood of owning inventory is significantly higher (about 5 pp) for treatment than for control households. This effect is the largest for marginal clients with at most primary education, who are 7 pp more likely to own inventory at the end of the experiment.

A key result here is that while we can show that there is more economic activity as

a result of the loan as well as more inventory, there is no evidence of increased business profits. To put our results in context, the profits from businesses in services is BAM 12,830 and in agriculture BAM 3,662. Thus, the results we are recording are not only statistically insignificant they are also very small.<sup>30</sup> A key question is whether this group of people have the know-how to expand their business in a profitable way. From our results here, it seems not.

Table 5 shows that while the percentage of business owners in our sample was about 62 percent at baseline<sup>31</sup> this had decreased to 50.7 percent for the controls at the time of the follow-up survey, most likely reflecting the severe impact of the financial crisis on small-scale entrepreneurs. Thus the program impact was to reduce the decline in business ownership during the financial crisis, a possible reflection of the importance of credit in propagating the crisis. The difference is driven both by fewer existing businesses closing and more new ones opening among the treated respondents. Overall, about 35 percent of business owners in our sample closed their business between the two survey rounds, and only 14 percent started one over this period.

Table 5: Business ownership: Baseline versus follow-up (%)

		Owns business at follow-up					
		Treatment			Control		
		Yes	No	Total	Yes	No	Total
Owns business at baseline (%)	Yes	42.6	20.5	63.2	38.3	23.0	61.3
	No	14.5	22.3	36.8	12.4	26.4	38.7
	Total	57.2	42.8	100.0	50.7	49.3	100.0

Cross-tab for business ownership at baseline and follow up by treatment and control group. Reported numbers are percentage of respondents.

### C. Impact on consumption and savings

Table 6 describes consumption at baseline, while Table 7 shows the estimated impacts. The first row shows the effect on the household’s overall consumption expenditure, which includes money spent on food (inside and outside of the house), other non-durables (such

<sup>30</sup>Karlan and Zinman (2011) also find no evidence of profitable investments. Contrary to their analysis, our treatment effects do not show a negative impact on subjective well-being (as measured by stress levels).

<sup>31</sup>63 percent in the treatment and 62 percent in the control group

as rent, bills, clothes, and recreation) and durables (large, infrequent purchases which here include educational expenses, the purchase of vehicles, and vacations).<sup>32</sup>

Table 6: Descriptive baseline statistics: Consumption

Variable -	Overall		Business at baseline		By education		Diff C-T (se)
	(BAM)	(US \$)	Yes	No	Low	High	
	(1)	(2)	(3)	(4)	(5)	(6)	
Total consumption (annual)	11,964 (23,659)	7,324	11,230 (17,855)	13,181 (30,967)	8,957 (11,680)	13,470 (27,667)	-1,566 (1,417)
Food consumed at home (weekly)	90.6 (70.5)	65	88.7 (70.5)	93.68 (70.5)	83.73 (68.1)	94 (71.5)	1.10 (4.51)
Food consumed outside (weekly)	15.3 (32.5)	11	15.5 (32.9)	14.98 (31.7)	10.50 (21.5)	17.7 (36.5)	-1.00 (2.04)
Cigarettes and alcohol (weekly)	20.2 (31.7)	14	9.6 (15.7)	38.04 (51.5)	8.89 (14.4)	25.98 (38.7)	-17.70 (18.16)
Other non-durables, monthly	263.2 (1187)	257	246.1 (1270)	168 (1037)	300 (787)	3,139 (1342)	-78.10 (73.11)
Durables, annual	2,325 (4,845)	1,663	2,171 (4,235)	2,579 (5,710)	1,565 (3,107)	2,704 (5,473)	288.90 (321.27)

Notes: See notes in earlier tables. Consumption in BAM unless US \$ stated. Control-treatment differences in the last column relate to the overall sample. Standard deviations in parentheses.

We find that those with low education reduced their consumption significantly. They let their weekly food consumption at home decline by approximately BAM 18 (US\$ 13), which amounts to 22 percent of the household's home food consumption; at the same time there was no change in food consumption outside of the home. These results are consistent with investments being lumpy so that households have to use their own resources to complement the loan. We may also have expected an increase in consumption for those who already had a business; however the difference between the two groups (by ownership of business at baseline) were small and insignificant and hence not reported.<sup>33</sup>

<sup>32</sup>Food expenditures were collected over a recall period of a week, other non-durables over a period of a month, and durables over a period of a year. To calculate the aggregate spending amount we assume that the week and month about which the household was asked were representative for the year. This assumption is not important in view of the impact analysis (as we compare treatment and control groups over the same period) but does play a role when we put the value of expenditures in context, for instance by comparing them to income.

<sup>33</sup>An alternative interpretation is that households that struggled to repay reduced consumption in order to avoid default and a loss of access to future credit. When we look at the distribution of the change in food consumption between baseline and follow-up, we see that for those that were at any point late in their repayment the distribution is shifted to the left. Yet, when we estimate the effect on consumption while constraining the sample to those households without repayment problems, the estimated coefficient and standard

Table 7: Impact on consumption

	Overall	By education	
		Low	High
	(1)	(2)	(3)
Total consumption (annual)	-608.1 (491)	-1,227** (621)	-388 (653)
Food consumed at home (weekly)	-4.145 (4.94)	-18.33** (7.45)	2.61 (6.30)
Food consumed outside (weekly)	0.042 (2.05)	0.796 (2.64)	-0.39 (2.74)
Cigarettes and alcohol (weekly)	-2.427* (1.33)	-1.71 (1.61)	-2.77 (1.78)
Other non-durables (monthly)	-16.44 (15.4)	-40.52 (28.4)	-14.9 (22.8)
Durables (annual)	-71.27 (2,589)	28.99 (62.58)	-137.3 (377.4)

Notes: See notes in earlier tables. Effects in BAM. Baseline covariates included in all regressions. \* significant at a 10 percent significance level; \*\* at the 5 percent level.

A final interesting finding in Table 7 is that marginal households significantly reduce their alcohol and cigarette consumption -typical “temptation goods” (Banerjee et al., 2010 and Banerjee and Mullainathan, 2010)- compared with the control group. The expenditures at baseline for these goods were on average 10 percent of total consumption expenditures. At the time of the follow-up survey, marginal clients spent about 12 percent less on alcohol and cigarettes than they did at baseline due to the loan.

If investments are lumpy, households may keep savings and appear not to be liquidity constrained. However, when a loan becomes available, a profitable investment may become feasible when the loan is combined with household savings. Hence, exactly as with consumption we may also observe a decline in savings as a result of the loan availability. In line with this, we find that households of marginal clients who already had a business at baseline as well as those with higher education reduce the amount of their savings significantly compared with the control group (Table 8). The Table shows also that the effect on savings is concentrated among those with businesses and higher education at baseline, who error change only marginally. This indicates that the decrease in consumption is driven by more than just repayment problems.

Table 8: Impact on savings

	Overall	Business at baseline		By education		Diff C-T (se)
		Yes	No	Low	High	
	(1)	(2)	(3)	(4)	(5)	
Effect on Savings (BAM)	-422.5** (174.5)	-539.3** (256.7)	-106.0 (181.4)	144.4 (230.0)	-698.2*** (233.3)	
Savings at Baseline (BAM)	1,120 (2,803)	1,369 (3,123)	705 (2,112)	722 (1,974)	1,318 (3,118)	-12.60 (180.06)

The first row is the impact on savings; the second shows the level of savings at baseline (standard errors in parentheses). Estimations include covariates. Control-treatment differences in the last column relate to the overall sample. Remaining notes as in other tables

indeed had most of the savings.

Combining these results with the findings on consumption it seems that the loan offered during the experiment relaxed liquidity constraints but only up to a certain extent. Households still had to find additional resources to be able to invest the minimum amount of capital that was needed. Those households that already had a business and those that have higher education could do so by running down their savings. In contrast, low-educated households did not have enough savings and hence reduced their consumption.

#### D. Impact on hours worked and school attendance

Table 9 displays the estimated impact on labor supply. The upper panel looks at total hours worked and the lower panel at hours worked in the household business.<sup>34</sup> While we do not find a change in the overall hours worked by the household as a whole (27 hours at baseline), we do find that children 16-19 worked on average 20 hours per week more than children of the same age in the control group - an effect that is significant at the 5% level.<sup>35</sup> And children of marginal clients with not more than primary education work on average 29 hours more than the control group; this effects is significant at 10%.

The lower panel of Table 9 indicates that the additional hours worked are indeed spent

<sup>34</sup>Table VI. provides descriptive statistics for the number of hours worked at the time of the baseline survey by household members of various age groups.

<sup>35</sup>At baseline the hours of work for children 16-19 was about 5 and the p-value for the difference between treatment and control group was 0.115. Descriptive statistics are reported in Table A6 in the appendix.

Table 9: Impact on labor supply

	Overall	Business at baseline		By education	
		Yes	No	Low	High
	(1)	(2)	(3)	(4)	(5)
<b>Total hours worked</b>					
by all hh members	-2.680 (1.922)	-3.285 (2.527)	-1.640 (2.822)	-3.669 (3.610)	-2.105 (2.254)
by hh members age 16-19	13.60 (10.62)	20.41* (11.01)	1.009 (30.66)	29.39* (17.39)	6.375 (13.40)
by hh members age 20-64	-2.421 (1.853)	-4.011* (2.409)	-0.236 (2.859)	-4.426 (3.471)	-1.430 (2.195)
<b>Hours worked in business</b>					
by all hh members	1.237 (2.691)	0.949 (3.167)	1.396 (4.816)	0.911 (4.739)	1.589 (3.276)
by hh members age 16-19	20.55** (9.996)	– –	– –	34.61* (18.30)	13.19 (11.65)
by hh members age 20-64	1.509 (2.666)	0.746 (3.082)	2.357 (4.915)	0.378 (4.709)	2.267 (3.273)
per hh member age 16-64	3.925** (1.954)	3.793** (2.295)	3.342 (3.338)	3.548 (3.326)	4.092* (2.394)

Notes: See earlier tables. In the online appendix Table A6 we show that the baseline differences between treatment and control in hours are both very small and insignificant.

in the business. Children aged 16-19 of low-educated households work on average 35 hours per week more in the business compared with the control group. The bottom row shows that the hours of work in the business per household member increased by about 4 as a result of microcredit, showing an increased overall effort and not just substitution between members of the household. Thus microcredit increased work effort in the business and increased the labor supply for 16-19 year old children.

Table 10: Impact on school attendance

	Overall	By education	
		Low	High
	(1)	(2)	(3)
<b>School attendance</b>			
Age 7-15	-0.002 (0.016)	-0.011 (0.025)	0.004 (0.021)
Age 16-19	-0.089* (0.054)	-0.193** (0.084)	-0.028 (0.067)

Notes as in earlier tables.



We now examine whether the increase in working hours is at the same time accompanied by a decrease in school attendance for these children. Table 10 indicates that this is indeed the case. We estimate the effect of the intervention on the likelihood of attending school for each household member younger than 20 years and compare different age groups. School attendance decreases significantly for teenage children aged 16-19. The results suggest that they are 9 percentage points less likely to attend school due to the intervention. This overall effect is driven by the children of borrowers with at most primary education - those for whom we also observe an increase in working hours. Due to the micro-credit program, teenage children aged 16-19 in these households are in fact 19 percent less likely to attend school than in the control group. Table A7 in the appendix shows that children of households with lower education levels were already less likely to attend secondary school before the program started. The intervention seems to have reduced schooling further, consistent with the idea that households with lower perceived returns to education (as may be those with low education) find the opportunity of having their children work in the household business more attractive than education.

## **V. Subsidized lending or sustainable expansion of loans?**

Our intervention consisted of extending loans to poorer individuals who would otherwise have limited access to finance as private institutions such as MFIs and commercial banks mostly considered it too risky to lend to this group. In this section we show that in fact lending to this group was loss-making and involved a large subsidy towards the participants of the program. As we argued earlier, if the quality signal from repayment activity remained private the MFI could use such a subsidy to discover the better clients and recoup the costs of experimentation from the surviving clients. However, it is hard to believe that such a signal can remain private.

To assess the profitability of the marginal lending program we compare all loans disbursed to marginal clients between December 2008 and May 2009 and due by June 2012 to those of regular borrowers over the same period in Table 11. One should keep in mind that

Bosnia went through a deep economic crisis at the time of the experiment and it is therefore important to compare the profitability of our experimental borrowers with the benchmark of regular clients of our MFI. Since the results are almost identical for men and women (an interesting result in itself) we only list the totals, with the detailed table relegated to Table A8 in the appendix.

It becomes clear that the new marginal client group was significantly more risky than either first-time or all regular clients of our MFI. In particular, late payment (column 4) is 1.5 times as high among marginal clients compared with regular first-time clients (46 versus 31 percent) while in the end non-repayment (column 5) among the marginal clients is even three times as high compared with regular clients (26 versus 9 percent). The last column reports the internal rate of return: while for regular borrowers this is 13-14%, for the marginal borrowers it is minus 11% implying losses for the MFI (regardless of the discount rate that we apply).<sup>36</sup>

Table 11: Repayment performance of regular and marginal borrowers

	No of Loans	Average loan size	Average interest rate	% Ever late	% Written off	% Repaid	% IRR
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Reg borrowers 1 <sup>st</sup> time & repeat	14,318	3,238	21%	29%	9%	89%	12.8%
Reg borrowers 1 <sup>st</sup> time	7,350	3,114	21%	31%	9%	89%	13.7%
Marginal borrowers	578	1,653	22%	46%	26%	71%	-11.1%

IRR: Internal rate of return. Currency: BAM

Although our MFI charged an interest rate of 22 percent per year, the lending program was not profitable due to a high level of non- and late repayments. As mentioned, 26 percent of the loans had to be written off and 46 percent of the borrowers were at least once late with monthly repayments. .

If we add up the total amount of loans that were never paid back by the marginal borrowers, as well as the foregone interest on these loans, and then divide this amount by the total number of marginal borrowers, we arrive at an implicit subsidy by our MFI to the average marginal borrower of 387 BAM (US\$ 268). This corresponds to approximately

<sup>36</sup>Our MFI receives concessional funding from various NGOs and development institutions. The average concessional funding rate is just under 40 percent of the costs of its commercial funding.

one fourth of the average loan amount extended to marginal borrowers. Whether a subsidy of this magnitude can be recovered by future loans to the clients who were revealed to be high quality is an important question that only follow up data can reveal. This would complete the answer as to whether such a loss-making intervention can be sustained without public-sector funding.

Table 12: Default probability

Variable	Coeff.	Coeff.	Coeff.
	(Std.Err.)	(Std.Err.)	(Std.Err.)
	(1)	(2)	(3)
Marginal client	0.174*** (0.019)	0.162*** (0.019)	0.166*** (0.019)
Covariates	No	Yes	Yes
Branch fixed effects	No	No	Yes
No. of Obs.	14,896	14,896	14,896
Log-likelihood	-4,678	-4,521	-4,432

'Marginal client' (=1 if the borrower is a marginal client and zero otherwise). Standard errors in brackets. The specifications in columns 2 and 3 include a set of covariates (borrower characteristics) and the specification in column 3 also branch fixed effects. \* significant at a 10 percent significance level; \*\* at the 5 percent level and \*\*\* at the 1 percent level. For variable definitions see Table A9 in the Appendix.

To get a better understanding of *why* marginal borrowers are more risky, we ran a set of probit regressions on a sample that contains both the regular and the marginal clients. The dependent variable is a *Default* indicator. Table 12 summarizes our results. The key point here is that the excess default rate of marginal borrowers (at about 16-17%-points) cannot be explained away by observable characteristics such as age, gender, marital and economic status.

In Table 13 we explore the correlation of two measures of default ('ever late with a repayment' and 'non-repayment') with observable characteristics and the information collected and assessed by the loan officer. This is all within the sample of the marginal borrowers. In columns 1-2 and 5-6 we only include three regressors that indicate whether a loan officer thought that an applicant satisfied our MFI's standard requirements in terms

Table 13: Late payment and default probability

	Ever late		Default	
	(1)	(2)	(3)	(4)
The applicant meets our MFI's...				
collateral requirement	0.134*	0.102	0.0252	0.00712
	(0.073)	(0.075)	(0.061)	(0.061)
repayment capacity requirement	-0.0950	-0.0477	-0.0761	-0.0538
	(0.069)	(0.074)	(0.061)	(0.064)
credit history requirement	-0.0141	-0.0314	-0.0246	-0.0482
	(0.081)	(0.085)	(0.069)	(0.075)
The applicant appears to be...				
...competent		-0.166**		-0.0839
		(0.075)		(0.066)
...stable		-0.0998		-0.0531
		(0.070)		(0.061)
...aggressive		0.0404		0.118
		(0.149)		(0.137)
...a risk-taker		0.0537		0.0880*
		(0.063)		(0.052)
Covariates	Yes	Yes	Yes	Yes
Branch fixed effects	Yes	Yes	Yes	Yes
No. of Obs.	403	389	403	389
Log-Likelihood	-247.9	-234.5	-206.4	-195.0

'Probit regression. Ever late' indicates at least once late with repaying. 'Default' indicates whether a marginal client defaulted. The regressors reflect loan officers' views about clients at the time of granting the loan. Standard error in parentheses. See also notes in earlier tales

of collateral, repayment capacity, and credit history. In columns 3-4 and 7-8 we add loan officers' judgments of various character traits of the marginal clients. Columns 2, 4, 6, and 8 contain the covariates and branch fixed effects that we used in Table 12.

We find a positive correlation between compliance with our MFI's collateral requirement and late payment though not with actual default. The coefficient declines once we add the various other soft and hard client characteristics. The fact that we find a *positive* correlation between collateral and late payments is an interesting indication of adverse selection: to be a marginal client despite having collateral reveals other strong negative characteristics relating to repayment capacity. However the loan officers seem to understand the actual quality of the applicant since the effect is explained away by her assessment.

All this suggests that the loan officers had good reason to classify our target population as marginal. It also raises the issue of whether formal and simple credit scoring can get round adverse selection as effectively as the loan officers were able to; however one also needs to compare the costs of each approach.

## **VI. Discussion and conclusion**

Our experimental evidence has yielded a rich set of results that are either new or reinforce evidence from earlier experimental papers. As a result of the loans, consumption tends to decline or remain the same and the same holds for savings. Business ownership increases and, interestingly, consumption of temptation goods declines which also shows an emphasis on the business and confirms earlier results. Finally, inventory holdings increase across the board. This all adds up to a promotion of business activity by the loans and indicates the prevalence of liquidity constraints and of indivisible investments, which inhibit the creation of new businesses.

Yet, we do not observe an increase in income or in business profits and we therefore do not have a direct indication that these loans will alleviate poverty. Moreover, the loans do not seem to benefit the poorest among our marginal clients: business ownership increased primarily among those with higher education. As a result of the experiment the higher educated also mainly increased their business activity in services, while the low educated did so in agriculture - a typically low-return activity. Of course, even the higher educated individuals are not particularly well off, but the loans do simply not seem to be as helpful for the poorest : without much human capital it may be hard to put loans to good use. More generally, liquidity constraints may not be the only impediment to income growth; training that allows better identification of business opportunities and possibly better management may also be crucial elements of a policy that encourages the poor into successful self-employment.

A key result in this paper is the increase in labor supply and related decrease in school attendance by children aged 16-19. There has been no such effect for younger children who

remain unaffected. Given the prevalence of liquidity constraints and given the possibility of other imperfections discussed in the paper, this is likely to be inefficient and detrimental at least from the perspective of the child. Such an unintended effect may lead to negative impacts in the long run if no corrective policy is put in place. For example, a conditional cash transfer program could be used to ensure that children complete high school while at the same time alleviating liquidity constraints for poor households. In any case we already showed that the loan program includes an implicit subsidy of US\$ 268 to the households in this group. Thus the evidence suggests that if the aim is to subsidize poor households to start a business a CCT program could be more efficient tool by achieving the dual role of alleviating constraints and improving schooling outcomes, instead of getting business activity to compete with schooling. An interesting policy to consider is a two-tiered one: a CCT component and an additional micro-loan to offer greater scope for expanding businesses.

## References

- Acemoglu, Daron, and Jörn-Steffen Pischke.** 1999. “The Structure of Wages and Investment in General Training.” *Journal of Political Economy* 107: 539–572.
- Altonji, Joseph G.** 2005. “Employer Learning, Statistical Discrimination, and Occupational Attainment.” *American Economic Review Papers and Proceedings* 95(2): 112-117.
- Attanasio, Orazio, Britta Augsburg, Ralph De Haas, Emla Fitzsimons, and Heike Harmsgart.** 2011. “Group Lending or Individual Lending? Evidence from a Randomized Field Experiment in Mongolia.” Working Paper No. 136, European Bank for Reconstruction and Development, London.
- Banerjee, Abhijit, Esther Duflo, Rachel Glennerster, and Cynthia Kinnan.** 2010. “The Miracle of Microfinance? Evidence from a Randomized Evaluation.” BREAD Working Paper No. 278.
- Banerjee, Abhijit, and Sendhil Mullainathan.** 2010. “The Shape of Temptation: Implications for the Economic Lives of the Poor.” NBER Working Paper No. 15973.

- Beegle, Kathleen, Rajeev H. Dehejia, and Roberta Gatti.** 2006. "Child Labour and Agricultural Shocks". *Journal of Development Economics* 81(1): 80-96.
- Berger, Allen N., and Gregory F. Udell.** 1995. "Relationship Lending and Lines of Credit in Small Business Finance." *Journal of Business* 68: 351-382.
- Collins, Daryl, Jonathan Morduch, Stuart Rutherford, and Orlanda Ruthven.** 2009. "*Portfolios of the Poor: How the World's Poor Live on \$2 a Day.*" New Jersey: Princeton University Press.
- Crépon, Bruno, Florencia Devoto, Esther Duflo, and William Parienté.** 2011. "Impact of Microcredit in Rural areas of Morocco: Evidence from a Randomized Evaluation." MIT Working Paper.
- De Mel, Suresh, David McKenzie, and Christopher Woodruff.** 2009. "Are Women More Credit Constrained? Experimental Evidence on Gender and Micro-Enterprise Returns." *American Economic Journal: Applied Economics* 1(3): 1-32.
- Demirgüç-Kunt, Asli, Leora F. Klapper, and Giorgios A. Panos.** 2011. "Entrepreneurship in Post-Conflict Transition – The Role of Informality and Access to Finance." *Economics of Transition* 19(1): 27-78.
- European Commission.** 2010. *Bosnia and Herzegovina 2010 Progress Report*, Brussels.
- Fafchamps, Marcel, David McKenzie, Simon R. Quinn, and Christopher Woodruff.** 2011. "When is Capital Enough to Get Female Microenterprises Growing? Evidence from a Randomized Experiment in Ghana." Policy Research Working Paper No. 5706, World Bank, Washington D.C.
- Field, Erica, and Rohini Pande.** 2008. "Repayment Frequency and Default in Micro-Finance: Evidence from India." *Journal of the European Economic Association* 6(2-3): 501-9.
- Feigenberg, Benjamin, Erica Field, and Rohini Pande.** 2010. "Building Social Capital Through Microfinance." NBER Working Paper No. 16018, National Bureau of Economic Research, Cambridge, M.A.
- Friedman, Milton.** 1957. "*A Theory of the Consumption Function.*" New Jersey: Princeton University Press.

- Ghatak, Maithreesh and Timothy W. Guinnane.** 1999. "The Economics of Lending with Joint Liability: A Review of Theory and Practice." *Journal of Development Economics* 60: 195-228.
- Giné, Xavier, Pamela Jakiela, Dean Karlan, and Jonathan Morduch.** 2010. "Microfinance Games." *American Economic Journal: Applied Economics* 2: 60-95.
- Giné, Xavier and Dean Karlan.** 2010. "Group versus Individual Liability: Long-term Evidence from Philippine Microcredit Lending Groups." mimeo.
- Hartarska, Valentina and Denis Nadolnyak.** 2007. "An Impact Analysis of Microfinance in Bosnia and Herzegovina." William Davidson Institute Working Paper No. 915, University of Michigan.
- Jacoby, Hanan G.** 1994. "Borrowing Constraints and Progress through School: Evidence from Peru." *Review of Economics and Statistics* 76(1): 151-160.
- Jacoby, Hanan G. and Emmanuel Skoufias.** 1997. "Risk, Financial Markets, and Human Capital in a Developing Country", *Review of Economic Studies* 64: 311-335.
- Kaboski, Joseph P. and Robert M. Townsend.** 2012. "The Impact of Credit on Village Economies", *American Economic Journal: Applied Economics* 4(2): 98-133.
- Kaboski, Joseph P. and Robert M. Townsend.** 2011. "A Structural Evaluation of a Large-Scale Quasi-Experimental Microfinance Initiative", *Econometrica* 79(5): 1357-1406.
- Karlan, Dean and Jonathan Zinman.** 2010. "Expanding Credit Access: Using Randomized Supply Decisions to Estimate the Impacts", *Review of Financial Studies* 23(1): 433-464.
- Karlan, Dean and Jonathan Zinman.** 2011. "Microcredit in Theory and Practice: Using Randomized Credit Scoring for Impact Evaluation", *Science* 332(June): 1278-1284.
- Kring, Thomas.** 2004. "Microfinance as an Intervention against Child Labour in Footwear Production in the Philippines." Working Paper No.12, School of Development Studies, University of Melbourne.
- Maurer, Klaus and Justyna Pytkowska.** 2011. "Indebtedness of Microfinance Clients in Bosnia and Herzegovina. Results from a Comprehensive Field Study." European Fund for Southeast Europe Development Facility, mimeo.



- Menon, Nidhiya.** 2005. “The Effect of Investment Credit on Children’s Schooling: Evidence from Pakistan.” mimeo, Brandeis University.
- Morduch, Jonathan.** 1998. “Does Microfinance Really Help the Poor? New Evidence on Flagship Programs in Bangladesh.” Princeton University Working Paper.
- Morduch, Jonathan and David Roodman.** 2009. “The Impact of Microcredit on the Poor in Bangladesh: Revisiting the Evidence.” Center for Global Development Working Paper No. 174 (revised in December 2011).
- Nelson, Leah K.** 2011. “From Loans to Labor: Access to Credit, Entrepreneurship and Child Labor.” mimeo, University of California, San Diego.
- Pitt, Mark M. and Shahidur R. Khandker.** 1998. The Impact of Group-Based Credit Programs on Poor Households in Bangladesh: Does the Gender of Participants Matter?” *Journal of Political Economy* 106(5): 958-98.
- Roodman, David.** 2012. “*Due Diligence. An Impertinent Inquiry into Microfinance.*” Center for Global Development, Washington, D.C.
- Wydick, Bruce.** 1999. “The Effect of Microenterprise Lending on Child Schooling in Guatemala.” *Economic Development and Cultural Change* 47(4): 853–869.

## **Appendix for Online Publication**

### **A1 Characteristics of marginal clients**

When identifying marginal clients loan officers followed our MFI's regular screening procedures as closely as possible. Since the decision on whether a loan applicant was marginal or not was not based on a credit-scoring system but on the loan officers' judgement, we asked loan officers to fill in a questionnaire about each marginal client. This questionnaire elicited a number of both objective and subjective assessments in order to help us better understand the composition of our population. Of course we cannot compare these to the traits of the regular clients. Our only benchmark in this exercise is whether the clients satisfy the requirements for regular clients.

First, loan officers had to indicate whether they thought that the client conformed with our MFI's requirements regarding the amount of available collateral, repayment capacity (based on estimated cash flows), the client's overall creditworthiness, his or her business capacity, and finally the client's credit history (if any). We find that the average marginal applicant did not meet 2.6 out of six main requirements of our MFI. Table A1 shows that most marginal credit applicants were considered marginal because they did not possess sufficient collateral (77 percent) or did not meet one or more of the 'other' requirements, which include an assessment of the applicant's character. About one in three marginal clients were judged to have a weak business proposal while loan officers worried about repayment capacity in about a quarter of the marginal applications. Loan officers were also asked which aspects of a potential marginal client they thought were most and least worrisome. The last two columns of Table A1 show that (a lack of) collateral was seen as most worrisome. On the other hand, loan officers report to be least concerned about credit history, which is less relevant for first-time borrowers, or the client's repayment and business capacity.

Second, because the loan officer's view of the applicant's character also feeds into the decision to provide a loan or not, we asked loan officers to rate a number of personality

traits on a scale of 1 to 5 (1 representing total agreement and 5 total disagreement). These traits included whether they perceived the marginal client to be competent, reliable, aggressive, trustworthy, etc. Table A2 (columns one and two) shows descriptive statistics for a summary indicator where agreement (‘totally agree’ and ‘agree’) is coded as one and disagreement (‘somewhat agree’, ‘disagree’, and ‘totally disagree’) as zero. The biggest ‘gaps’ are perceived to be in the applicants’ knowledge (almost 50 percent are not perceived as knowledgeable) and their integration into society (more than 50 percent are not seen as well integrated). We also asked loan officers whether each of these character traits would influence the prospective client’s business success. From the third column in Table A2 we can see that if a marginal client was perceived to be insecure, loan officers typically believed this insecurity would have an impact on the client’s business. Likewise, if a client was characterized as a risk-taker, then loan officers thought in about 70 percent of the cases that this trait would influence the success of the business.

**Table A1a. Marginal applicants not meeting our MFI’s requirements (%)**

	Mean (1)	Std.Dev. (2)	Mean	
			(3a)	(3b)
No. of requirements not met	2.55	1.24		
<u>our MFI’s requirement</u>			Most	Least
			<u>worrisome</u>	
Sufficient collateral	0.766	0.424	0.632	0.072
Repayment capacity	0.244	0.430	0.130	0.203
Creditworthiness	0.196	0.397	0.164	0.086
Business capacity	0.377	0.485	0.174	0.177
Credit history	0.141	0.348	0.026	0.445
Other (incl. characteristics)	0.838	0.369	0.022	0.017

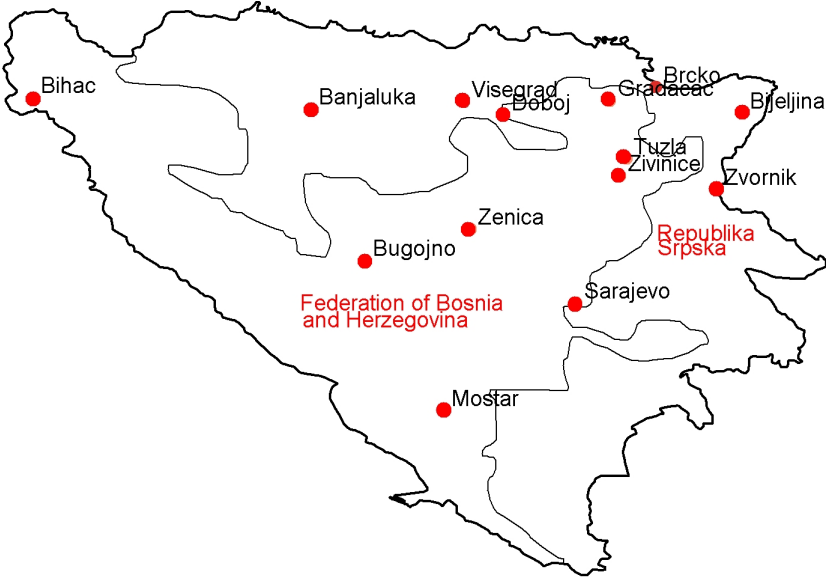
This table shows the mean and standard deviation of the number of requirements of our MFI that marginal clients did not meet according to their loan officer. For each requirement the table also shows the percentage of clients that did not meet that requirement and the percentage of cases where the loan officer judged this deficiency to be either the most or the least worrisome.

**Table A1b. Judgement of applicants' characteristics**

Loan officer perceives applicant as...	Mean (1)	Std.Dev. (2)	Most risky (3)
...reliable	0.703	0.456	0.028
...a fighter	0.700	0.458	0.029
...competent	0.683	0.465	0.016
...trustworthy	0.664	0.472	0.045
...clever	0.650	0.477	0.005
...stable	0.644	0.479	0.028
...experienced	0.638	0.461	0.138
...knowledgeable	0.514	0.500	0.086
...well-integrated into society	0.481	0.500	0.269
...a risk-taker	0.444	0.497	0.698
...insecure	0.086	0.281	1.000
...aggressive	0.072	0.259	0.014

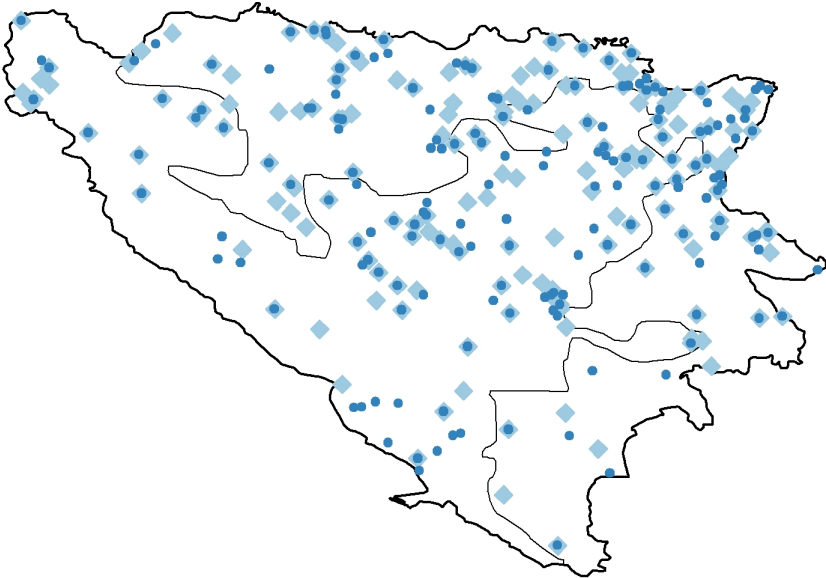
Columns (1) and (2) show summary statistics for variables that indicate whether the loan officer perceived a client to have certain characteristics. Column (3) shows, conditional on whether the client is perceived to have this characteristic, whether the loan officer believes that it will influence the client's business success.

Figure A1a Geographical location of participating branches



Note: This map shows the location and names of the 14 branches of our MFI that took part in the experiment

Figure A1b Geographical location of treatment and control households



Note: This map shows the localities with one or more treatment (dark-blue dots) or control (light-blue squares) households

**Table A2. The marginal client's household**

Variable		Baseline sample			
		Full		Re-interviewed	
		Mean C	Diff. C-T (std.dev)	Mean C	Diff. C-T (std.dev)
		(1)	(2)	(3)	(4)
HH composition	# Male	1.735	-0.154 (0.058)	1.736	-0.169 (0.065)
	# Female	1.689	-0.008 (0.057)	1.712	-0.009 (0.064)
	# Children aged 0-5	0.286	0.032 (0.032)	0.304	0.035 (0.037)
	# Children aged 6-10	0.265	-0.005 (0.032)	0.282	-0.009 (0.037)
	# Children aged 11-15	0.286	-0.113 (0.036)	0.291	-0.116 (0.039)
	# Children aged 16-19	0.253	-0.049 (0.031)	0.236	-0.047 (0.033)
	# Elderly (>64yrs)	0.183	0.038 (0.025)	0.185	0.039 (0.027)
Activity of hh members	# Attending school	0.701	-0.140 (0.055)	0.723	-0.146 (0.061)
	# Employed	1.083	-0.101 (0.054)	1.097	-0.072 (0.059)
	# Unemployed	0.721	0.027 (0.052)	0.685	-0.021 (0.057)
	# Retired	0.313	0.013 (0.031)	0.313	0.001 (0.034)
Consumption	Food (weekly)	109.9	2.740 (5.282)	105.91	0.040 (5.418)
	Other non-durable (monthly)	235.81	-53.15 (67.616)	213.51	-78.092 (73.105)
	Durable (annual)	2433.6	185.60 (278.5)	2490.5	247.41 (313.65)
No of observations		T: 637 C: 569		T: 551 C: 444	

This table provides summary statistics on both the potential marginal clients that received credit (T) and those in the control group (C). Column 1 provides the sample mean for the entire control group at baseline. Column 2 shows the mean difference between the control and the treatment group with the corresponding standard error. Household consumption and income are expressed in Bosnia-Herzegovina Convertible Mark (BAM). The exchange rate at baseline was USD 1 to BAM 1.634. For variable definitions see Table A7.

**Table A3. Test of joint significance**

Variable	Coeff.	Std.Err.	z	
	(1)	(2)	(3)	
<i>Respondent characteristics:</i>				
Female	0.050	0.084	0.600	
Age	0.009	0.021	0.410	
Age <sup>2</sup>	0.000	0.000	-0.130	
Marital Status	Never married	0.200	0.125	1.600
	Divorced/separated	0.210	0.159	1.320
	Widowed	-0.032	0.166	-0.200
Highest education	Sec.	-0.089	0.087	-1.030
	Univ.	-0.149	0.192	-0.780
<i>Household (HH) characteristics:</i>				
HH composition	# kids age 0-5	0.022	0.079	0.270
	# kids age 6-10	-0.062	0.103	-0.600
	# kids age 11-16	0.101	0.101	1.000
	# female	-0.047	0.049	-0.950
Activity of hh members	# employed	0.130	0.049	2.640
	# attending school	0.108	0.079	1.380
	# retired	0.106	0.121	0.870
Dwelling type	House	0.001	0.108	0.010
Dwelling owned		0.168	0.121	1.390
<i>HH income sources:</i>				
Self-employment		0.018	0.116	0.150
Agriculture		-0.087	0.123	-0.710
Shop		0.125	0.168	0.750
Manufacturing		-0.094	0.147	-0.640
Private business		-0.003	0.084	-0.040
Government employment		-0.089	0.123	-0.730
Remittances		-0.001	0.092	-0.010
Benefits		0.077	0.089	0.870
Pension		-0.123	0.138	-0.890
Rent		0.185	0.197	0.940
HH income	Total (log)	-0.079	0.061	-1.300
Assets	Total (log)	-0.007	0.017	-0.400
Household has savings		-0.021	0.029	-0.720
<i>Shocks experienced:</i>				
Job loss		-0.112	0.142	-0.790
Bad harvest		0.060	0.165	0.360
Illness of	Earning hh member	-0.057	0.149	-0.390
	Non-earning hh member	0.132	0.150	0.880
Death of	Earning hh member	0.276	0.274	1.010
	Non-earning hh member	-0.490	0.263	-1.860
Employee left		0.225	0.303	0.740
Crime		0.148	0.346	0.430
Competition		-0.074	0.103	-0.720
Other loss		-0.033	0.259	-0.130
Job gain		0.043	0.243	0.180
Business ownership		-0.006	0.100	-0.060
No of loans		0.003	0.008	0.390

This table presents a joint significance test. See Table 9 for variable definitions.

**Table A4. Test of joint significance - including ‘soft’ characteristics**

Variable	(1)	(2)
<i>Indicator whether LO believes the marginal client was...</i>		
...competent	0.013 (0.142)	-0.024 (0.151)
...reliable	0.216 (0.172)	0.215 (0.176)
...trustworthy	-0.019 (0.165)	0.017 (0.171)
...knowledgeable	-0.131 (0.134)	-0.238 (0.140)
...experienced	0.141 (0.139)	0.142 (0.147)
...well-integrated into society	-0.106 (0.140)	-0.099 (0.145)
...clever	-0.108 (0.135)	-0.114 (0.142)
...a risk-taker	-0.029 (0.132)	-0.053 (0.135)
...a fighter	0.066 (0.137)	0.044 (0.147)
...aggressive	-0.021 (0.217)	0.077 (0.222)
...stable	-0.046 (0.155)	-0.063 (0.169)
...insecure	-0.046 (0.210)	-0.121 (0.214)
Constant	0.935 (0.060)	1.801 (1.014)
Covariates		x
Chi2	6.26	55.70
Prob > Chi2	0.902	0.411

This table presents the results of a joint significance test between the treatment and control groups for a wide range of variables (including soft characteristics as reported by the loan officer). Standard errors are reported in brackets. (‘LO’ stands for ‘Loan officer’ and ‘MC’ for ‘Marginal client’.) See Table A7 for variable definitions.



**Table A5. Baseline and follow-up interviews**

Survey	Interview status	#
Baseline	Submitted by implementing agency	1,241
	Refused	33
	Unavailable	2
	Total interviewed	1,206
	Eliminated after interview	8
	Total interviewed and eligible for follow-up	1,198
Follow-up	Refused	100
	Invalid contact information/no answer	88
	Working abroad/moved	7
	Incomplete interview	13
	Hospitalized or dead	3
	Other	5
	Full response	982

This table provides information on the number of interviews during the baseline and follow-up surveys and the reasons why certain potential respondents were not (re-)interviewed.

**Table A6. Descriptive baseline statistics: Labor supply**

	Overall	Business at baseline		By education		Diff C-T
		Yes	No	Low	High	(se)
	(1)	(2)	(3)	(4)	(5)	(6)
<b>Total hours worked...</b>						
by all hh members	27.33 (29.18)	31 (29.90)	21.22 (26.86)	26.52 (29.51)	27.75 (29.01)	-0.2 (1.00)
by hh members age 16-19	4.93 (12.17)	6.13 (12.70)	2.44 (10.66)	5.94 (12.78)	4.36 (11.82)	-1.00 (1.68)
by hh members age 20-64	39.5 (27.91)	45.42 (26.46)	30.22 (27.62)	40.15 (28.62)	39.19 (27.58)	0.50 (1.18)
<b>Hours worked in business...</b>						
by all hh members	13.6 (22.89)	20.65 (25.48)	1.76 (9.49)	14.58 (23.72)	13.1 (22.44)	-0.40 (0.78)
by hh members age 16-19	3.79 (9.60)	5.63 (11.25)	0.0 (0.00)	4.88 (12.78)	3.18 (8.76)	-1.00 (1.28)
by hh members age 20-64	19.07 (25.45)	29.56 (26.31)	2.43 (11.17)	21.47 (26.71)	17.92 (24.74)	0.10 (1.06)
per hh member age 16-64	22.27 (30.21)	34.03 (30.88)	2.16 (14.23)	23.11 (29.28)	21.86 (30.66)	0.50 (0.99)

This table provides descriptive statistics for labor supply at the time of the baseline survey. Column 1 gives information on the mean for the whole sample; columns 2 and 3 means by whether respondents had a business at baseline ('Yes') or not ('No'); and columns 4 and 5 means by whether respondents only had primary education at baseline ('Low') or were more highly educated ('High'). Standard deviations in brackets. The last column provides the p-value for a test of equivalence of means of the treatment versus the control group. For variable definitions see Table A9 in the Appendix.

**Table A7. Descriptive baseline statistics: School attendance**

Variable	Overall	By business status		By education		Diff C-T
		Owner	Start-up	Low	High	(se)
<b>School attendance (fraction)...</b>						
Age 7-15	0.89 (0.30)	0.88 (0.30)	0.89 (0.30)	0.88 (0.32)	0.89 (0.29)	-0.01 (0.029)
Age 16-19	0.93 (0.26)	0.93 (0.26)	0.92 (0.27)	0.89 (0.31)	0.95 (0.23)	0.033 (0.034)

This Table provides descriptive statistics for outcome variables of the impact analysis. Statistics presented are means with corresponding standard deviations in brackets. The last column provides the p-value for the test of equivalence of means of the treated versus the control group.

**Table A8. Repayment performance of regular and marginal borrowers**

	No of Loans	Average loan size	Average interest rate	% Ever late	% Written off	% Repaid	% Active
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Regular borrowers (first-time and repeat)							
All	14,318	3,238	21%	29%	9%	89%	2%
Male	8,574	3,224	21%	29%	9%	89%	2%
Female	5,744	3,260	21%	29%	9%	89%	2%
Regular borrowers (first-time only)							
All	7,350	3,114	21%	31%	9%	89%	2%
Male	4,362	3,105	21%	30%	8%	89%	2%
Female	2,988	3,128	22%	31%	9%	88%	2%
Marginal borrowers							
All	578	1,653	22%	46%	26%	71%	2%
Male	344	1,650	22%	46%	27%	71%	2%
Female	234	1,658	22%	44%	26%	72%	3%

This table gives summary statistics of loan characteristics of all regular, first-time regular, and marginal borrowers of our MFI. Source: our MFI's management information system. For variable definitions see Table A9 in the Appendix.

**Table A9. Variable definitions (alphabetically)**

Variable		Description	Covariate
Activity of hh members	# attending school	No of hh members attending school	x
	# employed	No of hh members whose economic status is "employed"	x
	# unemployed	No of hh members whose economic status is "unemployed"	x
	# retired	No of hh members whose economic status is "retired"	x
Age		Age in years of the respondent	x
Age <sup>2</sup>		Age in years of respondent squared	
Applicant is perceived as...	...reliable	Dummy variable (=1) if the loan officer perceives the marginal client to be reliable	
	...a fighter	Dummy variable (=1) if the loan officer perceives the marginal client to be a fighter	
	...etc.		
Assets	Total (log)	Log of: Total value (BAM) of assets owned by the household	
Average amount (BAM)		Dummy variable (=1) if the household experienced... Amount (BAM) of savings of the household. Amounts were reported in bands (<1,000BAM, 1,000-2,000 BAM, 2,001-4,000 BAM, 4,001-10,000 BAM, > 10,000 BAM) and the midpoint was chosen as an estimate	
Average loan size		Size (BAM) of loan	
Average interest rate		Interest rate (%) charged by our MFI for loan	
Business in agriculture		Dummy variable (=1) if the respondent's main business is in agriculture	
Business expenses		Amount (BAM) of expenses made by the respondent's business	
Business in services		Dummy variable (=1) if the respondent's main business is in services	
Business ownership		Dummy variable (=1) if the respondent owns a business	x
Business profit		Amount (BAM) of profit from the respondent's business	
Business revenue		Amount (BAM) of revenues from the respondent's business	
Cigarettes and alcohol (weekly)		Amount (BAM) spent on cigarettes and alcohol by the household in the last week	
Consumption	Food (weekly)	Amount (BAM) spent on food (inside and outside the house) by the household in the last week	
	Other non-durable (monthly)	Amount (BAM) spent on non-durable items by the household in the last month (rent for residence, combustibles, transport services, clothes and shoes, recreation, magazines, newspaper, books, fees, insurance, remittances, financial gifts.)	
	Durable (annual)	Amount (BAM) spent on non-durable items by the household in the last year (education expenses, furniture, carpets, household textiles, repairs, household appliances, purchase of vehicles, vacation).	
Dwelling type	House	Dummy variable (=1) if the dwelling is a house	
Dwelling owned		Dummy variable (=1) if the household owns its dwelling	
Economic activity	Empl.	Dummy variable (=1) if the respondent is employed	x
Female		Dummy variable that is "1" if the respondent is female	x
our MFI's requirement	Sufficient collateral	Dummy variable (=1) if the respondent meets our MFI's collateral requirement	
	Repayment capacity	Dummy variable (=1) if the respondent meets repayment capacity (based on the estimated real cash flow. See footnote 17 for details.	
	Credit worthiness	Dummy variable (=1) if the respondent is creditworthy	
	Business capacity	Dummy variable (=1) if the respondent's suggested business meets the capacity requirements of our MFI.	
	Credit history	Dummy variable (=1) if the respondent's credit history is in line with our MFI's requirements.	

**Table A9. Variable definitions (alphabetically) - continued**

Variable		Description	Covariate
Food consumed at home (weekly)		Amount (BAM) spent on food consumed by the household at home in the last week	
Food consumed outside (weekly)		Amount (BAM) spent on food consumed by the household outside the home in the last week	
HH income	Total	Total income (BAM) household received in the previous year (wages from self-employment, agricultural work, shop/market work, bank/financial services, manufacturing/industry, tourism, other private business, government, migration/remittances, benefits from government schemes, pensions, income from rental properties, other income sources.)	
	Self-employment	Amount (BAM) households earned in the previous year through self-employment	
	Agriculture	Amount (BAM) household earned in the previous year from agricultural work	
HH Income sources		Dummy variable (=1) if the respondent gets income from...	
	Self-employment	...self-employment	
	Agriculture	...agriculture	
	Shop	...shop/market	
	Manufacturing	...manufacturing	
	Private business	...other private business	
	Government employment	...government employment	
	Remittances	...remittances	
	Benefits	...social benefits	
Pension	...pensions		
Rent	...rent		
HH composition	# male	Number of male household members	x
	# female	Number of female household members	x
	# kids aged 0-5	Number of children aged 0-5 years living in the hh	x
	# kids aged 6-10	Number of children aged 6-10 years living in the hh	x
	# kids aged 11-15	Number of children aged 11-15 years living in the hh	x
	# kids aged 16-19	Number of children aged 16-19 years living in the hh	x
	# elderly (>64)	Number of elderly aged 64 years and above living in the hh	x
Highest education		Dummy variable (=1) if the highest grade completed is...	
	Prim.	...Grade IX or lower	x
	Sec.	...between Grade X and Grade XIII including	x
Univ.	...at least one year at university	x	
Household has savings		Dummy variable (=1) if the household has any savings	
Household contributes weekly		Dummy variable (=1) if the household adds to savings on a weekly basis	
Household contributes annually		Dummy variable (=1) if the household adds to savings on an annual basis	
Household saves for education		Dummy variable (=1) if the household saves for education	
Marginal client		Dummy (=1) if the client is a marginal client	
Marital status	Married	Dummy variable (=1) if the respondent is married	x
Ownership of inventory		Dummy variable (=1) if the hh owns inventory	
% ever late		Dummy variable (=1) if the client was at least once late in repaying the loan	
% written off		Dummy variable (=1) if the loan was written off by our MFI	
% repaid		Dummy variable (=1) if the loan was repaid	
% active		Dummy variable (=1) if the loan is still active	

**Table A9. Variable definitions (alphabetically) - continued**

Variable		Description	Covariate
Rate of return	Internal	Discount rate that makes the net present value (NPV) of the credit program equal to zero	
	Overall	NPV calculated by the overall weighted discount rate, divided by the total amount of loans	
	Commercial	NPV calculated by the weighted commercial discount rate, divided by the total amount of loans	
	Concessional	NPV calculated by the weighted concessional discount rate, divided by the total amount of loans	
School attendance	Aged 7-19	Dummy variable (=) if the hh member ... ...aged 7-19 years attends school	
	Aged 7-15	...aged 7-15 years attends school	
	Aged 16-19	...aged 16-19 years attends school	
Self-employment		Dummy variable (=1) if at least one household member is self-employed	
Shocks experienced	Job loss	Dummy variable (=1) if the household experienced... ... a job loss in the previous year	
	Bad harvest	...a bad harvest in the previous year	
	Illness of earning hh member	...illness of an earning household members in the previous year	
	Illness of non-earning member	...illness of a non-earning household member in the previous year	
	Death of earning member	...death of an earning household member in the previous year	
	Death of non-earning member	...death of a non-earning household member in the previous year	
	Employee left	...that an employee left in the previous year	
	Crime	...crime in the previous year	
	Competition	...competition in the previous year	
	Other loss	...some other loss in the previous year	
Total hrs worked	By all hh members	...job gain in the previous year	
	By hh members aged 16-19	Total no of hours worked by all hh members in the last week	
	By hh members aged 20-64	Total no of hours worked by hh members age 16-19 years in the last week	
Total hrs worked in business	By all hh members	Total no of hours worked by hh members age 20-64 years in the last week	
	By hh members aged 16-19	No of hours worked in the business by all hh members in the last week	
	By hh members aged 20-64	No of hours worked in the business by hh members age 16-19 years in the last week	
Trade Services Agriculture Production		Dummy variable (=1) if the respondent's business is in...	
		...trade	
		...services	
		...agriculture	
Unemployment		...production and manufacturing	
		Dummy variable (=1) if at least one household member is unemployed	
Working hrs (week)	Total	Number of hours worked in total in the last week	x
	Business	Number of hours worked in the business in the last week	

This table provides all variable definitions. The last column indicates whether the variable was used as a control in the regression analyses.