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### **Abstract**

This paper applies the financing constraint approach to study whether microfinance institutions improved access to credit for microenterprises in Bosnia and Herzegovina. According to this approach, microenterprises with improved access to credit rely less on internal funds for their investments. Thus, we compare investment sensitivity to internal funds of microenterprises in municipalities with significant presence of MFIs to that of microenterprises in municipalities with no (or limited) presence of MFIs using Living Standards Measurement Survey and MFI branch location data. Results indicate that MFIs alleviated microbusinesses' financing constraint. This approach is applicable to evaluating microfinance impact in other countries.

**Keywords:** microfinance, impact study, Microfinance Institutions, financing constraints, Eastern Europe, Bosnia and Herzegovina

**JEL Codes:** G21, G11, O16, P20

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# **An Impact Analysis of Microfinance in Bosnia and Herzegovina**

## **1. INTRODUCTION**

Worldwide, microfinance institutions (MFIs) expand the frontier of finance by providing loans and other financial services to under-served populations. Microfinance is important in Bosnia and Herzegovina (BiH) as estimates for 2001 show that the number of people employed in MFI-supported microenterprises is comparable to the 72,000 workers on wait-lists for jobs (Dunn and Tvrtkovic, 2003).<sup>1</sup> Among post-communist countries, Bosnia has the most dynamic microfinance sector and analysis of both its successes and setbacks could help microfinance donors and policy makers in other post-transition countries develop adequate policies to promote microfinance.

This paper studies whether the microfinance sector in BiH improved access to credit for the entrepreneurial poor.<sup>2</sup> Previous studies focus mainly on evaluating the impact of a single MFI, usually on the request by donors who want to know whether to discontinue support for a specific MFI (Zohir and Matin, 2004). This paper focuses instead on the impact of all microfinance institutions operating in the local credit market. Industry-wide focus is important because competition may affect the impact of an individual MFI. For example, lack of impact could be the result of too much competition that leads to client over-indebtedness, where clients take too much debt and borrow from one lender simply to repay another. On the other hand, the lending criteria of a single MFI may address the needs of a specific target population but may not be flexible enough to include many viable microentrepreneurs.

The impact of microfinance on the target population can be measured in social and in economic terms.<sup>3</sup> While the choice of impact variables reflects what school of thought or “shisms” the authors belong to, a recent survey of the literature makes the case for evaluating both aspects (Morduch, 2000; Armendariz de Aghion and Morduch, 2005). In Bosnia, the impact on entrepreneurs’ finances has been underemphasized because, in the post-war environment, the social impact was of main interest (Matul and Tsilikounas, 2004). According to the financial sector development “shism,” MFIs should lend to entrepreneurs who already have the skills and the markets but lack credit (Conning, 1999). Post-war Bosnia had educated but impoverished population with limited access to credit, which affected entrepreneurs’ ability to sustain microbusinesses. This study contributes to the literature by studying whether MFIs collectively serving a local market improved credit access of the entrepreneurial poor.

The approach used in this paper avoids methodological challenges typical to impact assessment studies where MFI clients serve as a treatment group and non-clients who satisfy the lending criteria of a particular lender serve as a control group (Dunn, 2005). Such design has self-selection and, in panel data, attrition issues typical for social sciences where controlled experiments are not possible. In the case of self-selection bias, for example, achievements attributed to microfinance may simply be attributes of the most talented microentrepreneurs who self-select to apply and consequently receive microloans. These issues could be addressed in some programs where design and implementation yields quasi-experimental data such as in Coleman (1999), and Pitt and Khandker (1998). Since quasi-experimental data are not always available, exploring alternative methods remains important.

This paper evaluates the impact of microfinance by applying the financing constraint approach according to which improvement in access to credit resulting from availability of microfinance is reflected in the sensitivity of microbusinesses' investment to availability of internal funds. Specifically, the paper compares the sensitivity of investment to internal funds of microentrepreneurs in municipalities with significant presence of MFIs to that of microentrepreneurs operating in municipalities with no or only limited MFI presence using a randomly selected sample of municipalities and entrepreneurs from the Living Standards Measurement Survey (LSMS) series of the World Bank, conducted by the Agency for Statistics of Bosnia and Herzegovina, the Federal Office of Statistics and the Republika Srpska Institute of Statistics in 2001. The sample includes not only clients and comparable non-clients but also microbusinesses that may not qualify for a loan by the criteria of one or more MFIs. Data on the municipalities covered by MFIs comes from the Bosnian Local Initiative Project (LIP), MFIs reports and the Mapping Survey by the Microfinance Center for Central and Eastern Europe and Newly Independent States (Microfinance Center for CEE&NIS). Controlling for enterprise-specific and region-specific characteristics, we find that investment in microenterprises with weak presence of MFIs is more financially constrained, and depends to a larger extent on the availability of internal funds than investment of microenterprises in municipalities with strong presence of MFIs.

## **2. OVERVIEW OF THE MICROFINANCE SECTOR IN BOSNIA**

Microfinance initiatives targeting disadvantaged populations in the BiH started operations soon after the 1995 Dayton Peace Agreement was signed. According to some estimates, in the 90s, the international community supported as many as 70 projects with some element of

microfinance activity (Goranja, 1999). However, the microfinance sector developed mainly due to a unified strategy implemented by a Local Initiative Project (LIP) funded by the World Bank through the Local Initiatives Departments in the Federation of Bosnia and Herzegovina and Republika Srpska. LIP identified and trained about 25 organizations of which 17 potentially viable programs received funding and the most viable received further support through 2001 (Berryman and Pytkowska, 2003). Another important objective of the LIP was the creation of an appropriate legal framework for microfinance. This helped many MFIs to become more integrated in the financial sector. Some MFIs were successful in obtaining commercial loans from local banks, while others transformed into financial companies which also improved their access to funds as well as their ability to provide more financial services.

By 2001, MFI programs disbursed over 20,000 microloans but served a market different from that of banks since the loans offered by MFIs were much smaller. For example, in 2000, banks offered loans starting at 25,000KM while MFIs' loans started at 1,000KM (Berryman and Pytkowska, 2003).<sup>4</sup> The lending technologies employed by Bosnian MFIs were also culturally appropriate, adjusted to serve the unique clientele. Poverty in BiH differed from poverty in Africa and Asia, as the new poor were highly educated and usually with good physical assets base. The potential microentrepreneurs were people who before the war might have had sophisticated private businesses but were displaced or, alternatively, people who before the war were factory workers but became unemployed after the industry collapsed (post-war unemployment reached as much as 85%).

The first microfinance project in Tuzla in 1996 tested typical microfinance practices and lessons from this pilot program helped other MFIs develop better lending practices and

organizational structures. For example, it was discovered that the credit union approach was not viable and that the most viable approach was individual lending while solidarity groups worked only for specific sub-populations. Some unnecessarily restrictive lending practices, such as frequent meetings and forced retention, also did not work well and were eliminated (Goranja, 1999).

Since Bosnian MFIs competed for clients, the one-size-fits-all approach was quickly eliminated and many MFIs used focus groups, exit interviews, market research, etc., to learn from clients, identify needs, launch new products, and provide better financial services. This led to the development of more products and, as a result, the microfinance market was better able to serve the needs of a broader group of entrepreneurs and not only those with characteristics desired by a single institution (Goranja, 1999).

Geographic expansion was very important because competition forced MFIs to seek new clients. Many MFIs opened branches and sub-branches in new locations. In 2001, the average MFI had 9 branches and served on average about 22 municipalities. Geographic expansion led to reorganization with head offices having more of a supervisory role and branches being profit centers, allowing for better reaction to target clientele's needs (Berryman and Pytkowska, 2003).

Two studies on the impact of microfinance in Bosnia illustrate the differences between typical microfinance impact studies and the approach employed here, and provide benchmarks to compare the results of this study. Matul and Tsilikounas (2004) studied the impact of a single program Prizma in the city of Tuzla. Comparing Prizma's clients with non-clients, they did not find evidence that program participation led to increase in income,



number of workers, and investment in equipment, although these indicators were substantially better among clients with longer use of credit.

Dunn (2005) studied the impact on client income in MFIs supported by the LIP using the Imp-Act (SEEP/AIMS) methodology.<sup>5</sup> The project collected data by interviewing about 3,000 clients and comparable non-clients in 2002 and re-interviewing most of them in 2004. Regression analysis showed that participation increased client households' income and that microfinance programs increased employment and wages of non-household employees, but only among the newest clients perhaps because the impact may occur after the first loan and may level off over time. This study confirmed that clients of the 10 programs had higher income than a corresponding control group with similar characteristics in the same (non-randomly selected) areas. This methodology, however, does not help understand if and how microfinance contributed to credit market development.

### **3. METHODOLOGY**

The first step in microfinance impact studies is to determine which variable will measure the outcome from improved access to credit. Household income or socioeconomic outcomes (for example nutrition) are usually the main variables of interest. The next step is determining an adequate control group that most closely resembles the client group of a lender whose impact is being studied. Statistically significant difference in the outcome between treatment and control groups is an indication of impact by a microfinance lender.

The concept employed here is different in two ways. First, the focus is not on the impact of a single MFI but on evaluating whether the microfinance industry, through its many institutions, improved local credit markets. A second difference of this approach,

therefore, is that the focus is not on the impact on income or other socioeconomic outcomes. Instead, we explore whether microfinance alleviated financing constraints and thus played the role it should play according to the literature on financial sector development. Another contribution of this approach is that selection issues are alleviated by the use of a representative sample and by controlling for municipality characteristics.

The empirical methodology is rooted in the literature on asymmetric information in credit markets. According to this literature, in the presence of high transaction costs and asymmetric information, loans are either rationed or available at a premium (Jensen and Meckling, 1976; Stiglitz and Weiss, 1981). In such circumstances, external and internal finance are no longer substitutes and investment in enterprises facing high information costs, such as most microenterprises, is constrained by the availability of internal funds (Myers and Majluf, 1984). Since these constraints do not affect all firms uniformly, the extent of effective financing constraints that different enterprises face provides information on the ability of the financial system to cater to these firms' financial needs. In effect, investment in enterprises with limited or no access to credit due to missing or poorly functioning credit markets would be more dependent on internal funds than would be investment in enterprises with better functioning credit markets.

The financing constraints approach, pioneered by Fazzari et al. (1988) simply tests for differences in sensitivity of investment to internal funds in enterprises with different levels of informational opacity by splitting a sample of enterprises into sub-samples, defined according to suitable theoretical priors that characterize constrained and unconstrained firms (*i.e.*, criteria such as enterprise's age and size). For each sub-sample, reduced-form investment equation is estimated, where investment is modeled as function of the enterprise's

internal funds, usually defined as revenues minus expenses and taxes and used as a proxy for changes in net worth, as well as controls for enterprise specific characteristics and investment opportunities determined from a variety of theoretical perspectives (Hubbard, 1998).<sup>6</sup> A statistically significant difference in investment sensitivity to internal funds across subsamples indicates that one group is more credit constrained.<sup>7</sup>

While the financing constraint is an empirical approach, its theoretical underpinnings come from recent developments in the literature on investment. Cleary, Povel, and Raith (2007) show that for positive or slightly negative levels of enterprise wealth, investment is positively related to internal finance.<sup>8</sup> With greater asymmetries of information between external providers of funds and the enterprise, investment becomes even more sensitive to the availability of internal funds. That is, everything else equal, enterprises facing higher asymmetric information costs have investment more sensitive to availability of internal finance than firms facing lower information costs.

The financing constraints approach has been used to study small and medium enterprises in transition countries (Budina *et al.* 2000; Hartarska and Gonzalez-Vega, 2006). The empirical analysis here adapts the financing constraints approach to fit the nature of the data, household microenterprises, and the microfinance market of BiH.

Microenterprises are informationally opaque, unable to signal their quality to traditional lenders, and usually cannot provide adequate collateral to alleviate the asymmetric information problem either because these enterprises do not have collateral or because poorly functioning secondary markets for the collateral render it worthless. Therefore, microentrepreneurs who cannot secure funds from banks and other traditional sources of external funds have to rely more on internal funds for their investment. Indeed, Dunn and

Tvrtkovic (2003) report that microentrepreneurs who obtained microloans used them mainly for investment in premises and in equipment.

The purpose of microfinance is to improve access to credit for the entrepreneurial poor via innovative lending technologies designed to decrease problems of asymmetric information. The expectation is that microenterprises in regions with several MFIs, as a group offer more than one credit products, would have investment less sensitive to the availability of internal funds because they have better access to external funds. On the other hand, microenterprises operating in regions without strong presence of MFIs would face more significant financial constraints and will rely primarily on internal funds for investment.

The model by Cleary, Povel, and Raith assumes that the cost of debt financing is endogenously determined and investments are scalable, meaning that change in the marginal cost of debt finance affects both the decision to invest and the choice of investment. This assumption permits us to use a logit model similar to the one in Johnson *et al.* (2002) to study investment decisions by small firms in transition economies.

The logit model assumes logistic distribution of the probability of an event:

$Pr_i = (1 + \exp(-\lambda_i))^{-1}$ , where  $\lambda$  is linearly dependent on the variables hypothesized to affect the probability:  $\lambda_i = \alpha + \beta X_i$ . The probability thus varies from 0 to 1 ( $\lambda = \pm\infty$ ), and the model is simplified by rearranging it into a log of the odds,  $\ln(P_i / (1 - P_i)) = \alpha + \beta X_i$  which, for samples consisting of individual outcomes, can be estimated with maximum likelihood. Interpretation of the coefficients can be also done by reverting back to the probabilities.

Thus, we estimate

$$\Pr(IFA = 1) = f(\alpha + \beta_1 IC + \beta_2 IO + \gamma Z) \quad (1)$$

where *IFA* is the decision to invest in fixed assets, *IC* is the variable for internal capital; *IO* is the investment opportunity variable, and *Z* is a vector of variables that capture various characteristics of the enterprise and the municipality in which it operates. Firms without investment opportunities would not invest even if they had capital. Thus, we control for investment opportunity (*IO*) and separate it from the effect of internal funds (*IC*).

An important challenge in studying microentrepreneurs' investment is to distinguish between business and household assets. A measure of the enterprise cash flow may be incorrect because it is not always possible to separate the capital that entrepreneurs use for private purposes from that used for business purposes. Indeed, microfinance institutions have increasingly focused on evaluating assets and cash flows belonging to the household rather than those belonging only to the enterprise they run (Hartarska and Holtmann, 2006). That is why care is taken to include variables that control for the impact of household income, cash flows and consumption, as well as for access to informal funds.

This approach avoids self-selection, when possibly more entrepreneurial clients apply and get loans, and for whom loan "impact" may be result of unobserved entrepreneurial characteristics. Enterprises in the sample are randomly selected and may or may not have a loan in either type of municipality (with or without MFIs). If availability of several providers and products improves access to credit, then for both (current) clients and non-clients, investment will depend less on internal funds because broader group of entrepreneurs could get a loan when they need it. The impact of microfinance cannot be attributed to unobservable entrepreneurial characteristics. Of course, it is possible that MFIs themselves have self-selected to serve the most promising regions and this remains unresolved in traditional impact studies. To alleviate the supply-side self-selection, the empirical analysis

includes controls for regional characteristics.<sup>9</sup> In this respect, a positive feature of the data is the random selection of municipalities in the Bosnian LSMS.

#### **4. DATA**

Microenterprise data come from Bosnia and Herzegovina Living Standards Measurement Study Survey, a part of the Living Standards Measurement Survey (LSMS) series of the World Bank, conducted by the Agency for Statistics of Bosnia and Herzegovina, the Federal Office of Statistics and the Republika Srpska Institute of Statistics in 2001. While this is a household survey designed to measure the living standards of the population, in 2001 it included a section that asked households with enterprises about their businesses. The sample includes 25 municipalities out of total 146.<sup>10</sup> The total sample of the 2001 LSMS comprises 5,400 households, of which 341 indicated that they owned businesses and provided complete answers to the private enterprise section of the survey. Since the target clientele of MFIs are less wealthy households, and since loans to microenterprises are usually defined as loans for self-employment and microenterprises, only enterprises with up to 10 employees were included in the analysis. The final sample consists of 294 observations. Sample weights from the original LSMS data are used throughout the analysis.

MFI data and the municipalities they served come from the 2001 Annual Report by the Local Initiative Project in Bosnia and Herzegovina, which published a survey of the microfinance industry with detailed description of the geographic coverage by individual MFIs.<sup>11</sup> This report included all significant programs that operated in BiH in 2001 except PRIZMA and MICRA. The annual reports of these two MFIs were used to collect information on their geographic coverage. Data on the number of MFIs per municipality

were then merged with the household enterprise data to create the database used in the analysis.

Table 1 lists municipalities included in the database, their type (rural, urban, and mixed), and location (Republika Srpska or the Federation of BiH). It also lists the names of MFIs operating in each municipality, their collective assets base, and some characteristics of the lending methodologies they used in 2001. In addition to detailed data for geographic coverage by each MFI and its assets base from the LIP report, data on loan product characteristics were obtained from the 2001 Mapping Survey conducted by the Microfinance Center for CEE & NIS as well as from MFIs annual reports.<sup>12</sup> These data were used to classify municipalities as *constrained* and *unconstrained*.

Table 1. Geographic distribution of microfinance institutions by municipalities

Classification	Micro-businesses	Municipality	Type	Entity	MFI assets (mln)	No MFI	Main office	Branch	Lending Products
Constrained	1	Cajnice	Mixed	RS*	0	0			mostly individual lending (except EKI which offered limited group loans); target microenterprises with less than 5 employees; targeted main city only; or only refugees; 95 percent of loans less than 5,000KM
Constrained	3	Grude	Rural	FBiH**	0	0			
Constrained	3	Kneževo	Rural	RS	0	0			
Constrained	18	Novi Grad	Urban	FBiH	7.3	1		Sunrise	
Constrained	4	Srpska Ilidža	Urban	RS	7.3	1		Sunrise	
Constrained	3	Posušje	Rural	FBiH	13.9	1		EKI	
Constrained	8	N.Sarajevo	Urban	FBiH	11.1	2	Sunrise	Benefit	
Constrained	23	Novi Grad	Urban	RS	16.2	2		Sinergija, Mikra	
Constrained	1	Višegrad	Mixed	RS	17.7	2		Benefit, EKI	
Constrained	11	Zvornik	Rural	RS	26	2		EKI, Partner	
Unconstrained	61	Banja Luka	Urban	RS	26.5	3	Sinergija, Mikrofin	Mikra	
Unconstrained	9	Modrica	Mixed	RS	30	3		Sunrise, Partner, Mikrofin	
Unconstrained	19	Šamac	Rural	RS	33.3	3		Partner, Sunrise, Sinergija	
Unconstrained	4	Breza	Mixed	FBiH	33.8	3		Partner, EKI, Sunrise	
Unconstrained	6	Vogošća	Mixed	FBiH	33.8	3		EKI, Partner, Sunrise	
Unconstrained	15	Gradacac	Rural	FBiH	36.5	3		EKI, LOK, Partner	
Unconstrained	16	Prijedor	Mixed	RS	37.4	3		EKI, Mikrofin, Sinergija	
Unconstrained	9	Srbac	Rural	RS	37.4	3		Mikrofin, Sinergija, EKI	
Unconstrained	19	Tuzla	Urban	FBiH	33.1	4	MI-BOSPO, Bosvita, Partner	EKI	
Unconstrained	14	Sarajevo C.	Urban	FBiH	34	4	EKI, LOK, Mikra	Sunrise	
Unconstrained	11	Travnik	Mixed	FBiH	35.5	4		LOK, EKI, Prizma, Sunrise	
Unconstrained	2	Kakanj	Rural	FBiH	36.6	4		EKI, Partner, Mikra, Sunrise	
Unconstrained	11	Visoko	Mixed	FBiH	36.6	4		Mikra, Partner, EKI, Sunrise	
Unconstrained	11	Zavidovici	Rural	FBiH	39.9	4		Partner, Sunrise, EKI, MI-BOSPO	
Unconstrained	12	Zenica	Urban	FBiH	46.6	5		EKI, LOK, Sunrise, Partner, Mikra	

+Unweighted \* RS stands for Republica Srpska \*\* FBiH stands for the Federation of BiH



A municipality was classified as (credit) *constrained* if it had none or up to two MFIs and joint assets base of less than 30 mln KM.<sup>13</sup> Moreover, if only one or two MFIs operated in the constrained municipalities, they had a specific focus in terms of a target location (e.g. Benefit and Partner lent only in the main municipality town), or targeted microenterprises with less than 5 employees or, alternatively, a specific group (e.g. EKI targeted refugees) and over 95 percent of the loans of each MFI were for less than 5,000KM. In these municipalities, MFIs offered only individual loans restricting the pool of potential borrowers.<sup>14</sup>

In *unconstrained* municipalities, at least three MFIs operated and their asset base was at least 30 mln KM. The loans offered were relatively more varied and offered more options. For example, solidarity groups offered loans to borrowers with limited collateral; loans larger than KM 5,000 were also more prevalent. In addition, while individual MFIs targeted a specific group, collectively the three or more MFIs offered more choices to borrowers with different circumstances, e.g., women, refugees, unregistered microentrepreneurs and those with more than 5 employees. Thus, collectively, MFIs in *unconstrained* municipalities appealed to more types of potential clients.

Money *fungibility* means that money received as a business loan may be used for personal or family consumption instead of productive purposes and that consumption credit may be used to alleviate financial constraints of the enterprise. Studies usually address the *fungibility* issue by widening the unit of analysis to include the financial portfolio of the entire household unit (Chen and Dunn, 1996). Since the LSMS data contain household data, the cash flows of the enterprise and those of the household are used in the analysis.

The LSMS dataset contains a section with detailed information on credit use by each member of the household.<sup>15</sup> Table 2 provides information on credit use by households owning microenterprises with less than 10 employees. Table 2 reveals that 31.7 percent of these households had loans from formal and informal sources (family and friends), and the average value of total amount borrowed was 5,224KM with loans ranging from 100KM to 50,000KM.<sup>16</sup> The average amount borrowed by households with enterprises in constrained municipalities was 5,360 KM or slightly higher than the 5,190KM in unconstrained municipalities. Similar pattern is observed for the amount currently owed by the household and the amount of their most recent loan.

Table 2. Experience with credit of households who own a microbusiness.

	<b>All</b>	<b>Constrained</b>	<b>Unconstrained</b>
Percentage who reported value of the loan	31.7	28.1	33.6
Value most recent loan in KM	4, 109	4,415	3,998
Value owed (currently) in KM	3,992	5,231	3,474
Value of all family loans (in KM for past year)	5,224	5,360	5,190
Range	10-50K	100-50K	100-50K
Loans by type			
Banking loans (% of all loans)	28.8	33.8	26.8
Pawn loans (% of all loans)	1.1	3.4	1.3
Roscas (% of all loans)	2.9	9.7	1.3
NGO and other (% of all loans)	15.2	5.9	19.3
Rejection from formal source (% reported)	2	0	2.1
Loans identifies as loan for business purposes (%)	28.4	45.1	21.4
More than one formal loan (%)	2.4	3.4	2.0

Table 2 also reveals that, compared to households in credit unconstrained municipalities, households in constrained municipalities used proportionally more bank debt (33.8 versus 26.8 percent respectively) and proportionally less credit from NGOs and other

formal sources (5.9 versus 19.3 percent respectively). On average, the group of households in credit constrained municipalities identifies 45.1 percent of their loans as loans for business purposes, while the households in the unconstrained group identified 21.4 of their loans as loans for business purposes. Households in credit constrained municipalities were never rejected for a formal loan, which may indicate that many potential borrowers might not have even incurred the transaction cost to apply. Of the constrained group, 3.4 percent had more than one formal loan, while among households in unconstrained municipalities two percent had more than one loan. This result is consistent with Dunn and Tvrkovic (2003) who report that only 1.2 percent of the clients with MFI loans had access to other types of formal loans.

The survey first asks microentrepreneurs to list the type and value of fixed assets they have which include land, buildings, equipment and machines, furniture, small and large tools, vehicles (including small vehicles such as bicycles and wheel barrows) and other fixed assets and then asks if the entrepreneur had purchased such assets during the past 12 months. A dummy variable is constructed taking the value of 1 if the owner answered yes and zero otherwise.

Summary statistics of the variables used in the econometric analysis are presented in Table 3. Only 17.6 percent of the microenterprises in credit constrained municipalities, or *constrained microenterprises*, purchased fixed assets in the past year, while 28.4 percent of microenterprises in credit unconstrained municipalities or *unconstrained microenterprises* purchased fixed assets.

Table 3. Variables definition and summary statistics, by credit constrained and unconstrained municipalities

Variables	Definition	Constrained	Unconstrained
<i>Invested in past 12 months</i>	A dummy variable that takes the value of one if fixed assets were purchased in the past 12 months	0.176 (.071)	0.284 (.039)
<i>HHIncome</i>	Household income (monthly salary plus social security payment for all family members in '000KM)	4.254 (2.112)	3.596 (0.576)
<i>Cash Flow</i>	Enterprise income minus expense (monthly in '000KM)	1.672 (0.835)	0.703 (0.132)
<i>Markets &amp; Skills</i>	A dummy variable that takes the value of one if the entrepreneur has indicated that non-financial issues were among the top three constraints in the past 12 months	0.299 (0.065)	0.475 (0.043)
<i>Mun_Income</i>	Annual average household income in the municipality ('000KM)	8.127 (.830)	5.805 (0.974)
<i>No employees</i>	Number of paid employees	0.760 (0.219)	2.172 (0.814)
<i>Fixed Assets</i>	Value of the fixed assets of the microenterprise(in '000KM)	17.323 (6.128)	28.619 (8.021)
<i>Enterprise age</i>	Age of the enterprise (years)	5.908 (1.088)	8.299 (0.685)
<i>Female</i>	A dummy variable that takes the value of one if the owner was a female; zero otherwise	0.241 (0.059)	0.148 (0.28)
<i>HH_Consumption</i>	Annual household consumption (in '000KM constructed by LSMS)	3.184 (0.569)	1.437 (0.077)
<i>No. non-formal loans</i>	Number of non-formal loans the family has had during the past 12 month	4.369 (0.289)	4.208 (0.111)
<i>Rural</i>	A dummy variable that takes the value of one if the municipality is defined as rural in the LSMS survey, zero otherwise	0.523 (0.083)	0.524 (0.029)
<i>Urban</i>	A dummy variable that takes the value of one if the municipality is defined as urban in the LSMS survey, zero otherwise	0.219 (0.048)	0.193 (0.017)
<i>Trade</i>	A dummy variable that takes the value of one if the microbusiness is in trade according to LSMS definition, zero otherwise	0.403 (0.093)	0.259 (0.039)
<i>Service</i>	A dummy variable that takes the value of one if the microbusiness is in service according to LSMS definition, zero otherwise	0.454 (0.087)	0.538 (0.043)

Internal funds are measured with two variables. The first variable captures the cash-flow of the enterprise and is constructed as monthly enterprise profits defined as the revenue minus total business related expenses. The second variable is the sum of annual household income from employment or social assistance payment and captures the non-business cash flow of the household. Households may use salaried (social security) income to purchase business equipment and may also use enterprise profits to improve consumption.

Table 3 shows that compared to the unconstrained, constrained microenterprises generated higher levels of cash income (average monthly profits of 1,672KM versus 703KM for the unconstrained). Microenterprises in credit constrained municipalities had on average higher cash flows along the whole range of this variable, except for relatively high profit levels, that is, when own cash flows sufficed for investment in both groups. This is consistent with the notion that in credit constrained municipalities only enterprises generating sufficient cash flows operated and that some enterprises might have not been launched or expanded due to lack of access to credit. It also is consistent with the smaller percentage of investment in fixed capital in constrained municipalities. Thus, availability of microcredit should have an impact on investment through the financing constraints.

This interpretation is also consistent with the data on return on assets (ROA), fixed assets and microenterprises distribution by sector. In municipalities with credit constraints, microenterprises were more likely to be in retail and trade, they were less profitable and less capital intensive than enterprises in municipalities with less severe credit constraints. In particular, constrained microenterprises had ROA of 0.25, average fixed assets of 17,232KM, and 40 percent worked in retail and trade. Unconstrained microenterprises had ROA of 0.78, fixed assets of 28,619KM and 26 percent operated in retail and trade.

Annual household income generated from sources other than the microenterprise in constrained municipalities was higher (8,127KM) than that of the unconstrained (5,805KM) but the annual consumption by the households in constrained municipalities was also higher (3,184 KM) than that of households in unconstrained municipalities (1,437KM). These figures suggest that MFIs might have targeted more economically distressed areas.

Investment opportunities are controlled for by two variables. The first variable is average annual income in the municipality described above. The expectation is that richer municipalities provide better opportunities for business expansion.

A second variable called "*Markets and Skills*" is designed to capture the impact of business opportunities and is constructed as a dummy variable that takes the value of one if a microentrepreneur indicated lack of clients or lack of own skills among the first three problems with his business. The expectation is that this variable captures opportunities for expansion that may not be easy to overcome. Only 30 percent of constrained microenterprises had problems with present markets and skills, versus 48.5 percent of the unconstrained microenterprises.

Microenterprise-specific characteristics controlled for are age, size, activity type, and gender of the enterprise owner. Size of the enterprise is controlled for by including the value of fixed assets, as well as the number of non-family members employed in the enterprise. The model was estimated with both the number of all employees (including self-employment) and number of hired non-family members. The latter specification is preferred because the financing constraints approach suggests controlling for operating expense when possible due to the substitutability between fixed and operating expense. Table 3 reveals that constrained microenterprises employed on average about one non-family member versus two

employees for the unconstrained. Constrained microenterprises were also smaller in size according to the size of their fixed assets.

One reason for the smaller size of MFIs in constrained municipalities may be that microenterprises there formed later, as indicated by the younger age (5.9 years) of constrained versus the unconstrained microenterprises (8.3 years). In addition, consistent with the prevalence of retail and trade among constrained microenterprises, more women ran microbusinesses in the constrained municipalities with 24.1 percent, compared to 14.8 percent run by women in unconstrained areas.

## **5 DISCUSSION OF THE RESULTS**

Results of the estimation of logit models are presented in Table 4. Two specifications for each group—enterprises in credit constrained and in credit unconstrained municipalities—are estimated with the marginal effects or factor changes in the following column. The first specification is presented in columns 2-4, while columns 5 through 8 present results from specification that includes controls for type of activity of the enterprise such as production (omitted group), trade, and services, as well as the type of municipality: rural, urban and mixed (omitted group).

Table 4. Logit regression results on microenterprises in constrained and unconstrained municipalities.

	(1) Constrained		(1) Unconstrained		(2) Constrained		(2) Unconstrained	
	Coefficient	Factor Change	Coefficient	Factor Change	Coefficient	Factor Change	Coefficient	Factor Change
<i>Constant</i>	1.621		-0.841		3.221		-1.208	
	(1.06)		(0.80)		(1.75)*		(0.90)	
<i>HHIncome</i>	0.019	1.019	0.019	1.019	-0.015	0.985	0.021	1.021
	(0.29)		(0.64)		(0.14)		(0.71)	
<i>Cash Flow</i>	0.677***	1.967***	0.352*	1.422*	0.744***	2.100***	0.423**	1.525**
	(4.67)		(1.92)		(4.31)		(2.22)	
<i>Markets &amp; Skills</i>	-0.007	0.993	1.329***	3.778***	0.178	1.195	1.197***	3.317***
	(0.01)		(3.10)		(0.22)		(2.70)	
<i>Mun_Income</i>	-0.361**	0.697**	-0.054	0.947	-0.442**	0.623**	-0.006	0.994
	(2.44)		(0.40)		(2.02)		(0.03)	
<i>No employees</i>	-0.236	0.789	-0.004**	0.996**	-0.330	0.719	-0.003	0.997
	(0.82)		(2.55)		(0.82)		(1.60)	
<i>Fixed Assets</i>	0.014	1.013	0.002	1.003	0.017	1.018	0.003**	1.003**
	(1.47)		(1.45)		(1.13)		(2.00)	
<i>Enterprise Age</i>	-0.167	0.846	-0.054*	0.948*	-0.145	0.865	-0.082**	0.921**
	(1.02)		(1.82)		(0.71)		(2.45)	
<i>Female</i>	-0.760	0.468	0.694	2.000	-0.628	0.534	1.040	2.830
	(0.81)		(1.27)		(0.56)		(1.61)	
<i>HHConsumption</i>	-0.325	0.722	0.052	1.053	-0.222	0.801	0.104	1.109
	(1.60)		(0.16)		(1.03)		(0.28)	
<i>No. non-formal loans</i>	-0.046	0.954	-0.179	0.836	-0.054	0.947	-0.197	0.822
	(0.11)		(1.19)		(0.14)		(1.21)	
<i>Rural</i>					-0.043	0.958	0.337	1.401
					(0.03)		(0.62)	
<i>Urban</i>					0.534	1.705	-0.219	.0803
					(0.43)		(0.25)	
<i>Trade</i>					-1.941	0.143	-1.077	0.341
					(1.02)		(1.13)	
<i>Service</i>					-1.403	0.246	0.633	1.883
					(0.87)		(0.86)	
<i>Other</i>					-2.300	0.100	-0.011	0.989
					(0.67)		(0.01)	
<i>Pseudo Ftest</i>	2.62		2.36		1.94		2.20	
<i>Probability</i>	(0.04)		(0.01)		(0.02)		0.006	
<i>Observations</i>	75		219		75		219	

Absolute value of t statistics in parentheses

\*significant at 10%; \*\* significant at 5%; \*\*\* significant at 1%

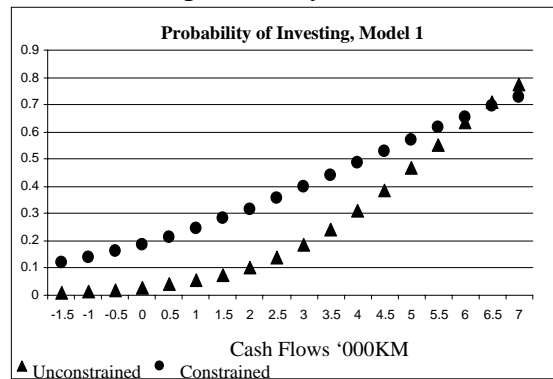
The main interest is in the signs and magnitudes of the variables measuring availability of internal funds (*Cash Flow* and *HHIncome*) because they represent the sensitivity of investment to internal funds. As expected, the coefficients on *Cash Flow* are statistically significant. The magnitudes of these coefficients are consistent with the hypothesis that MFIs improve the credit market and alleviate credit constraints since



enterprises in municipalities with three or more MFIs face less severe financing constraints. Specifically, according to the first model, and in the group of constrained enterprises (municipalities without MFIs), for each additional 1,000 KM in monthly profit the odds of investing in fixed capital increase by a factor of 1.97, while the odds of investing increase by the lower factor of 1.42 in the sample of microenterprises operating in credit unconstrained municipalities. Thus, investing in the constrained group is more sensitive to availability of internal funds than is investment in the unconstrained group. The difference of a factor of 0.545 is statistically significant at the 5 percent level. In the second specification, the difference in the odds is 0.575 and is statistically significant at the 7 percent level.

This is also illustrated on Figure 1 where investment probabilities are related to internal funds along the range of that variable. In Figure 1, the probability of investing is calculated for various levels of cash flows.<sup>17</sup> The results consistently indicate differences in investment probabilities for the two groups with estimated probabilities of investing, for the same level of internal funds consistently higher in credit constrained municipalities. In addition, investment probability is different from zero even for negative values of cash flows consistent with the theoretical model of Cleary, Povel and Raith (2007).

Figure 1. Predicted investment probability as a function of cash flows



Results presented in Table 4 also show that, while investment depends on internal funds in credit constrained municipalities, it does not depend on household income, as coefficients of *HHincome* are not statistically significant in any of the regressions. The reason for that is probably the separation (for investment purposes) between household and business income. Other household characteristics such as gender of the enterprise owner, household consumption, and household access to non-formal loans also do not affect investment.

In unconstrained municipalities, microenterprises where lack of skills and markets were among the top three problems in the current business were more likely to invest, perhaps in order to take advantage of new opportunities. This relation is not observed in microenterprises in credit constrained municipalities.

The results also show that older microenterprises in the unconstrained municipalities were less likely to invest, consistent with a notion that microbusinesses have a lifecycle with heavier investment needs at earlier age. Holding all else constant, similar evidence for a lifecycle investment is not observed in microbusinesses in constrained municipalities perhaps because these businesses could not take full advantage of the available opportunities. The interpretation of these results is consistent with the theoretical conjecture and the empirically observed substitutability between hiring more employees and investing in fixed assets in unconstrained microenterprises. No such relation is found in the credit constrained municipalities where limited access to capital might have prevented businesses from taking advantage of productive opportunities either by buying (renting productive capital) or by hiring labor. On the other hand, holding consumption constant, microbusinesses located in wealthier constrained municipality, were less likely to have invested in their businesses than

those in poorer constrained municipalities, perhaps because in wealthier credit-constrained municipalities people could earn alternative income. No such relation is found in unconstrained municipalities.

The second model presented in the last four columns of Table 4 adds industry dummies for trade and service with production as the omitted dummy as well as dummies for urban, rural and mixed (the omitted category) municipality. Previous impacts of cash flow, investment opportunity, enterprise age and municipality wealth are the same as in model one. Inclusion of industry and regional dummies only makes the coefficient on size in unconstrained municipalities statistically significant and the coefficient on number of employees statistically insignificant, possibly due to the correlation between these two variables. The variance inflation factor, however, is less than 10 and it does not suggest a strong multicollinearity.

Usually, microenterprises in production activities are more capital intensive than those in trade, services, and other activities. The evidence does not show that investment in industries like trade and services differs significantly from that in production in both types of municipalities. This eliminates possible concerns that investment may differ across sectors and is consistent with the theory suggested by Clearly, Rovel and Raith (2007) where the decision to invest and the size of investment are jointly determined by entrepreneurs.

For the two types of municipalities, investment in rural and in urban municipalities is not statistically different than that in mixed municipalities, where presumably more opportunities for both urban and rural type businesses exist. These variables together with the industry type and average family income by municipality are reassuring that municipality

characteristics are controlled for although it is possible that supply-side selection issues persist to the extent that salient municipality characteristics cannot be fully measured.

## **6. CONCLUSIONS**

This paper uses the financing constraint approach to study the impact of microfinance on access to credit for microenterprises in Bosnia and Herzegovina. It uses data collected from the Living Standards Measurement Survey of the World Bank, the Local Initiative Project and the Association of Bosnian Microfinance Institutions. The approach is an alternative to traditional microfinance impact studies relying on specific and costly multi-year surveys associated with challenges in empirical implementation and possible sample bias. Moreover, while traditional studies evaluate the impact of a single MFI, the approach used in this paper evaluates the impact of the microfinance industry as a whole and, thus, could capture important issues such as oversupply of microcredit and possibly over-indebtedness.

Since 2001, the World Bank has conducted a scaled back version of the LSMS in other countries with transition economies and did not collect data from self-employed individuals and those who run microenterprises. This is unfortunate, because these are precisely the businesses missed from larger scale studies such as the World Bank's Business Environment and Enterprise Performance Survey. Scarce development assistance funds should be used efficiently and this paper shows that LSMS data could provide valuable insights on how well initiatives designed to help the poor work.

The data and method employed here produce results consistent with more traditional impact study on Bosnia for the same period. They show that MFIs improved access to credit in municipalities where two or more MFIs offered financial products because investment in

local microenterprises was less sensitive to availability of internal funds than was investment in microenterprises in municipalities where microfinance activities were limited or non-existent and where microentrepreneurs had to rely more on internal funds for investment.

This methodology is appropriate for other countries where LSMS or similar large scale household surveys are conducted and where data on geographic distribution of MFIs branches can be assembled. Popularity of microfinance forces MFIs to be more transparent and decreases the cost of assembling a database with MFIs branch distribution, therefore making the financing constraints approach more attractive.

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<sup>1</sup> A micro enterprise is defined as business with ten or fewer employees, one or more of whom owns the enterprise.

<sup>2</sup> Microfinance institutions target the relatively poor who are below or close to the poverty line and who usually have the (entrepreneurial) skills to undertake some activity but lack access to credit.

<sup>3</sup> Traditionally, the Ohio State School argued that a focus on social objectives is misplaced because only clients of sustainable financial institution gain economically while clients of subsidized institutions aiming at social objectives do no. These conclusions were drawn from the experience of heavily regulated development banks which in the 1980 employed price (interest rate) and quantity (targeted credit) controls to redistribute income in favor of small producers, to promote adoption of technology, and to eliminate moneylenders. As a result, banks lent to large farmers to cover higher screening and monitoring costs. These farmers defaulted on their subsidized loans because they already had access to loans from unsubsidized sources. Banks were left with smaller loanable funds to lend to poor farmers and this adverse income redistribution undermined the development of rural financial markets (Gonzalez-Vega, 1977; Adams et al., 1984). Re-evaluation of some of the data shows that subsidized banks achieved social objectives and suggest that measuring the social impact of MFIs is also important (Smith, 2002; Binswanger and Khandker 1995).

<sup>4</sup> Convertible Mark, or KM, is the currency of the sate of Bosnia and Herzegovina. The exchange rate was fixed by a currency board at 1KM=1DM through end-2001 and KM=0.51 Euro since January 1, 2002.

<sup>5</sup> For more details see <http://www.ids.ac.uk/impact/>

<sup>6</sup> This approach has been modified to account for the impact of working capital and other issues. Advantages and disadvantages of the approach are also discussed in Hubbard, 1998.

<sup>7</sup> Usually these are either a t-test (F-test) for difference in slopes on the investment coefficients (and other coefficients) across groups or the equivalent Chow test to establish if two separate regressions for each group are needed.

<sup>8</sup> The model also makes the empirically relevant assumption that some firms may have negative levels of internal funds and even negative net worth, applicable to microenterprises with few tangible assets but valuable growth opportunities. This theoretical model addresses previous criticism of the financing constraints approach.

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<sup>9</sup> Some bias may persist to the extent that salient regional characteristics cannot be fully measured.

<sup>10</sup> Overall 25 out of the 146 municipalities were selected. For detailed information, see <http://www.worldbank.org/lsmc/country/bih/bih01home.html>.

<sup>11</sup> The report is available in English at [www.odraz.ba](http://www.odraz.ba).

<sup>12</sup> The survey is described in details in Foster and Pytkowska (2003).

<sup>13</sup> One exception is Banja Luka (the center of Republika Srpska ) with 26.5mln assets. It is classified as unconstrained because it had three MFIs and as a whole they offered less restrictive loan products than the pairs of MFIs in the group of constrained municipalities.

<sup>14</sup> Sinergija is an exception because it offered individual and solidarity group loans but it was a very small MFI with limited reach.

<sup>15</sup> The credit section was completed during the first visit. The section on household enterprise was completed during a follow up visit to households engaged in entrepreneurial activities, and the interviews were with the household members most familiar with the enterprise. It may be possible that business related credit information was not revealed during the first visit; thus, linking household credit to investment in the business is not prudent.

<sup>16</sup> All averages are weighted by the appropriate sample weights.

<sup>17</sup> Calculations are based on estimation results from Model 1, Table 4.

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