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Abstract

Microfinance at the margin: experimental evidence from Bosnia and Herzegovina

We use a randomised controlled trial (RCT) to analyse the impact of microcredit on poverty reduction in Bosnia and Herzegovina. The study population are loan applicants that would normally have just been rejected based on regular screening. We find that 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 their savings, presumably to complement the loan and to achieve the minimum amount necessary to expand their business. In less-educated households, however, consumption went down. A key new result is that there was a substantial increase in the labour supply of young adults (16-19 year olds). This was accompanied by a reduction in school attendance.

Keywords: Microfinance; liquidity constraints; human capital; randomised controlled trial.

JEL classification: 016, G21, D21, I32.

1. Introduction

A substantial part of the world's population has no or only limited access to formal financial services. Instead these people often need to rely on informal networks and family ties which may be less reliable or relatively expensive (Collins, Morduch, Rutherford and Ruthven, 2009). Credit rationing may constrain the potential entrepreneurs among them in executing profitable investment projects.

The inability of the poor to access formal credit led to the emergence of microfinance institutions (MFIs) at the end of the 1970s. MFIs, as pioneered by the Bangladeshi Grameen Bank, started by lending small amounts of money to groups of low-income individuals on an uncollateralised basis but with joint liability.[1] The rapid growth of microcredit over the last three decades has, however, been accompanied by a move towards individual-liability loans. The empirical evidence on the impact of either type of micro-credit on the economic lives of poor borrowers is still scarce. This paper presents some such evidence from a randomised controlled trial (RCT) in Bosnia and Herzegovina.

The aim of our RCT was to analyse the effect on entrepreneurial activity and poverty reduction of a programme that gave a random selection of poor Bosnian loan applicants, who would otherwise be excluded from loans, access to individual-liability microcredit. The formal reason for their exclusion is in many cases a lack of collateral. However, loan officers also use other, often subjective, criteria to identify eligible applicants. In our experiment collateral requirements were substantially loosened and in general the criteria were relaxed to allow loans to be offered to what can be loosely described as marginal individuals. These clients did not have prior access to credit from our collaborating MFI.

As a result of the intervention we found increased levels of business activity and more self-employment. However, 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 increases in income will appear later as the new or expanded businesses start yielding results. We also document another set of important results: 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.

A further important finding of our study is that the loans led to a decline in school participation and an increase in labour supply of young adults aged 16 to 19. Such unintended effects need to be interpreted carefully. On the one hand, these young adults may be prevented (say through funding restrictions) from attending school by their families who feel internal labour is cheaper and who may not fully take into account the benefits of education that will accrue to the youth. On the other hand, if returns to education are very low, the new home business may provide an opportunity and working there may be a more efficient way of allocating time.[2] This of course begs the question as to why returns to education may be low for poorer families.

[1] 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 join liability affects loan repayment.

[2] The share of the Bosnian labour force younger than 25 that was unemployed was 48.7 per cent in 2009 (European Commission, 2010, p.63).

This paper contributes to two main strands of the literature. First, we add to the still-limited empirical evidence on the poverty impact of microcredit. While the microcredit evaluation literature was sparked by a non-experimental study, Pitt and Khandker (1998), more focus has recently been placed on RCTs to gather rigorous evidence on the effectiveness of microcredit programmes.[3] Our work falls within this group of studies, which focus on the impact of microcredit on business formation and poverty reduction.[4] While a number of studies confirm, for various settings, that microcredit may stimulate business creation, the impact on borrowers and their households remains ambiguous. Attanasio et al. (2011) document positive impacts, including increased food consumption, for those offered group loans. Banerjee et al. (2010) document that those who start an enterprise reduce consumption in order to pay for the fixed start-up cost, whereas non-entrepreneurs increase their consumption. Similar negative impacts on consumption are found by Crépon, Devoto, Duflo and Parienté (2011) for those who expand their existing business. Karlan and Zinman (2010), in a study on consumer loans offered by a South African lender, find net positive benefits for borrowers along a broad range of outcomes, while Karlan and Zinman (2011), in a paper with a similar design to ours, find that access to loans led to a small decline in subjective well-being. Their findings indicate that microcredit mainly helped borrowers to manage risk and smooth consumption but did not lead to profitable investments.

Second, our findings relate to the literature on the relationship between liquidity constraints and schooling. In our context there are two opposing forces at play as a result of offering microcredit. On the one hand, alleviating liquidity constraints can allow increased schooling of children and reduce the demand for child labour.[5] On the other hand, microcredit can increase the demand for labour by the family business. This may result in a reduction of schooling if returns to education are (perceived as) low and hiring outside labour is more expensive than internal labour (say because of regulation or taxes).[6] Kring (2004), Menon (2005) and Nelson (2011) provide empirical evidence to this effect for the Philippines, Pakistan and Thailand, respectively. Our findings suggest that similar mechanisms may play a role in Bosnia and Herzegovina.

There has been some earlier non-experimental evidence on the impact of microcredit in post-conflict Bosnia and Herzegovina.[7] Our experimental study adds to this evidence and

[3] Morduch (1998), Morduch and Roodman (2009) and Roodman (2012) point to the scope for selection bias in non-experimental studies. They replicate Pitt and Khandker's (1998) study and fail to reproduce the positive impacts. Another prominent non-experimental study is Kaboski and Townsend (2005) who find a positive impact of microcredit on consumption but not on investments in Thailand.

[4] See Banerjee, Duflo, Glennerster and Kinnan (2010) who find that offering microcredit in the slums of Hyderabad boosted business creation. Attanasio, Augsburg, De Haas and Harmgart (2011) 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 analyse more specific issues, such as the impact of contract design on repayment rates. For example, Giné and Karlan (2010) analyse 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). Lastly, De Mel, McKenzie and Woodruff (2009) and Fafchamps, McKenzie, Quinn and Woodruff (2011) use RCTs to study the impact of providing microentrepreneurs with grants instead of microcredit and show that relaxing capital constraints through cash grants boosts business profits of men but not women.

[5] See Jacoby (1994), Wydick (1999), and Karlan and Zinman (2010). 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 labour to smooth income.

[6] See Wydick (1999) for example.

[7] Hartarska and Nadolnyak (2007) use a non-experimental approach and find that access to microcredit has alleviated Bosnian firms' financing constraints. Demirgüc-Kunt, Klapper and Panos (2011) find similar results

coincidentally came at a particularly interesting point, namely at the height of the 2008-09 global financial crisis which strongly affected Bosnia and Herzegovina. Various Bosnian MFIs experienced, after years of rapid credit expansion, 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.

for financing constraints at the household level. Their findings suggest that households that received microcredit switched more often from informal to viable, formal entrepreneurs over the period 2001-04.

2. The experiment

At the start of our experiment Bosnia and Herzegovina had an active market for microcredit. Our original aim was to test the benefits of extending microcredit to a poorer segment of the population that was excluded by MFIs. What can be learnt from extending credit to these "marginal clients" and is there a market failure that prevents credit flowing to profitable projects?

In the absence of any market failure (implying that microcredit will include an implicit subsidy) we may ask whether microcredit is to be seen as a way of implementing a social welfare programme in an economy with high levels of informality. For example, microcredit may be an effective alternative to in-work benefit programmes such as tax credits (for example, the Earned Income Tax Credit (EITC) in the United States).

Another possibility is that the market excludes individuals for whom it may be socially efficient to provide loans due to an informational externality. 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 pay-off 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 the entire client relationship.[8] However, this will only work for the MFI 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 programme that promotes loans to this population may also be socially desirable and not obviously provided by the private market.

Longer-run follow-up data will 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.

2.1 Experimental design

We conducted our field experiment together with EKI, a Bosnian MFI.[9] At the start of the experiment, loan officers across all EKI branches were asked to identify potential marginal clients over a period of several months. 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.[10] 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.[11] 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.

EKI 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

[8] This point was suggested by Joe Altonji and draws from Altonji (2005).
[9] EKI was created by World Vision International in 1996 and has currently about 36,000 clients across both the Federation Bosnia i Herzegovina and the Republika Srpska.
[10] EKI did not use an automated credit-scoring system.
[11] The loans offered as part of the experiment were similar to EKI's regular loan product in terms of interest rate (22 per cent per annum in both cases) and maturity (around 11 months).

needed to identify marginal clients, loan officers received a fee of KM 10 (~US$6) for each marginal client to whom a loan was disbursed.[12] 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 per cent risk of having to turn down a solid client due to the randomisation process.

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 six main EKI requirements for regular loans: 77 per cent 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. 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 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 clients were offered a 50 per cent chance of a loan.[13]

Following a pilot in November 2008 in two branches in Gradacac and Bijeljina the experiment was extended two months later to all 14 EKI branches (see Figure 1a in the Appendix). 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.[14] This baseline survey was conducted after the individual was judged to be eligible for participation in the programme but before the randomisation took place. This ensured that responses were not influenced by the outcome of the randomisation 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 per cent probability to either the treatment (receiving a loan) or the control group (no loan).[15] Successful applicants received the loan within a week. Applicants that were allocated to the control group did not receive a loan from EKI for the duration of the study. The last interview and loan disbursal 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 rate substantially.

[12] The exchange rate at baseline was US$ 1 to KM 1.634.

[13] 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, EKI 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. EKI indeed continued to lend to a significant number of marginal clients who repaid on time during the experiment.

[14] The interview lasted up to 60 minutes and was conducted by a professional survey company using computer-assisted telephone interviews (CATI).

[15] The chance of obtaining a loan was slightly higher than 50 per cent (*ex post* 52.8 per cent) 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 randomisation 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 per cent chance on each applicant, but we wanted to avoid occasional batches with too many rejections.

3. Data

3.1 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 1 below and Table A4 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 1: Marginal clients: treatment-control balance, attrition, representativeness

Variable		Baseline sample				Population (LITS '10)	Regular EKI client
		Full		Re-interviewed			
		Mean C	Diff. C-T (std.dev)	Mean C	Diff. C-T (std.dev)		
		(1)	(2)	(3)	(4)	(5)	(6)
Age		37.373	-0.479	37.097	-1.290	45.26	40.3
			(0.708)		(0.767)	(17.04)	
Female		0.392	-0.014	0.405	-0.008	0.52	0.404
			(0.028)		(0.031)	(0.50)	
Marital status	Married	0.612	0.024	0.619	0.008	0.57	0.672
			(0.028)		(0.031)	(0.49)	
Economic activity	Empl.	0.559	-0.013	0.568	0.007	0.38	0.647
			(0.029)		(0.032)	(0.49)	
Highest education	Prim.	0.308	-0.030	0.315	-0.031	0.19	0.10
			(0.027)		(0.030)	(0.390)	(0.306)
	Sec.	0.641	0.020	0.633	0.018	0.63	0.85
			(0.028)		(0.031)	(0.48)	(0.355)
	Univ.	0.051	0.007	0.052	0.010	0.09	0.041
			(0.012)		(0.014)	(0.29)	(0.199)
Working hrs (week)	Total	49.117	0.902	49.191	1.553		
			(1.572)		(1.765)		
	Business	33.527	-0.317	32.743	-0.735		
			(1.706)		(1.913)		
HH income	Total	18,175	819.9	17,716	592.8		
			(834.3)		(880.4)		
	Self-empl.	7,128	-48.61	6,641	-212.80		
			(551.4)		(557.1)		
	Agriculture	266.8	8.143	288.3	37.14		
			(62.90)		(70.10)		
Number of loans outstanding		0.759	0.006	0.802	0.030		
			(0.049)		(0.055)		
Value (BAM) of main three loans		4,937	392	5,224	810		
			(686)		(746)		
No of observations			T: 637 C: 569		T: 551 C: 443		

This table provides summary statistics for the potential marginal clients that received credit (T) and those that did not (C). Column 1 provides the sample mean for the entire control group at baseline. Column 2 shows the mean difference between the control and treatment groups with the corresponding standard error. Columns 3 and 4 show the same statistics for those households that were re-interviewed at follow-up. These first four columns are based on data from the baseline survey. Column 5 contains statistics for the entire Bosnian population based on the EBRD-World Bank Life in Transition Survey (LiTS) 2010. Column 6 shows comparative statistics on regular first-time borrowers based on data from EKI's management information system. For variable definitions see Table A7 in the Appendix.

Table 1 shows that almost 60 per cent of the (potential) marginal clients are male and that their average age is 37 years. Just over 60 per cent 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 per cent of the sample went to university. We also show information on household income of the marginal clients. The average income was KM 18,175 (US$ 11,123) in the year prior to the baseline survey, of which on average KM 7,128 (U$D 4,362) was earned through self-employment and KM 267 (US$ 163) as wages from agricultural activities.

The last rows of Table 1 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 per cent had no loan outstanding and 42 per cent one loan). In 44 per cent of the cases these loans were provided by a bank and in 41 per cent 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) interviewed a random sample of 887 clients of six leading MFIs that represent about 56 per cent of the Bosnian microcredit market. The interviews were conducted just a few months after our baseline survey. The study found that 58 per cent of microcredit clients in Bosnia and Herzegovina had more than one active credit contract, the average was 2.021 per client, and the maximum number of loans was 14.[16]

Columns 5 and 6 in Table 1 allow us to compare the average marginal client to the population of Bosnia and Herzegovina as a whole and to regular (that is, non-marginal) first-time EKI clients, respectively. In column 5, we use 2010 data from the Life in Transition Survey (LiTS) in which 1,000 households were interviewed in Bosnia and Herzegovina, a sample representative at the national level. 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. We also find that on average the marginal client is less educated as relatively many of them completed at most primary education. Comparing the marginal client to first-time borrowers of EKI 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.

3.2 Randomisation 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 1 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. For almost all variables we observe no statistically significant difference between the means of the two groups. The only exception is the number of children aged 11 to 15 (Table A4). However, the number of young children is only 0.11 higher in the treatment

[16] Of course the survey will give a biased outcome in favour of more loans just because of stock sampling; so this comparison is just indicative.

group and the economic relevance of this difference is negligible. When we conduct a joint significance test for all variables together we also find no systematic overall difference between the two groups.[17] We conclude that the randomisation process was successful in that there is no evidence of imbalance between treatment and control.

3.3 Attrition

A total of 1,206 individuals were interviewed before the programme and 995 of these were re-interviewed as part of the follow-up survey.[18] The attrition rate was thus relatively low at 17 percent. Among other efforts to reinterview,[19] people who initially declined were called back later by a senior interviewer and asked once more to participate and were also offered a €10 phone card.[20]

In the end, the response rate among the control group was about 10 per cent lower than in the treatment group. Importantly, however, when we analyse 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 1 and A4).[21] 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 A6 in the Appendix and show that these characteristics are not jointly significant in determining attrition and this is true independent of whether we account for other covariates. We conclude that it is unlikely that attrition undermined the balanced nature of the treatment and control samples and introduced bias in the reported results.

[17] Table A5 in the Appendix contains the full regression results for this test.

[18] Eight baseline respondents were not approved by the loan committee or 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 A3 in the Appendix provides more details on the targeted and actual number of interviews at baseline and follow-up.

[19] 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.

[20] The average yearly income of potential marginal clients was KM 13,381 at baseline. €10 (KM 19) therefore corresponds to 54 per cent of average daily earnings.

[21] 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. Lastly, 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.

4. Some theoretical considerations for interpreting the results

In Appendix A2 we describe a simple model that can explain some of the key findings of our paper. The main premise of the model is that investments are lumpy, in the sense that to start up a business some minimum amount of capital is needed. In addition we assume that it is more expensive to hire external labour because of taxes and regulatory costs. Under these assumptions we show that for households that can make marginal investments, say because they are already in business, an increase in the available loan amount will lead to increases in both investments and consumption (for liquidity-constrained households). However, for households that are facing minimum investment amounts (or indeed other start-up costs) consumption and accumulated savings may decline if the loan amount is insufficient to cover the start-up capital. In this case the household will crowd-in resources by running down other assets and reducing consumption.

In addition some of these households may also reduce the schooling of their young adults (16-19), that is, those facing the choice between schooling and work.[22] This will only happen for those whose expected returns to education are relatively low. In this case, and because of the additional wedge caused by the regulation costs of hiring outside labour, young adults who would have attended school in the absence of a home business will start working and reduce schooling. Moreover the amount of schooling will decline more as the loan amount is increased. In other words, we may see reductions in schooling for both start-up businesses and existing ones. While the negative effect of the loans on consumption should only be temporary, the reduction in schooling will persist even for established businesses when the expected returns to education are relatively low and regulatory costs high. The reduction in schooling does not necessarily point to an inefficiency or to an undesirable effect of microcredit; if the returns to schooling are indeed very low, starting to work at home may be the right thing to do. However, such reductions may also be due to parents not internalising the entire benefits of schooling for their children or because of labour market distortions that create a wedge between household and market labour.

Overall, the model generates four main predictions for households that receive access to loans:

1. Consumption increases for households with an existing business as their liquidity constraint is relaxed (with the proviso that marginal investments are not lumpy).

2. Consumption may decrease for those who start up a business if the loan is not large enough to cover the initial costs.

3. Savings may decrease for those who are starting up a business.

4. Labour supply by young adults may increase and educational participation may decline, in particular for those with lower expected returns to education.

The model predictions are not sharp because they depend on a number of factors we do not observe, such as the extent to which profitable investments are lumpy and larger than the

[22] Education in Bosnia and Herzegovina is free and compulsory for all children aged 7 to 15, while secondary education remains free but is voluntary.

loan, and the expected returns to education. However they point to important features in the results that we should be looking out for and they provide an interpretative framework.

4.1 Do borrowers make lumpy investments?

To examine the extent to which investments are lumpy we analyse reported loan use. A limitation of this approach is that, although the information we collected on loan use is detailed when compared with many other household surveys, the categories are still quite broad. To give an example, we know whether a client used the loan for the purchase of livestock but we do not know whether she bought, say, 20 chickens or one cow. Given such limitations, this section only aims at providing some indicative evidence of the lumpiness of the marginal borrowers' investments.

A first indication of lumpy investments is that on average borrowers used the loan for only 1.32 different purposes (with a standard deviation of 0.59). Thirty per cent of the loans have been used exclusively for one single purpose. From Table 2 we can see that most loans are used for purchasing livestock – 139 marginal clients (24 per cent of all clients) report this use (columns 1 and 2). The average amount used for this purpose was KM 1,636 (~US$ 1,000) (column 3) or about 77 per cent of the average loan amount (column 5). The remainder of these loans were almost completely put towards buying auxiliary agricultural inputs such as seed, fertiliser, and fodder (column 6).

The first two rows of Table 2 show that investments in livestock combined with buying seed, fodder and other agricultural items is indeed very common. A large number of clients have used practically the whole loan amount to start-up or to substantially expand an agricultural activity. This suggests that borrowers had to cover some upfront costs that are more than proportional to returns (that is, are lumpy) to make their investment.

Table 2: Main loan use

Amount used for	Obs.	% clients	Mean	Std.Dev.	% of loan amount	remaining amount: use & %
	(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, fertiliser, 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%

This table reports the number and percentage of marginal clients that used their loan for various purposes (columns 1 and 2); the average amount invested (column 3, in BAM); the standard deviation of this amount (column 4, in BAM); the average percentage of the loan that was used for this purpose (column 5); and the main use of the remaining part of the loan as well as the percentage of this remaining part that was used for this secondary purpose (column 6). Categories with less than five respondents, such as 'purchase of computer/laptop', are omitted. For variable definitions see Table A7 in the Appendix.

5. Results

5.1 Main outcomes of interest and estimation strategy

We start by estimating the impact of microcredit on business ownership and start-up, business profits and household income. We then consider consumption, savings and labour supply, the latter particularly of young adults. We estimate separate treatment effects by splitting the sample according to whether the household had a business at baseline or not and according to the level of education of the marginal borrower. For the latter, we define "low education" as having obtained no more than primary education and "high education" as any grade completed above primary education.

We estimate the effects of the programme through a simple comparison of means of the various outcomes of interest *Y*. To improve precision we include baseline covariates and estimate the following equation using OLS:

(1) $$Y = \alpha_0 + \alpha_1 * T + \alpha_2 * X_b + u$$

where *T* is the treatment indicator (*T=1* if the individual received a loan and *T=0* if not) so that α_1 is the average treatment effect of being offered a loan for our population of loan applicants. X_b is a set of baseline covariates that includes the respondent's age, gender, and marital, educational and economic status. It also includes characteristics such as household composition and the economic status and income level of the individual household members. u is the error term. To estimate how the effect may vary with observable characteristics, we repeat the estimation on suitably defined sub-samples.

5.2 Impact on business creation and development

We first look at the effect on enterprise creation and growth. Note that EKI 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.

Column 1 of Table 3 shows that while unemployment at the household level did not change significantly, self-employment increased. 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 per cent more likely to own a business. Column 5 shows that the 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 control group. There is no significant difference between those that did and did not have a business at baseline (columns 2 and 3). Note that we do not find a significant impact on actual profits generated through these small-scale entrepreneurial activities.[23]

[23] 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 wellbeing (as measured by stress levels).

We also observe some interesting heterogeneity by education level in terms of the types of businesses that are created. Those with no higher than primary education are more likely to start up agricultural activities than the control group.

Table 3: Impact on business creation and development

	ESTIMATED EFFECT				
	Overall	Business at baseline		By education	
		Yes	No	Low	High
	(1)	(2)	(3)	(4)	(5)
Unemployment	-0.009	-0.010	-0.011	-0.066	0.017
	(0.029)	(0.036)	(0.048)	(0.053)	(0.035)
Self-employment	0.060**	0.039	0.082	0.048	0.067*
	(0.029)	(0.034)	(0.052)	(0.050)	(0.036)
Business ownership	0.058*	0.046	0.054	0.037	0.069*
	(0.031)	(0.038)	(0.050)	(0.055)	(0.038)
Business in services	0.031	0.047	0.002	-0.052	0.071**
	(0.025)	(0.033)	(0.036)	(0.042)	(0.030)
Business in agriculture	0.035	0.024	0.048	0.094*	0.008
	(0.028)	(0.037)	(0.041)	(0.053)	(0.032)
Ownership of inventory	0.053**	0.057**	0.041*	0.072**	0.044*
	(0.020)	(0.029)	(0.024)	(0.032)	(0.026)
Business profit (BAM)	671	676	531	234	893
	(541)	(812)	(461)	(979)	(667)
Business expenses (BAM)	601	548	586*	-23.3	864
	(593)	(879)	(331)	(530)	(811)
Business revenue (BAM)	1,384	1,547	1,029	499	1,780
	(981)	(1,464)	(717)	(1,296)	(1,298)

This table shows estimated coefficients for the treatment impact on business creation and development (standard errors in brackets). Column 1 gives estimated effects for the whole sample; columns 2 and 3 show heterogeneous effects for respondents with ('Yes') or without ('No') a business at baseline; and columns 4 and 5 show heterogeneous effects by whether respondents only had primary education at baseline ('Low') or were more highly educated ('High'). Estimations include covariates. * significant at a 10 percent significance level; ** at the 5 percent level. Business profit, expenses, and revenues 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 in the Appendix.

In contrast, those with a higher education are more likely to start up an enterprise in the services sector. Table 4 shows that already at the time of the baseline survey there were some sectoral differences according to education level (although these differences were not statistically significant). Lastly, 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.

Table 5 shows that while the percentage of business owners in our sample was about 62 per cent at baseline (63 per cent in the treatment and 62 per cent in the control group) this had decreased to 54 per cent at the time of the follow-up survey, most likely reflecting the severe impact of the financial crisis on small-scale entrepreneurs. Thus the programme 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 per cent of business owners in our sample closed their business between the two survey rounds, and only 14 per cent started one over this period.

Table 4: Descriptive baseline statistics: Business ownership

	DESCRIPTIVE STATISTICS					
	Overall	Business at baseline		By education		p-value
		Yes	No	Low	High	T vs.C
	(1)	(2)	(3)	(4)	(5)	(6)
Unemployment	0.266	0.260	0.324	0.297	0.251	0.929
	(0.442)	(0.439)	(0.470)	(0.458)	(0.434)	
Self-employment	0.78	0.96	0.47	0.77	0.79	0.540
	(0.41)	(0.19)	(0.50)	(0.42)	(0.41)	
Business ownership	0.62	1.0		0.62	0.63	0.540
	(0.48)	(0.00)		(0.49)	(0.48)	
Business in services	0.18	0.28		0.10	0.21	0.125
	(0.38)	(0.45)		(0.30)	(0.41)	
Business in agriculture	0.24	0.38		0.32	0.20	0.436
	(0.43)	(0.49)		(0.47)	(0.40)	
Ownership of inventory	0.197	0.286	0.043	0.190	0.201	0.601
	(0.398)	(0.452)	(0.203)	(0.393)	(0.401)	
	BAM USD					
Business profit	6,940 4,249	13,298		10,509	14,500	0.386
	(16,221)	(20,421)		(14,547)	(22,399)	
Business expenses	4,826 2,954	9,218		7,140	10,114	0.245
	(21,489)	(28,923)		(14,335)	(33,263)	
Business revenue	11,715 7,172	22,367		17,858	24,354	0.231
	(33,149)	(42,993)		(25,503)	(48,604)	

This table provides descriptive statistics for business ownership at the time of the baseline survey. The first six variables are expressed as fractions and the last three in BAM (USD). Column 1 provides 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. Business profit, expenses and revenue 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 in the Appendix.

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

		Owns business at follow-up					
		Treatment			Control		
		Yes	No	Total	Yes	No	Total
Owns business	Yes	42.6	20.5	63.2	38.3	23.0	61.3
at baseline (%)	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

This table tabulates the business ownership status of respondents at baseline with the status at follow-up, split between treatment and control. Reported numbers are percentage of respondents.

5.3 Impact on consumption and savings

Table 6 shows the estimated impacts on a number of consumption measures. 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 as rent, bills, clothes and recreation) and durables (large, infrequent purchases which here include educational expenses, the purchase of vehicles and vacations).[24]

[24] 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.

Table 6: Impact on consumption

	ESTIMATED EFFECT				
	Overall	Business at baseline		By education	
		Yes	No	Low	High
	(1)	(2)	(3)	(4)	(5)
Total consumption (yearly)	-608.1	-583.4	-646.9	-1,227**	-388
	(491)	(675)	(652)	(621)	(653)
Food consumed at home (weekly)	-4.145	-0.389	-10.08	-18.33**	2.61
	(4.94)	(5.91)	(8.39)	(7.45)	(6.30)
Food consumed outside (weekly)	0.042	0.431	-0.441	0.796	-0.39
	(2.05)	(2.39)	(3.56)	(2.64)	(2.74)
Cigarettes and alcohol (weekly)	-2.427*	-3.460*	-0.75	-1.71	-2.77
	(1.33)	(1.91)	(1.54)	(1.61)	(1.78)
Other non-durables (monthly)	-16.44	-18.09	-13.88	-40.52	-14.9
	(15.4)	(20.3)	(23.2)	(28.4)	(22.8)
Durables (yearly)	-71.27	-188.6	105.8	28.99	-137.3
	(2,589)	(423)	(95)	(62.58)	(377.4)

This table shows estimated coefficients for the treatment impact on consumption (standard errors in brackets). Variables are expressed in BAM. Column 1 gives estimated effects for the whole sample; columns 2 and 3 show heterogeneous effects based on whether respondents had a business at baseline ('Yes') or not ('No'); and columns 4 and 5 show heterogeneous effects by whether respondents only had primary education at baseline ('Low') or were more highly educated ('High'). Estimations include covariates. * significant at a 10 percent significance level; ** at the 5 percent level. The exchange rate at baseline was USD 1 to BAM 1.634. For variable definitions see Table A7 in the Appendix.

We find that those with low education reduced their consumption significantly. They let their weekly food consumption at home decline by approximately KM 18 (US$ 13), which amounts to 22 per cent of the household's home food consumption (Table 7 provides descriptive statistics of consumption expenditures at baseline); 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. If marginal investments are not lumpy one would expect the loan to be shared between extra investments and extra consumption. Yet, the point estimates, although imprecise, seem to suggest a decrease in overall consumption consistent with marginal investments being lumpy too. Unfortunately, we do not have enough statistical power to make a stronger statement than that.[25]

A final interesting finding in Table 6 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 per cent of total consumption expenditures. At the time of the follow-up survey, marginal clients spent about 12 per cent less on alcohol and cigarettes than they did at baseline due to the loan.

[25] 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 error change only marginally. This indicates that the decrease in consumption is driven by more than just repayment problems.

Table 7: Descriptive baseline statistics: Consumption

Variable -	DESCRIPTIVE STATISTICS Overall		Business at baseline		By education		p-value
	(BAM)	(USD)	Yes	No	Low	High	T vs.C
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Total consumption (yearly)	11,964 (23,659)	7,324	11,230 (17,855)	13,181 (30,967)	8,957 (11,680)	13, 470 (27,667)	0.285
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)	0.813
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)	0.615
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)	0.330
Other non-durables, monthly	263.2 (1187)	257	246.1 (1270)	168 (1037)	300 (787)	3,139 (1342)	0.286
Durables, yearly	2,325 (4,845)	1,663	2,171 (4,235)	2,579 (5,710)	1,565 (3,107)	2,704 (5,473)	0.355

This table provides descriptive statistics for consumption at the time of the baseline survey. Statistics presented are means with corresponding standard deviations in brackets. The last column provides the p-value for a test of equivalence of means of the treated versus the control group. All variables 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 in the Appendix.

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 the household's 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 (see Table 8).

Table 8: Impact on savings

	ESTIMATED EFFECT Overall	Business at baseline		By education	
		Yes	No	Low	High
	(1)	(2)	(3)	(4)	(5)
Household has savings	-0.018 (0.028)	-0.019 (0.037)	-0.023 (0.042)	0.064 (0.042)	-0.057 (0.037)
Average amount (BAM)	-422.5** (174.5)	-539.3** (256.7)	-106.0 (181.4)	144.4 (230.0)	-698.2*** (233.3)
Household contributes weekly	-0.022** (0.009)	-0.021 (0.013)	-0.024** (0.012)	0.003 (0.011)	-0.033*** (0.012)
Household contributes yearly	-0.024* (0.013)	-0.018 (0.016)	-0.032 (0.023)	-0.007 (0.016)	-0.032* (0.018)
Household saves for education	-0.019 (0.014)	-0.045** (0.020)	0.022 (0.014)	-0.006 (0.020)	-0.026 (0.018)

This table shows estimated coefficients for the treatment impact on savings (standard errors in brackets). Column 1 gives estimated effects for the whole sample; columns 2 and 3 show heterogeneous effects based on whether respondents had a business at baseline ('Yes') or not ('No'); and columns 4 and 5 show heterogeneous effects by whether respondents only had primary education at baseline ('Low') or were more highly educated ('High'). Estimations include covariates. * significant at a 10 percent significance level; ** at the 5 percent level. The exchange rate at baseline was USD 1 to BAM 1.634. For variable definitions see Table A7 in the Appendix.

Indeed, the descriptive statistics in Table 9 show that it is the same households who actually had a higher amount of savings at baseline that reduce these savings after receiving a loan. Households of marginal clients with high education save twice as much as households of marginal clients with low education. Likewise, households of marginal clients who had a business at baseline have twice as much savings as households without a business.

Combining these results with the findings on consumption and our model predictions, 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 (a typical proxy for higher income) could do so by running down their savings. In contrast, low-educated households did not have enough savings and hence reduced their consumption.

Table 9: Descriptive baseline statistics: Savings

	DESCRIPTIVE STATISTICS						
	Overall		Business at baseline		By education		p-value
			Yes	No	Low	High	T vs. C
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Household has savings	1.8		1.74	1.9	1.81	1.8	0.53
	(1.23)		(1.21)	(1.26)	(1.00)	(1.33)	
	BAM	USD					
Average amount (BAM)	1120	686	1369	705	722	1318	0.94
	(2803)		(3123)	(2112)	(1974)	(3118)	
Household contributes weekly	0.04		0.05	0.01	0.04	0.03	0.72
	(0.19)		(0.22)	(0.09)	(0.19)	(0.18)	
Household contributes yearly	0.03		0.04	0.02	0.02	0.04	0.40
	(0.15)		(0.19)	(0.14)	(0.14)	(0.19)	
Household saves for education	0.05		0.09	0.05	0.05	0.094	0.36
	(0.27)		(0.28)	(0.24)	(0.23)	(0.28)	

This table provides descriptive statistics for savings at the time of the baseline survey. Column 1 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. Business profit, expenses and revenue 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 in the Appendix.

5.4 Impact on hours worked and school attendance

An implication of our interpretative framework is that young adults (16-19) may start to work more when capital constraints are relaxed, particularly those with a lower expected return to schooling. We do not have information on the perceived return to schooling, but use the educational status of their parents as a proxy, based on the idea that poorer and less-educated parents invest less in their children, which may lead to lower returns to education.

Table 10 displays the impact on labour supply. The upper panel looks at total hours worked and the lower panel at hours in the household business. While we do not find a change in the overall hours worked by the household as a whole, we do find strong impacts for children and young adults aged 16-19. These young household members work significantly more, compared with the control group, if their household already had a business at baseline or if the borrower had no higher than primary education. In particular, children of marginal clients with a business at baseline work on average 20 hours per week more than children of the same age in the control group. And children of marginal clients with no higher than primary education work on average 29 hours more than the control group.[26]

[26] Table 11 provides descriptive statistics for the number of hours worked at the time of the baseline survey by household members of various age groups.

Table 10: Impact on labour supply

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

This table shows estimated coefficients for the treatment impact on labour supply. Standard errors in brackets. Standard errors for effects at the indivíual level (variable "per hh member age 16-64") are clustered at the household level. Column 1 gives estimated effects for the whole sample; columns 2 and 3 show heterogeneous effects based on whether respondents had a business at baseline ('Yes') or not ('No'); and columns 4 and 5 show heterogeneous effects by whether respondents only had primary education at baseline ('Low') or were more highly educated ('High'). Estimations include covariates. * significant at a 10 percent significance level; ** at the 5 percent level. The data does not give us enough variation to estimate the number of hours for the children of marginal clients with a business at baseline. For variable definitions see Table A7 in the Appendix.

Table 11: Descriptive baseline statistics: Labour supply

	DESCRIPTIVE STATISTICS					
	Overall	Business at baseline		By education		p-value
		Yes	No	Low	High	T vs.C
	(1)	(2)	(3)	(4)	(5)	(6)
Total hours worked...						
by all hh members	27.33	31	21.22	26.52	27.75	0.775
	(29.18)	(29.90)	(26.86)	(29.51)	(29.01)	
by hh members age 16-19	4.93	6.13	2.44	5.94	4.36	0.115
	(12.17)	(12.70)	(10.66)	(12.78)	(11.82)	
by hh members age 20-64	39.5	45.42	30.22	40.15	39.19	0.622
	(27.91)	(26.46)	(27.62)	(28.62)	(27.58)	
Hours worked in business...						
by all hh members	13.6	20.65	1.76	14.58	13.1	0.639
	(22.89)	(25.48)	(9.49)	(23.72)	(22.44)	
by hh members age 16-19	3.79	5.63	0.0	4.88	3.18	0.155
	(9.60)	(11.25)	(0.00)	(12.78)	(8.76)	
by hh members age 20-64	19.07	29.56	2.43	21.47	17.92	0.927
	(25.45)	(26.31)	(11.17)	(26.71)	(24.74)	
per hh member age 16-64	22.27	34.03	2.16	23.11	21.86	0.233
	(30.21)	(30.88)	(14.23)	(29.28)	(30.66)	

This table provides descriptive statistics for labour 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 A7 in the Appendix.

The lower panel of Table 10 shows that the additional hours worked are indeed spent 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 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.

We now examine whether the increase in working hours is indeed accompanied by a decrease in school attendance for young adults. Table 12 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 per cent less likely to attend school due to the intervention. This overall effect is driven by the children of marginal clients with at most primary education – those for whom we also observe an increase in working hours. Due to the microcredit programme, teenage children aged 16-19 in these households are in fact 19 per cent less likely to attend school than in the control group. Table 13 shows that children of households with lower education levels were already less likely to attend secondary school before the programme started (again, this was not significantly different between treatment and control households). 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.

Table 12: Impact on school attendance

	ESTIMATED EFFECT				
	Overall	Business at baseline		By education	
		Yes	No	Low	High
	(1)	(2)	(3)	(4)	(5)
School attendance...					
Age 7-19	-0.030	-0.017	-0.054	-0.051	-0.009
	(0.002)	(0.025)	(0.039)	(0.034)	(0.027)
Age 7-15	-0.002	0.015	-0.036	-0.011	0.004
	(0.016)	(0.018)	(0.031)	(0.025)	(0.021)
Age 16-19	-0.089*	-0.087	-0.087	-0.193*	-0.028
	(0.054)	(0.052)	(0.116)	(0.084)	(0.067)

This table shows estimated coefficients for the treatment impact on the probability of school attendance (standard errors clustered at the household level in brackets). Column 1 gives estimated effects for the whole sample; columns 2 and 3 show heterogeneous effects based on whether respondents had a business at baseline ('Yes') or not ('No); and columns 4 and 5 show heterogeneous effects by whether respondents only had primary education at baseline ('Low') or were more highly educated ('High'). Estimations include covariates. * significant at a 10 percent significance level; ** at the 5 percent level. For variable definitions see Table A7 in the Appendix.

Table 13: Descriptive baseline statistics: School attendance

Variable	DESCRIPTIVE STATISTICS					
	Overall	Business at baseline		By education		p-value
		Yes	No	Low	High	T vs.C
	(1)	(2)	(3)	(4)	(5)	(6)
School attendance...						
Age 7-19	0.90	0.90	0.90	0.89	0.91	0.964
	(0.30)	(0.30)	(0.30)	(0.32)	(0.29)	
Age 7-15	0.89	0.88	0.89	0.88	0.89	0.718
	(0.30)	(0.30)	(0.30)	(0.32)	(0.29)	
Age 16-19	0.93	0.93	0.92	0.89	0.95	0.326
	(0.26)	(0.26)	(0.27)	(0.31)	(0.23)	

This table provides descriptive statistics for school attendance at the time of the baseline survey. Variables are expressed as fractions. 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 A7 in the Appendix.

5.5 Does gender matter?

About 40 per cent of the marginal clients are female. Table 14 displays estimated impacts, for a subset of our outcome variables, for both the sample as a whole as well as by gender. We uncover an interesting pattern. The effect on business creation and the likelihood of being self-employed seems to be mainly driven by female clients, who as a result of access to credit are 8 per cent more likely to be self-employed and to own a business compared with the control group. These women also are 7 per cent more likely to own business inventory.

In contrast, the other effects reported above appear to be mainly driven by male borrowers. It is male marginal clients who decrease household savings and cut back consumption (cigarettes and alcohol as well as other non-durable consumption). And it is these variables ("other non-durables" and "average savings") where the gender difference in impact is statistically significant at the 5 per cent level. Moreover, it is also male marginal clients in whose households young adults work significantly more (in general as well as in the business) and are significantly less likely to attend school. In fact, teenagers who just completed mandatory schooling and live in households of male marginal clients are 13 per cent less likely to attend school than teenagers of the same age group in control households.

A possible explanation is that access to credit allowed men to expand and scale-up pre-existing businesses, whereas women created new businesses. If these new female-operated businesses were very small there was no need to supplement the loan with existing savings, to reduce consumption or to take young adults out of school. In contrast, male borrowers that expanded existing businesses may have only been able to do so by crowding in resources from savings, reducing consumption and using the labour of teenage household members. Table 15 provides some supportive evidence for this idea. It shows that between the baseline and follow-up survey, there was a sharp reduction in the proportion of enterprises that engaged in trade. This likely reflects the sudden and strong negative impact of the financial crisis on trade flows. As a result, the services and agricultural sectors became relatively more important for both men and women. However, women seem to have shifted to agricultural activities in particular: at follow-up about 60 per cent of all female enterprises were agricultural in nature. To the extent that such newly established "enterprises" were informal and small-scale, mainly reflecting the difficult economic environment during the crisis, they

may not have required the lumpy investment that leads to a reduction in savings or consumption.

Table 14: Effects and descriptive statistics by gender

	ESTIMATED EFFECT				DESCRIPTIVE STATISTICS	
	Overall	By gender		F-stat		
		Male	Female	p-val	Male	Female
	(1)	(2)	(3)	(4)	(5)	(6)
Self-employed	0.060**	0.046	0.080*	0.32	0.789	0.771
	(0.029)	(0.037)	(0.047)	(0.573)	(0.408)	(0.420)
Business ownership	0.058*	0.041	0.083*	0.42	0.683	0.561
	(0.031)	(0.041)	(0.049)	(0.515)	(0.466)	(0.497)
Ownership of inventory	0.053*	0.043	0.069**	0.38	0.189	0.210
	(0.020)	(0.027)	(0.031)	(0.538)	(0.392)	(0.408)
Business profit (BAM)	671	771	528	0.05	15,433	9,743
	(541)	(824.7)	(641.1)	(0.821)	(22,407)	(16,177)
Food consumed at home (weekly)	-4.145	-6.516	-0.710	0.38	83.34	95.72
	(4.94)	(6.314)	(7.408)	(0.539)	(67.82)	(77.49)
Food consumed outside (weekly)	0.042	-1.503	2.281	0.96	19.29	12.74
	(2.05)	(2.826)	(2.752)	(0.327)	(50.06)	(29.94)
Cigarettes and alcohol (weekly)	-2.472*	-3.652*	-0.652	1.58	12.05	29.91
	(1.33)	(2.066)	(1.234)	(0.209)	(20.45)	(455.7)
Other non-durables (monthly)	-16.44	**-40.89***	**18.98**	4.42	257.3	274.8
	(15.4)	(23.21)	(16.75)	(0.036)	(1,182)	(1,197)
Durables (yearly	-71.27	188.6	-226.9	0.32	2,664	1,849
	(2,589)	(466.9)	(578.8)	(0.574)	(5,246)	(3,976)
Average savings (BAM)	-422.5**	**-751.4*****	**54.02**	5.67	1,194	914.8
	(174.5)	(255.2)	(218.2)	(0.017)	(2,980)	(2,396)
Hrs worked, hh members age 16-19, total	13.60	29.12**	0.393	1.75	5.057	4.788
	(10.62)	(13.67)	(16.18)	(0.188)	(12.49)	(11.88)
Hrs worked, hh mem age 16-19, business	20.55**	22.73*	17.81	0.06	3.854	3.726
	(9.996)	(11.55)	(16.91)	(0.810)	(10.26)	(8.873)
School attendance, age 16-19	-0.089*	-0.131**	-0.037	0.77	0.894	0.965
	(0.054)	(0.065)	(0.087)	(0.383)	(0.309)	(0.186)

This table shows estimated coefficients for various treatment impacts by gender. Standard errors in brackets. Standard errors for "School attendance, age 16-19" are clustered at the household level. Effects that differ significantly between genders are in bold. The first two variables are expressed as probabilities (fractions in columns 5 and 6). Column 1 gives estimated effects for the whole sample; columns 2 and 3 show heterogeneous effects by gender; column 4 displays the F-statistic and corresponding p-value test for the equivalence of male and female coefficients; and columns 5 and 6 show pre-treatment descriptive statistics (means and corresponding standard deviations). Estimations include covariates. * significant at a 10 percent significance level; ** at the 5 percent level. The exchange rate at baseline was USD 1 to BAM 1.634. For variable definitions see Table A7 in the Appendix.

Table 15: Type of business by gender

Type	Baseline			Follow-up		
	Male	Female	p-value (m vs. f)	Male	Female	p-value (m vs. f)
	(1)	(2)	(3)	(4)	(5)	(6)
Trade	0.210	0.385	0.000	0.119	0.159	0.193
	(0.408)	(0.488)		(0.325)	(0.367)	
Services	0.370	0.156	0.000	0.418	0.213	0.000
	(0.483)	(0.363)		(0.494)	(0.410)	
Agriculture	0.362	0.400	0.295	0.420	0.585	0.000
	(0.481)	(0.491)		(0.494)	(0.494)	
Production	0.059	0.059	0.970	0.043	0.043	0.997
	(0.235)	(0.237)		(0.202)	(0.202)	

This table provides information on the proportion of businesses in different sectors, split by gender. Columns 3 and 6 display p-values for the test of equality between male and female respondents. For variable definitions see Table A7 in the Appendix.

6. Commercial viability of the programme

To put the borrower impacts into context, we proceed with a concise analysis of the profitability, and therefore commercial viability, of lending to marginal borrowers. We analyse both the profitability in absolute terms and relative to EKI's regular lending operations over the same period.

To assess the profitability of the marginal lending programme we compare two groups of loans. First, we analyse all loans disbursed to marginal clients between December 2008 and May 2009, the period of the experiment, and that were due by June 2012 at the latest. Second, we analyse all loans disbursed to regular first-time clients during the same period. We focus on first-time regular clients for comparability reasons as all marginal clients are by definition first-time borrowers of our MFI. For both groups we take into account all regular and late payments that were made. Table 16 provides general statistics on these two groups of clients. For ease of comparison, we also present the same statistics for all regular EKI clients, whether they are first-time or repeat clients.

It becomes clear that the new marginal client group was significantly more risky than either first-time or all regular EKI clients. 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). We find no significant differences in repayment between men and women in either borrower group.

Table 16: 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 EKI. Source: EKI management information system. For variable definitions see Table A7 in the Appendix.

To better understand how these significant differences in non-repayment affected the commercial viability of the programmes, we calculate the net present value (NPV) of both the marginal and the regular lending programmes. For each programme, we first sum up all the discounted outgoing (loan disbursements) and incoming (repayments, fee income and interest revenue) cash flows. As a discount rate we use EKI's weighted-average cost of debt funding in March 2011 (where we weigh by the size of individual outstanding liabilities). Since EKI uses both commercial and concessional funding, we use three discount rates: one based on

the (weighted cost of) its commercial funding, one based on the (weighted cost of) its concessional funding; and one based on the (weighted cost of) all funding.[27] We then divide these NPVs by the total amount of loans granted under the programme to calculate an overall rate of return. In addition, we also calculate an internal rate of return (IRR) of both lending programmes (the discount rate at which the net present value of the sum of all cash flows equals zero). Table 17 summarises these calculations.

We find that the rate of return on the marginal-lending programme is negative – regardless of the discount rate that we apply – and that the IRR is minus 11 percent. Although EKI charges an interest rate of 22 per cent per year, the lending programme was not profitable due to a high level of non- and late repayments. As mentioned, 26 per cent of the loans had to be written off and 46 per cent of the borrowers were at least once late with monthly repayments. Although the rate of return on loans to female marginal clients was slightly lower than on loans to male clients, this difference is not statistically significant.

While the lending programme to marginal clients was not profitable during our sample period, one should keep in mind that Bosnia and Herzegovina went through a deep economic crisis at the time of the experiment. It is therefore important to compare the profitability of our experimental borrowers with the benchmark of regular EKI clients.

Table 17: Commercial viability

	Rates of Return			
	Internal	Overall	Commercial	Concessional
	(1)	(2)	(3)	(4)
	Regular borrowers (first-time and repeat)			
All	12.8%	7.1%	5.8%	10.3%
Male	12.9%	7.1%	5.9%	10.4%
Female	12.6%	7.0%	5.7%	10.3%
	Regular borrowers (first-time only)			
All	13.7%	8.0%	6.7%	11.3%
Male	14.1%	8.4%	7.1%	11.7%
Female	13.2%	7.5%	6.2%	10.8%
	Marginal borrowers			
All	-11.1%	-14.1%	-14.8%	-12.1%
Male	-12.1%	-15.0%	-15.7%	-13.1%
Female	-9.6%	-12.7%	-13.5%	-10.8%

This table compares the profitability of lending to regular versus marginal clients. Column 1 displays the internal rate of return: the discount rate at which the net present value of the sum of all cash flows equals zero. Column 2 displays an overall rate of return: the NPV divided by the total amount of granted loans. The discount rate is our EKI's weighted average cost of debt funding in March 2011. Column 3 displays a commercial rate of return. The discount rate is EKI's weighted average cost of commercial debt funding in March 2011. Column 4 displays a concessional rate of return. The discount rate is EKI's weighted average cost of concessional debt funding in March 2011. 445 regular borrowers are dropped from the analysis as gender information is not available. For variable definitions see Table A7 in the Appendix.

[27] EKI receives concessional funding from various NGOs and development institutions. The average concessional funding rate is just under 40 per cent of the costs of its commercial funding.

Table 17 shows that during the same period the internal rate of return of EKI's regular lending business was positive, at 14 per cent for first-time borrowers. Of the regular loans to first-time borrowers 9 per cent had to be written off and 31 per cent of the clients were at least once late with repaying (Table 16). This implies that the "marginal clients" were substantially worse risks compared with regular clients and in the end loss-making.

Overall, we conclude that the programme was not commercially viable, at least in this period of financial crisis. 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 EKI to the average marginal borrower of KM 387 (US$ 268). This corresponds to approximately one fourth of the average loan amount extended to marginal borrowers.

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 18 summarises our results. The probability of default is 17 percentage points higher for marginal than for regular clients (this corresponds to the difference between the 26 and 9 per cent write-offs in Table 16). In column 2, we add a set of borrower characteristics that are both observable to the loan officer and the econometrician (such as the borrower's age, gender, and marital, educational and economic status). The marginal client dummy stays statistically significant at the 1 per cent level and the coefficient is only marginally reduced in size. This shows that even when controlling for basic borrower characteristics, marginal clients were inherently more risky. It appears that loan officers, using "soft" information (Berger and Udell, 1995) about less readily observable borrower characteristics, have been able to adequately distinguish between marginal and regular clients. The marginal client dummy also remains statistically significant and the coefficient size does not change much when we add branch fixed effects (column 3). This implies that there was no substantial cross-branch variation in average default levels, for example due to geographic heterogeneity in borrower risk or an uneven quality of loan officers between branches.

Table 18: Default probability

Variable	Coeff. (Std.Err.)	Coeff. (Std.Err.)	Coeff. (Std.Err.)
	(1)	(2)	(3)
Marginal client	0.174***	0.162***	0.166***
	(0.019)	(0.019)	(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 characteristis) 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 A7 in the Appendix.

We further explore the idea that loan officers use soft information effectively when making decisions about loan applicants by using our data on loan officers' perceptions of marginal clients, previously discussed in Section 2.2. Table 19 shows the results of regressions where the dependent variable is either an indicator of whether a marginal client was at least once late with repaying a loan instalment (columns 1-4) or a default indicator (columns 5-8). In columns 1-2 and 5-6 we only include three regressors that indicate whether a loan officer thought that an applicant satisfied EKI's standard requirements in terms 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 18.

We find a positive correlation between compliance with EKI's collateral requirement and late payment though not with actual default. This correlation becomes imprecisely estimated 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 (unobserved) characteristics relating to repayment capacity.

In terms of the relationship between (*ex ante* measured) personality traits and repayment behaviour, we find that the estimated coefficients for these traits have the expected sign. Borrowers that were judged to be relatively competent and stable turn out to be less likely to pay late or to default, whereas the opposite holds for those that were deemed to be aggressive and risk-takers.

Table 19: Late payment and default probability

Variable	Ever late				Default			
	Coeff. (SdE)	Coeff. (SdE)	Coeff. (SdE)	Coeff. (SdE)	Coeff. (SdE)	Coeff. (SdE)	Coeff. (SdE)	Coeff. (SdE)
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
The applicant meets EKI's...								
collateral requirement	0.124**	0.134*	0.0963	0.102	0.0375	0.0252	0.0135	0.00712
	(0.061)	(0.073)	(0.064)	(0.075)	(0.054)	(0.061)	(0.055)	(0.061)
repayment capacity requirement	-0.0674	-0.0950	-0.0543	-0.0477	-0.0504	-0.0761	-0.0410	-0.0538
	(0.059)	(0.069)	(0.063)	(0.074)	(0.052)	(0.061)	(0.055)	(0.064)
credit history requirement	-0.0173	-0.0141	-0.0305	-0.0314	-0.00778	-0.0246	-0.0279	-0.0482
	(0.069)	(0.081)	(0.072)	(0.085)	(0.060)	(0.069)	(0.064)	(0.075)
The applicant appears to be...								
...competent			-0.0747	-0.166**			-0.0484	-0.0839
			(0.062)	(0.075)			(0.055)	(0.066)
...stable			-0.0916	-0.0998			-0.0572	-0.0531
			(0.059)	(0.070)			(0.052)	(0.061)
...aggressive			0.223**	0.0404			0.220**	0.118
			(0.107)	(0.149)			(0.110)	(0.137)
...a risk-taker			0.0267	0.0537			0.0613	0.0880*
			(0.052)	(0.063)			(0.046)	(0.052)
Covariates	No	Yes	No	Yes	No	Yes	No	Yes
Branch fixed effects	No	Yes	No	Yes	No	Yes	No	Yes
No. of Obs.	403	403	389	389	403	403	389	389
Pseudo R2	0.0139	0.0984	0.0342	0.118	0.005	0.090	0.029	0.112
Log-Likelihood	-271.2	-247.9	-256.7	-234.5	-225.9	-206.4	-213.2	-195.0
Chi2	403	403	389	389	403	403	389	389

'Ever late' indicates whether a marginal client was at least once late with repaying (columns 1-4). 'Default' indicates whether a marginal client defaulted (columns 5-8). The independent variables reflect loan officers' views about clients at the time of granting the loan. Standard errors are reported in brackets. * significant at a 10 percent significance level; ** at the 5 percent level and *** at the 1 percent level. For variable definitions see Table A7 in the Appendix.

Even when we include a set of easily observable borrower covariates as well as branch fixed effects, we find that some of these characteristics remain significantly correlated with repayment behaviour. This suggests that EKI's loan officers not only effectively used information on applicants' characteristics to distinguish between regular and marginal clients but also to differentiate among marginal clients. This raises the question whether simple credit scoring is perhaps less effective than the face-to-face assessment by loan officers; however one also needs to compare the costs of each approach.

7. Conclusion

This paper presents results from a field experiment in Bosnia and Herzegovina in which a random selection of potential borrowers received one or more loans from a local microfinance institution. We find that access to borrowing (partially) relaxed the liquidity constraints of the treatment group and had a positive impact on business creation and survival. One year after the start of the programme, marginal borrowers were 6 per cent more likely to own an enterprise compared with the control group. Borrowers with higher education levels mainly started businesses in the services sector whereas the less educated established small-scale agricultural activities. Those households that already had a business and those that were highly educated ran down their savings. In contrast, less-educated households reduced consumption. This is consistent with investments being lumpy so that households need to crowd in additional resources to make up the difference and to implement investments that would have been unattainable without the loan.

We also document that households of marginal clients with low education levels reduced the school attendance of their teenagers (aged 16-19) and let them work more in the household's business instead. On average these children work 35 hours per week more in this business compared with the control group and, not surprisingly, are 19 per cent less likely to attend school. Teenage children of marginal clients who had a business at baseline also work more in the business, but their school attendance is not reduced significantly when compared with the control group. As yet, there is not much evidence that the small-scale and often agricultural activities of lower-educated families will generate positive revenues that more than offset the loss in future income due to children's lower human capital.

The findings paint a mixed picture of the impact of microcredit. On the one hand, households did use the loans to start up new businesses, to keep existing ones afloat, or to expand them. Where necessary they even cut back on consumption and used their savings to make sufficiently large investments. On the other hand, we do not find that these entrepreneurial activities had a positive impact on income. Even for households that already had an enterprise at the time of the baseline survey, and for whom our model predicts an increase in consumption, we do not find such a positive impact.[28] Moreover, we document that the program was not profitable: EKI in fact provided an implicit subsidy to the average marginal borrower of US$ 268.

There are various possible reasons why we do not (yet) find evidence of a positive impact of microcredit on enterprise profits, household income, or consumption, notwithstanding an increase in entrepreneurial activity. First, the period between our baseline and follow-up surveys – about 14 months – may have been too short to allow households to fully implement investments and increase firm profitability. Households that cut back consumption when they received a loan will have done so in the expectation that their investment will lead to higher

[28] Crépon et al. (2011) also find that households with a pre-existing enterprise decrease consumption as they save and borrow to scale up their activities.

future consumption. While profitability may thus still increase over time, one should also keep in mind that the businesses were mainly in the services and agricultural sectors and quite straightforward in nature. After loan disbursal, borrowers should in most cases have been able to implement investments and reap their pay-offs quite quickly.

An alternative explanation is that access to finance may not be the only binding constraint on entrepreneurial activity. Bruhn and Zia (2011) use an RCT to study the impact of a business and financial literacy programme on the firms of young Bosnian entrepreneurs, all of whom were borrowers from a local MFI. They find that while training did not influence business start-up or survival, it significantly improved business practices, investments and loan terms for surviving firms. An interesting area for future research is therefore to uncover what combinations of credit and training can help stimulate entrepreneurship not only at the intensive but also at the extensive margin.

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Appendix

A1 Characteristics of marginal clients

When identifying marginal clients, loan officers followed EKI'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' judgment, 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 with 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 EKI 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 lastly the client's credit history (if any). We find that the average marginal applicant did not meet 2.6 out of six main EKI requirements. 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.

Table A1. Marginal applicants not meeting EKI requirements (%)

	Mean (1)	Std.Dev. (2)	Mean (3a)	(3b)
No. of requirements not met	2.55	1.24		
EKI requirement			Most worrisome	Least worrisome
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 EKI requirements 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.

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 and so on. 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 per cent are not perceived as knowledgeable) and their integration into society (more than 50 per cent 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 characterised as a risk-taker, then loan officers thought in about 70 per cent of the cases that this trait would influence the success of the business.

Table A2. Judgement of applicants' characteristics

Applicant is perceived 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.

A2 Relaxing liquidity constraints when investments are lumpy: a simple model

To structure a unified interpretation of our empirical findings, this Appendix develops a simple model of investment decisions when production requires a minimum amount of capital in order to make lumpy investments. The model describes two periods. In the first period the household can invest in a business that will produce output to be consumed in the second period. A minimum level of capital Γ is required to produce, so that the production function is $Q=1(K> \Gamma)\delta K^{\alpha}H^{1-\alpha}$, where Q is output, K is capital and H is total labour employed. The rate of time preference is equal to the interest rate r and the discount factor is $\beta=1/(1+r)$. The household includes a young adult who can either go to school in the first period, and earn a lifetime return of s, or work. We model the return to education as increasing the efficiency units of labour. An untrained person has one unit of labour. With school attendance maximum efficiency units become $\hat{l}_2 = 1 + s(1 - l_1)$ where $1 - l_1$ is the schooling attendance in period one. Since leisure does not yield utility here, the individual will work $\hat{l}_2$ in the second period. Let the wage rate per efficiency unit be w. Preferences are described by

(A1) $$U(c_1, c_2) = \frac{c_1^{\rho+1}}{\rho+1} + \beta \frac{c_2^{\rho+1}}{\rho+1}$$

We assume the household is liquidity constrained. However, we take the case where the returns to education are high enough to imply zero labour supply in the absence of a home business. At lower returns to education there will be an interior solution to young adult labour supply even in the absence of a household business. Household income in the first period is Y_1 and in the second period $Y_2> Y_1$. We assume that the household can borrow up to an amount $\bar{B}$ (the microloan) and invests an amount K. It only uses internal labour (for simplicity): external labour is assumed more expensive because of taxes and regulatory costs that can be evaded/avoided when hiring internal labour. We also only consider the case where the loan is not large enough to alleviate liquidity constraints. Hence the household maximises lifetime utility subject to the two constraints

(A2) $$c_1 = Y_1 + B - K, \qquad K \geq 0, \qquad 0 \leq B \leq \bar{B}$$

and

(A3) $$c_2 = Y_2 + w\big(1 + s(1 - l_1)\big) + 1(K > \Gamma)\delta K^{\alpha} l_1^{1-\alpha} - RB$$

where R is the gross return payable for the loan and foregone future returns to education is the opportunity cost of labour. Given the optimal level of investment $K>\Gamma$ the solution to the problem is

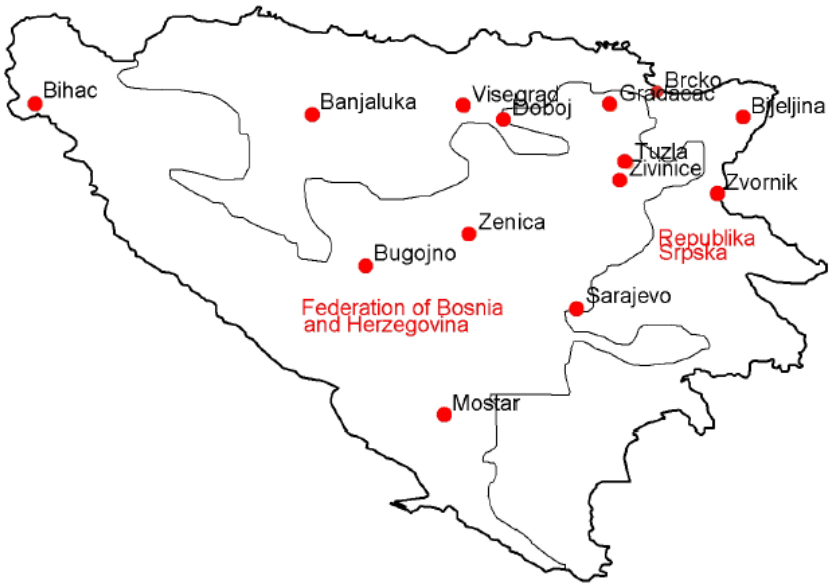
$$K = \frac{Y_1 + B - A(Y_2 - RB + w(1+s))}{A(\delta m^{1-a} - wsm) + 1}$$

(A4) $$c_1 = Y_1 + B - K$$

$$l_1 = mK$$

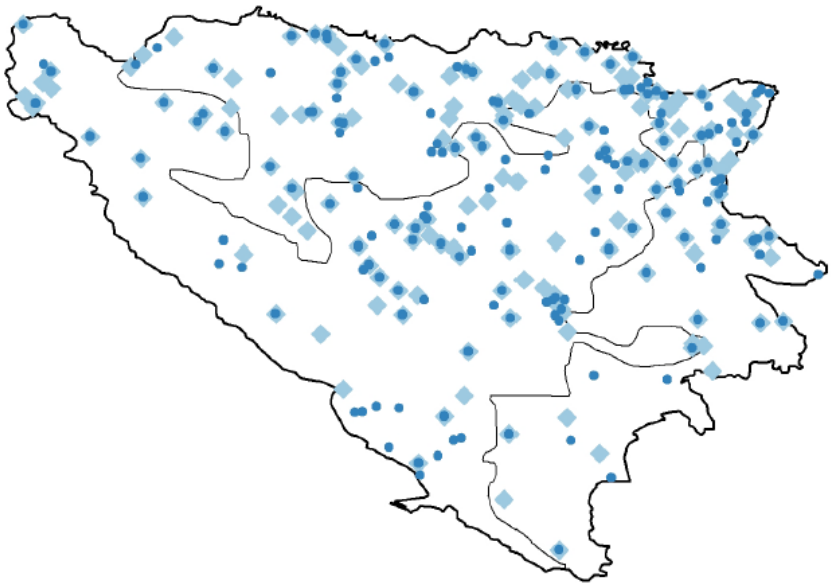
where $m = \left[\frac{\beta ws}{(1-\alpha)\delta}\right]^{-\frac{1}{\alpha}}$ and $A = [\delta\beta\alpha m^{1-\alpha}]^{\frac{1}{\rho}}$. In the absence of investment and the loan $c_1=Y_1$ (assuming a corner solution for labour, that is, full-time education and liquidity constraints). Now a marginal increase in the loan will increase both consumption and investment. However a switch from zero investment to a positive amount (over Γ) can lead to a decline in consumption as K can be larger than B for high enough return (a high enough δ will deliver this). Young adult labour also increases with investment. More importantly, for those with low enough returns to education (but high enough to go to school in the absence of a home business) l_1 will switch to a positive amount from zero as the household starts a business. If returns to education are high enough then the opportunity cost of internal labour increases and the household may hire the more expensive external labour instead. In this sense we expect young adult labour to go up for households where the returns to education are (perceived to be) low, which is likely to include many of the poorer households. The jump will be larger for those with no business at baseline.

Chart A1a Geographical location of participating branches



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

Chart 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 A3. Interviews during baseline and follow-up surveys

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 clients interviewed during the baseline and follow-up surveys and the reasons why certain potential respondents were not (re-)interviewed.

Table A4. 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	1.736	-0.169
			(0.058)		(0.065)
	# Female	1.689	-0.008	1.712	-0.009
			(0.057)		(0.064)
	# Children aged 0-5	0.286	0.032	0.304	0.035
			(0.032)		(0.037)
	# Children aged 6-10	0.265	-0.005	0.282	-0.009
			(0.032)		(0.037)
	# Children aged 11-15	0.286	-0.113	0.291	-0.116
			(0.036)		(0.039)
	# Children aged 16-19	0.253	-0.049	0.236	-0.047
			(0.031)		(0.033)
	# Elderly (>64yrs)	0.183	0.038	0.185	0.039
			(0.025)		(0.027)
Activity of hh members	# Attending school	0.701	-0.140	0.723	-0.146
			(0.055)		(0.061)
	# Employed	1.083	-0.101	1.097	-0.072
			(0.054)		(0.059)
	# Unemployed	0.721	0.027	0.685	-0.021
			(0.052)		(0.057)
	# Retired	0.313	0.013	0.313	0.001
			(0.031)		(0.034)
Consumption	Food (weekly)	109.9	2.740	105.91	0.040
			(5.282)		(5.418)
	Other non-durable (monthly)	235.81	-53.15	213.51	-78.092
			(67.616)		(73.105)
	Durable (yearly)	2433.6	185.60	2490.5	247.41
			(278.5)		(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 A5. Test of joint significance

Variable		Coeff.	Std.Err.	z
		(1)	(2)	(3)
Respondent characteristics:				
Female		0.050	0.084	0.600
Age		0.009	0.021	0.410
Age^2		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
Household (HH) characteristics:				
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
HH income sources:				
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
Shocks experienced:				
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 of a range of variables. See Table 26 for variable definitions.

Table A6. Test of joint significance - including 'soft' characteristics

Variable	(1)	(2)
Indicator whether LO believes the marginal client was...		
...competent	0.013	-0.024
	(0.142)	(0.151)
...reliable	0.216	0.215
	(0.172)	(0.176)
...trustworthy	-0.019	0.017
	(0.165)	(0.171)
...knowledgeable	-0.131	-0.238
	(0.134)	(0.140)
...experienced	0.141	0.142
	(0.139)	(0.147)
...well-integrated into society	-0.106	-0.099
	(0.140)	(0.145)
...clever	-0.108	-0.114
	(0.135)	(0.142)
...a risk-taker	-0.029	-0.053
	(0.132)	(0.135)
...a fighter	0.066	0.044
	(0.137)	(0.147)
...aggressive	-0.021	0.077
	(0.217)	(0.222)
...stable	-0.046	-0.063
	(0.155)	(0.169)
...insecure	-0.046	-0.121
	(0.210)	(0.214)
Constant	0.935	1.801
	(0.060)	(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 A7. 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^2		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	
		Dummy variable (=1) if the household experienced...	
Average amount (BAM)		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 EKI 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 (yearly)	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
EKI requirement	Sufficient collateral	Dummy variable (=1) if the respondent meets EKI 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 requirments of EKI.	
	Credit history	Dummy variable (=1) if the respondent's credit history is in line with EKI's requirements.	

Table A7. 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	...manifacturing	
	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 yearly		Dummy variable (=1) if the household adds to savings on a yearly 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 EKI	
% repaid		Dummy variable (=1) if the loan was repaid	
% active		Dummy variable (=1) if the loan is still active	

Table A7. 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		Dummy variable (=) if the hh member ...	
	Aged 7-19	...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		Dummy variable (=1) if the household experienced...	
	Jobloss	... a jobloss 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	
	Job gain	...job gain in the previous year	
Total hrs worked	By all hh members	Total no of hours worked by all hh members in the last week	
	By hh members aged 16-19	Total no of hours worked by hh members age 16-19 years in the last week	
	By hh members aged 20-64	Total no of hours worked by hh members age 20-64 years in the last week	
Total hrs worked in business	By all hh members	No of hours worked in the business by all hh members in the last week	
	By hh members aged 16-19	No of hours worked in the business by hh members age 16-19 years in the last week	
	By hh members aged 20-64	No of hours worked in the business by hh members age 20-64 years in the last week	
		Dummy variable (=1) if the respondent's business is in...	
Trade		...trade	
Services		...services	
Agriculture		...agriculture	
Production		...production and manufacturing	
Unemployment		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.

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