

FINANCING CONSTRAINTS AND MICROFINANCE  
IN EASTERN EUROPE AND CENTRAL ASIA

Except where reference is made to the work of others, the work described in this thesis is my own or was done in collaboration with my advisory committee. This thesis does not include proprietary or classified information.

---

Thomas McAdams

Certificate of Approval:

---

Valentina Hartarska, Co-Chair  
Associate Professor  
Agricultural Economics

---

Daniel Gropper, Co-Chair  
David and Meredith Luck Professor  
Business Administration

---

Robert Lawson  
Associate Professor  
Finance

---

George T. Flowers  
Dean  
Graduate School

FINANCING CONSTRAINTS AND MICROFINANCE  
IN EASTERN EUROPE AND CENTRAL ASIA

Thomas McAdams

A Thesis

Submitted to

the Graduate School of

Auburn University

in Partial Fulfillment of the

Requirement for the

Degree of

Master of Science

Auburn, Alabama

May 9, 2009

FINANCING CONSTRAINTS AND MICROFINANCE  
IN EASTERN EUROPE AND CENTRAL ASIA

Thomas Joseph McAdams

Permission is granted to Auburn University to make copies of this thesis at its discretion, upon the request of individuals or institutions and at their expense. The author reserves all publication rights.

---

Signature of Author

---

Date of Graduation

THESIS ABSTRACT  
FINANCING CONSTRAINTS AND MICROFINANCE  
IN EASTERN EUROPE AND CENTRAL ASIA

Thomas McAdams

Master of Science, May 9, 2009  
(B.B.A. Ohio University 2007)

63 Typed Pages

Directed by Valentina Hartarska and Daniel Gropper

Microfinance institutions are a growing tool used to alleviate poverty throughout the world. This thesis estimates how much the impact, if any, that microfinance institutions in 19 countries have throughout Eastern Europe and Central Asia. The study focuses on regions and cities inside the countries, opposed to measure a country-wide impact. The study shows a difference in investment behavior between firms that have access to an MFI and firms that do not have access.

Style manual or journal used: American Economic Review

Computer software used: Microsoft Word 2007  
Microsoft Excel 2007  
Stata SE 10

## TABLE OF CONTENTS

LIST OF FIGURES.....	vii
LIST OF TABLES.....	viii
INTRODUCTION.....	1
HISTORY OF MICROFINANCE.....	4
MICROFINANCE IN EASTERN EUROPE AND CENTRAL ASIA.....	7
LITERATURE REVIEW.....	11
THEORETICAL MODEL.....	19
Conceptual Model.....	20
Empirical Model.....	22
DATA.....	24
RESULTS.....	32
Panel Regressions I.....	34
Instrumental Variable Regressions (year 2005 only).....	38
Fixed Effects, Panel Regression with Instrumented Access.....	40
Tobit Regressions.....	42
Possible Issues.....	47
CONCLUSION.....	48
REFERENCES.....	54
APPENDIX Correlation Tables.....	56

## LIST OF FIGURES

FIGURE 1	Amount of loans Grameen Bank disbursed 2002-2006.....	2
FIGURE 2	Expected Slope of Firms Internal Investment Behavior.....	23
FIGURE 3	Resulting Firms Internal Investment Behavior.....	42

## LIST OF TABLES

TABLE 1	Top 15 Items for which members took loans.....	3
TABLE 2	Micro-businesses operating in cities with or without an MFI by country....	26
TABLE 3	Micro-businesses that have gained access from 2002 to 2005, by country...	26
TABLE 4	Variables Description.....	28
TABLE 5	Interaction Variables Description.....	29
TABLE 6	Summary Statistics of Variables .....	30
TABLE 7	Panel Dataset Regressions.....	34
TABLE 8	Correlation Between Access and Predictors.....	36
TABLE 9	Predicted Access Results.....	36
TABLE 10	Regressions with 2005 Variables, Instrumented Access.....	39
TABLE 11	Fixed Effects, Panel Regression with Instrumented Access.....	41
TABLE 12	Tobit Models (Panel and 2005).....	42
TABLE 13	Panel Regression with Instrumented Access (Tobit Model).....	44
TABLE 14	2005 Regression with Instrumented Access (Tobit Model).....	46

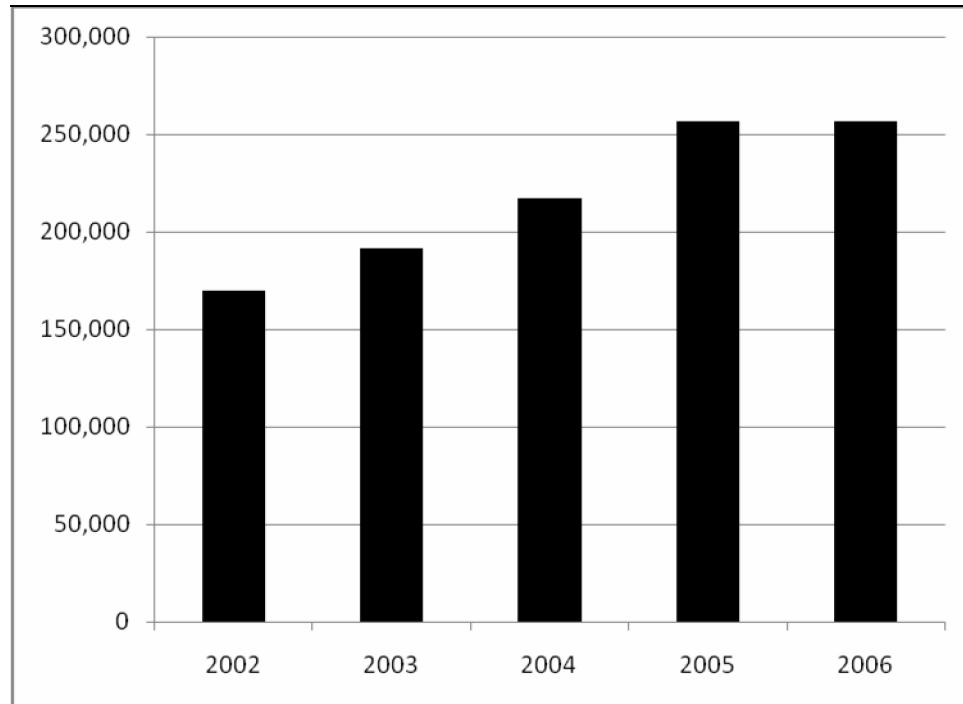


## INTRODUCTION

Microfinance is a world-wide phenomenon with the goal of helping lower income entrepreneurs access relatively small loans at affordable interest rates. Commercial banks generally do not cater to the needs of the poor which leaves a gap in the market that microfinance fills. The projects that most poor borrowers in developing countries undertake are small scale, requiring small loans; therefore, the costs of obtaining the information necessary to select borrowers, evaluate their creditworthiness, monitor the use of the loans, and enforce repayment may outweigh the potential profits to most lending institutions (Coleman et al 1999). This creates a potential market for lending small loans to poor borrowers. The microfinance lending process started out targeting poor women in order to supply them with capital needed to start or improve their small businesses. In most instances the institution will lend to groups of women opposed to an individual to decrease potential moral hazard and asymmetrical information problems. Recently, microfinance institutions (MFIs) have begun to adopt a wide array of other strategies throughout the world, besides only targeting women. Many programs now focus on lending to micro-businesses (businesses with 10 or fewer employees) or self-employed . The objective is to break the vicious circle of poverty consisting of low capital, productivity, income and savings (Hietalahti and Linden 2006). The volume of lending has been growing as is exemplified through the Grameen Bank.

**Figure 1**

**Amount of loans Grameen Bank disbursed 2002-2006<sup>1</sup>**



1 US Dollar equals approximately 68.5 Taka  
1,000,000 Taka equals 14,599 US Dollars

An example of a success story could be an entrepreneur, who owns a shop, and makes a wide array of things, from crafts to furniture. The entrepreneur may be able to sell more products, but is constrained in producing more due to a lack of capital. A microfinance institution would step in to provide the entrepreneur with financial capital to aid with the expansion of the business, whether they need the funding for more materials, another worker, or something else.

The first loan may be for as small as \$50 U.S. in some countries, but as the business expands the loans may become larger and the entrepreneur will be more likely to

---

<sup>1</sup> Grammeen-info.org

receive credit since they have credit history with the institution. Access to capital, even on a tiny scale, can have a transformational effect on human lives. Over time, many of the poor are able to use the small stake that a microloan provided as the basis for building a thriving business that can lift them out of poverty.<sup>2</sup>

**Table 1**

Top 15 Items for which members took loans from the Grameen Bank in Bangladesh<sup>3</sup>

	Item	Number of Loans	Amount (In Taka)
1	Milk cow	765,075	5,934,980,583
2	Grocery shop	557,196	5,683,025,114
3	Cow fattening	751,574	5,131,401,434
4	Paddy husking	428,111	2,890,963,795
5	Rice/Paddy trading	377,183	2,836,236,671
6	Paddy cultivation	227,624	1,494,941,969
7	Land lease	168,906	1,363,716,568
8	Stationery shop	149,402	1,251,383,248
9	Bamboo works	153,310	1,174,355,705
10	Vegetables trading	149,442	1,144,204,673
11	Fish trading	153,729	1,038,835,563
12	Rickshaw purchase	121,022	800,174,715
13	Pisciculture	106,442	785,765,168
14	Cloths trading	82,604	769,369,699
15	Poultry raising	108,990	656,858,656

<sup>2</sup> Yunus, Muhammad. Creating a World Without Poverty. 2007. Page 8.

<sup>3</sup> (grameen-info.org).

## HISTORY OF MICROFINANCE

Muhammad Yunus is known as one of the pioneers of microfinance due to his success with the Grameen Bank which he started in Bangladesh in 1976. Yunus started out with one branch and directed his loans of very small denominations toward women who were self-employed. Eventually, more branches began to open in Bangladesh as well as in many other countries. Microfinance has become a worldwide phenomenon in recent decades. The year 2006 was selected as the International Year of Microfinance by the United Nations, and Yunus was awarded the Nobel Peace Prize in 2007. As of February 2008, the bank had 7.45 million borrowers, 97 percent of whom were women. With 2,499 branches, the Grameen Bank provides services in 81,334 villages, and operates on several continents.<sup>4</sup>

Due to microfinance institutions' growing popularity through the Nobel Prize, the Grameen Foundation, and the World Bank, many other organizations and institutions have become involved in microfinance activities. As will be seen in this thesis, through donations or investments in Non-Governmental Organizations (NGO's), insurance companies, as well as many multi-national corporations and charities have become involved in lending to the least fortunate people in the world.

While reducing or eliminating poverty stays constant as the main goal, the products and services that organizations offer vary greatly. For example, insurance

---

<sup>4</sup> (grameen-info.org).

companies may begin to offer affordable life-insurance policies to potential new clients, while commercial banks may work harder to encourage their clients to open and utilize savings accounts. Multi-national corporations may just be performing their corporate social responsibility, while trying to expand their brand name, or a company can take on all of these initiatives at the same time.

Although some microfinance institutions are profitable, many more are not and rely on subsidies or donations from their respective governments or outside donors. There are differing opinions on whether institutions should put more effort into turning a profit or more effort into reaching more and more clients. This is one of the main challenges of microfinance institutions. The poorer and more difficult clients they try to reach the more their per-unit costs may increase, therefore the less-profitable they will be, unless the more difficult to serve clients pay a premium for their services. However, if MFIs target better-off, and thus more profitable clients MFIs can improve their profitability, but questions arise as to whether or not they are achieving their goal of alleviating poverty.

At the heart of the microfinance debate are important disagreements over the nature and scope of potential tradeoffs between outreach, impact, and sustainability in microfinance lending, and what to do about them. The term *outreach* is typically used to refer to the effort by MFOs to extend loans and financial services to an ever-wider audience breadth and especially toward the poorest of the poor depth of outreach. *Impact* refers to the extent to which the incomes and welfare of those so reached is raised. In most discussions *sustainability* is taken to mean full cost recovery or profit making, and

is associated with the aim of building microfinance institutions that can last into the future without continued reliance on government subsidies or donor funds (Conning 1999). These are issues which vary by location and institutions within the same location. Hopefully, time and research will be used to discover the most efficient and effective balance between outreach, impact, and sustainability.

Microfinance institutions achieve exceptionally high repayment rates which allows them to keep their interest rates as low as possible. Most MFIs collect over 95 percent of what they lend out. The reason the repayment rates are so high has to do with the method in which they organize their operation, which consists of several practices. For example, clients can be placed in groups of four or five other borrowers and group members are responsible for their share of the loan payment each week or month; if they don't have the money to repay other group members to cover their share. Alternatively, the loans can be organized through village banking where the money is given to larger groups but loans have individual liabilities. This group-lending innovation alleviates high risk-taking behavior, and addresses both moral hazard and adverse selection problems. Due to group members monitor each others behavior, since they may share responsibility for repayment. Self-selection ensures proper screening because members will not want someone in their group that is unreliable because it could set their own business back as well, so they carefully select their members. Since most borrowers have virtually no collateral and obtaining formal information about the individuals is very costly and time-consuming for the MFI, group lending is one of the strategies MFIs use to solve the issue. Finally, MFIs are increasingly moving away from group lending and

focus on individual lending where they borrowers incentives are aligned with those of the MFI either through the promise of future access to more loans or by using as collateral property that may not have resale value but is personally valuable to the borrower.

Muhammad Yunus's foundation, the Grameen Foundation states, "Microfinance is often considered one of the most effective and flexible strategies in the fight against global poverty. It is sustainable and can be implemented on the massive scale necessary to respond to the urgent needs of those living on less than \$1 a day, the world's poorest."<sup>5</sup> It is usually assumed, based on the high repayment rates as well as numerous anecdotes of how individual members pulled themselves out of poverty, that the village banks accomplish this goal (Remenyi, 1991).

However, not everyone agrees with these assertions about the importance and impact of microfinance institutions. The most common criticism which was discussed a little above is that the institutions still may not reach the poorest clients and that while they may pull some of the "marginally poor" out of poverty, the poorest people are still left behind. Another common criticism is that many accuse the banks of charging interest rates that are too high which puts their clients into a circle of debt from which they cannot escape, also known as a poverty trap. In addition, microfinance is one part of the puzzle; simply stating that MFIs do not help all of the poor is no reason to fail to recognize contributions that MFIs make to help some of the poor. With this in mind, I turn next to a description of the context of microfinance institutions in Eastern Europe and Central Asia.

---

<sup>5</sup> [grameenfoundation.org](http://grameenfoundation.org)

# **MICROFINANCE IN EASTERN EUROPE AND CENTRAL ASIA**

The microfinance scene in Eastern Europe and Central Asia (ECA) is different than elsewhere in the world, especially from Southern Asia, Africa, and China where a majority of the world's most impoverished live. One of the main reasons this study chose to examine countries in the ECA region is due to this difference and to measure the business effect of the MFIs as opposed to the social effect. The business effect solely measures whether access to an MFI relieved credit constraints; it does not deal with social impacts, which can range from expenditures on education to purchasing a larger house. The ECA region has much better institutions in place in order to measure this, as opposed to say Africa, where the impoverished have much less formal education and business training.

Among surveyed institutions in ECA, 42 percent did not know the poverty status of their clients. This indicates that almost half of institutions do not specifically target low-income clients and rather focused on providing credit to financially excluded entrepreneurs. Among those MFIs that track the income levels of their clients, the poor constitute 54 percent of all borrowers (Pytkowska and Rataj 2007). This implies that most clients using MFIs services in the region are not the extremely poor, but rather the less educated, entrepreneurial type. These clients will most likely respond much better to



easier access to credit, for they are much more likely to have some formal education and business skills. Only 12 out of 159 NGOs or NBFIs (non-bank financial institutions) are dedicated to serving almost exclusively poor clients located in the Balkans and Central Asia, with only two of these organizations reaching significant scale of more than 10,000 clients (Pytkowska and Rataj 2007). Therefore, it is reasonable to assume that the other 147 MFIs were servicing entrepreneurs who own and work in micro-businesses.

Ilmi Shehu, a carpenter from Albania is a typical example. Ilmi and his family moved to Greece in the early 1990's but eventually moved back when they realized how hard it was for immigrants to accumulate wealth and property in a foreign country. With the carpentry skills Ilmi learned in Greece, he decided to open up his own carpentry business in 1996 in Tirana Albania. While looking for ways to expand his business in 2000 he discovered Pro Credit Bank, an MFI specializing in small loans to micro-businesses. A few days after hearing about the bank, Ilmi applied for a loan and was approved. With the loan, Ilmi purchased equipment he needed in order to improve his business. Today, Ilmi has four employees and his business is known throughout Albania due to the high quality of work he has done. His future plans include transforming his small manufactory into a larger manufacturing line. All of this is due to his good standing relationship with Pro Credit Bank in Albania.

Although MFIs in the ECA region target different clients than Yunus' Grameen Bank, the MFIs still have the ultimate goal of reducing poverty. While some MFIs in the ECA region use the group lending technique, the vast majority use the more traditional methods of securing collateral before issuing a loan. Banks in the region do

not implement the group lending strategy due to its difficulty to cover costs and because it is less appropriate for the clients in the region. This implies that many banks still operate on the model of using some type of collateral for their loans, which is possible since they are targeting less-impooverished clients than some MFIs in other parts of the world.

A main similarity MFIs in ECA share with ones throughout the world are the high repayment rates which top 90 percent most of the time. However, while MFIs in other areas struggle to achieve sustainability, many institutions in the ECA region profit or at least survive on their own. The Russian and Albanian programs are pushing to make profits; however, with annual interest rates at 10 percent and inflation at 17 percent, some rural Albanian programs are far from making ends meet (Benjamin and Ledgerwood, 1999). In the broadest sense, MFIs in the ECA region are much more focused on sustainability than they are with outreach, while the impact they try to make is much more focused on owners of micro-firms and other small businesses, as opposed to the extremely impooverished that live on one or two dollars a day.

## LITERATURE REVIEW

This paper is a continuation of other impact studies done in the microfinance field. There have been a number of different approaches on how to accurately measure the impact microfinance has on alleviating poverty and each study attempts to deal with the problems associated with program impact evaluation. The main problems include over or under predicting the impact due to selection bias, and the issue of which clients, including the truly poorest people in a region, these microfinance institutions are serving. Impact studies are important for a number of reasons, possibly the best being stated by Jahangir Chowdhury. Since more money for micro-credit in practice means less money for other programs with similar aims, it is extremely important to carefully evaluate whether or not “small loans for poor people” in fact work (Chowdhury, et al. 2005). As will be seen in the methodology section, this study attempts to measure the impact solely based on how much an entrepreneur invested funds back into their business. Many studies try to measure the impact of many other factors, ranging from health and education expenditures to subjective levels of poverty.

In Johanna Hietalahti and Mikael Linden’s “Socio-economic Impacts of Microfinance and Repayment Performance” they compare the impact that two separate microfinance institutions have on the poor in South Africa. Their data is collected through interviews of 21 entrepreneurs in the two groups; one group was from the

“poorest of the poor” while the other group was a little better off but still below the poverty line. The “better off” group of the two borrowed from the original Micro Credit Program while the “poorest of the poor” borrowed from an MFI specifically targeting poverty stricken clients. Interviews were then conducted with questions asked on loan history, education, performance, experience, etc. A next section of interviews focused on changes in business and household activities, experience as a group member, welfare, and livelihood structure.

The main finding of the paper is that there is a strong correlation between loan size and profits. The “better off” group received larger loans due to these borrowers having more experience and education compared to the poorer group. The very poor group tended to receive smaller loans compared to the better off group, and their profits reflected this. Not only did they receive smaller loans, but they also tended to stay at that level of loans while the better off group would progressively borrow more money and increase their profits as a consequence.

Besides the differences between groups, there were also differences between members of the same group in relation to professional skills, business management, and returns (Hietalahti and Linden 2006). It is reassuring to see that some entrepreneurs succeeded and began to borrow larger sums of money to grow their businesses while other business owners did not, for that is how the business world functions. However, what is less encouraging is that business owners who were more affluent initially succeeded significantly more than entrepreneurs that were not as well off. This suggests

that microfinance is better suited for those who are already experienced and talented in business, but are financially constrained.

Jahongir Chowdhury's "The Impact of Microcredit on Poverty," looked at the Grameen Bank and two other MFIs impact in Bangladesh. Chowdhury surveyed over 900 households in five districts of Bangladesh. The surveys collected demographic information (sex, age, marital status, etc.) as well as socio-economic information (education, food consumption, employment). An unusual feature of this study is that it measures objective and subjective levels of poverty. The objective level is based on the cost of consuming 2112 calories per day, while the subjective level was a "yes" answer to whether the survey taker considered their family poor.

An important point to note is that the study differentiates between new and old members. Before any statistical models are run there is a clear difference between the two groups. New members are 40 percent more likely to respond "yes" to the subjective poverty answer and 15 percent more likely to be objectively poor under the previously mentioned criteria. This led to some very interesting results. At first glance, Chowdhury finds that objective poverty falls by 2.5 percent per program year while subjective poverty falls by 6.5 percent per program year. However, the study determines that it didn't control for the proper factors in this measurement and it possibly over-stated the impact.

A logit model was then formed to control for those factors and determined if the household was poor or not. The model can be viewed below:

$$\Pr (P = 1) = f(X_P, X_H, X_V)$$

$P$  is equal to 1 if the household is poor and 0 if not.  $X_P$  is a vector of micro-credit program variables;  $X_H$  is a vector of household variables; and  $X_V$  is a vector of household variables. Three different specifications are then run to capture the impact of program duration on poverty. Forty-five of the nine-hundred plus participants had not yet received a loan and the study attempts to show that participants with a length of time being zero should not have been affected since they had not yet received their loan. Chowdhury does this in order to detect any selection bias.

The study determines that after controlling for the other measures, participating in a micro-credit program does reduce poverty for the short-run, but not for the long-run. Chowdhury concludes that micro-credit is “particularly strong for about six years with some leveling off after that point.” Giving people money may help them move out of poverty for a short period of time but when the money is spent they fall back into poverty. For microcredit to permanently reduce poverty it must have a long run impact (Chowdhury, et al. 2005). The final conclusion is that micro-credit needs to restructure their aim to a longer-run poverty reduction focus, opposed to a short-run focus.

Brett Coleman tries to address one of the major problems with impact studies which is selection bias and why impact studies over-estimate results. Over estimation is usually caused by selection bias. For example, only talented entrepreneurs that have a good or profitable business idea will borrow from micro-banks which will cause the effect to be much higher than it really is. In “The Impact of Group Lending in Northeast Thailand” Coleman tackles this problem by surveying entrepreneurs from 14 different villages, some of which had microfinance institutions for a number of years, others just

had one installed within the year of the survey, while others did not have one at all.

Coleman surveys members of the institutions as well as those that chose not to participate in a two equation instrumental variable model. Coleman notes that selection bias can occur in two different instances; (1) self-selection in the village bank or (2) non-random program placement. An example of the first way would be if one “entrepreneurial” family decided to borrow money from an MFI while a less talented household refrained from investing. An example of the second selection bias possibility would be if an MFI located in a strategic location where borrowers would have some kind of advantage or incentive to earn more profit than another village.

Coleman has a unique method to correct for the selection-bias problem in which there were no other studies of this kind. Instead of using an instrumental variable, due to the difficulty of finding a reliable one, he compares the eight villages that have had prior relations with a micro-bank (treatment group) to six villages that will have a micro-bank installed in the next year, the control group. The unique part of his survey is that Coleman knows which entrepreneurs signed up in the control villages for a loan when an MFI opens, therefore the treatment and control groups will have similar unobserved variables (e.g. entrepreneurial ability) which rids the model of self-selection bias.

Compared to past studies that didn’t correct for selection-bias, Coleman’s results were very disappointing. Impact was insignificant on all of the following impact variables: physical assets, savings, sales, labor time, expenditures on health care and education. Expenditure of men’s health care was significant and negatively related to credit, and was the only variable of interest that deemed significant. There is no evidence

in these results that village bank loans are being directly invested in productive activities with a positive return. The study concludes that “poor are poor because of reasons other than lack of access to credit.”

Although the study’s results were disappointing it does make some important points, and serves as a reminder that providing the poor with accessible credit has many challenges and potential downsides. However, the model in this study differs in that it only tries to measure if micro-business owners investment their firms depended less on internally generated funds when they had access to an MFI compared to the investment of entrepreneurs who did not have access to microfinance. As will be seen later, the model will not have a problem with selection-bias due to only measuring business owners and not the entire population.<sup>6</sup>

The approach in this study will be similar to that in “An Impact Analysis of Microfinance in Bosnia and Herzegovina,” by Hartarska and Nadolnyak (2008). In the study, they analyze micro-firms in municipalities with and without microfinance institutions to see if micro-businesses’ investment was affected by a lack of credit. In theory, microfinance institutions are supposed to ease credit constraints of entrepreneurs. Therefore, in municipalities with few or no MFIs investment should be more sensitive to the internal funds compared to municipalities with access to microfinance (with 3 or more MFIs). This study is very unique in the fact that it gets rid of the self-selection problems discussed in much of the other literature. Instead of measuring impacts of many variables such as expenditures on education, health care, disposable income, and

---

<sup>6</sup> There is still the possibility of MFI’s selecting more profitable sites and that issue will be addressed.



others (as Coleman's study did), this paper only measures whether the MFI alleviated financing constraints of the small business owners.

To determine the levels of financing constraints that micro-firms face, Hartarska and Nadolnyak (2008) measure whether there is a statistically significant difference in investment sensitivity to internal funds across sub-samples indicating that one group is more credit constrained than another. They use a logit model that assumes a logistic distribution and estimate the following model:

$$\Pr(\text{IFA}=1) = f(\alpha + \beta_1 \text{IO} + \beta_2 \text{IC} + \gamma'Z)$$

where IFA is the decision to invest in fixed assets, IC measures internal capital, IO is the investment opportunity, and Z is a vector measuring characteristics of the town or city which the micro-firm is located.

This model is free of self-selection bias Possible program placement bias is alleviated by controlling for municipality specific characteristics such as poverty level and other municipality- specific characteristics although to the extent that salient municipality specific characteristics cannot be measured, it is still possible for some program placement bias to persist. The model tests for sensitivity to potentially access credit and not whether the impact on the entrepreneurs' livelihoods was improved, which is what makes it unique, and why this thesis applies this methodology

The study concludes that micro-firms in areas with adequate access to MFIs (three or more in a municipality) had greater access to credit and relied less on internal funds for capital. The main variable to measure this is the cash flow variable. When measuring the

constrained credit group, the authors determine that for each additional 1,000 KM<sup>7</sup>, the odds of investing in fixed capital increase by 1.97. The credit unconstrained group's odds of increasing investment is only 1.42. Since the difference in odds ratio is statistically significant, the authors conclude that the constrained group is more dependent on internal funds to increase their investment due to less access to MFIs, thus access to credit alleviates financing constraints for micro-entrepreneurs in Bosnia.

As can be seen, there are many different ways to measure whether MFIs have a positive impact on their respective communities or not. Another thing to keep in mind, however, is that it isn't very easy to measure the increased output MFIs potentially create. In a study by Binswanger and Khandker, they attempt to measure the impact MFIs have on rural, non-farm output through improved access to credit. Their econometric results confirm this, suggesting that the rapid expansion of commercial banks in rural areas has had a substantially positive effect on rural, non-farm employment and output. The availability of better banking facilities appears to have overcome one of the obstacles to locating non-farm activities in rural areas. This could be another of many potential advantages of MFIs. Perhaps more people in rural areas could transfer into more specialized areas with the help of credit; while agricultural workers could become more efficient and move away from subsistence levels that have been such an anchor to poverty for so long. Although this study doesn't try to prove that, it is another interesting possibility to improving access of credit for the poor.

---

<sup>7</sup> Konvertibilna Marka, currency of Bosnia and Herzegovina

## **THEORETICAL MODEL**

The objective of this study is to determine how much of an impact, if any, MFIs had on micro-entrepreneurs' finances in the ECA countries with microfinance markets. Many people and organizations appear to agree that microfinance has had a major impact in alleviating poverty. However, there are also a number of people and studies that disagree with this assumption. The theoretical framework only measures the impact on investment and not on quality of life variables (e.g. expenditures on education, healthcare, etc.) because it seeks to answer if MFIs in Eastern Europe alleviated financing constraints. It will be assumed that if the financing constraints of businesses are alleviated, then they would be able to invest in better and more profitable projects and will not be constrained by the availability of their own internal cash. From this assumption we can assume that the owner is climbing out of poverty, or at the very least becoming better off due to their business improving.

Even if microfinance is not effective in alleviating poverty, this study is also relevant. NGO's, governments, private companies and donors, and all other parties would be better off placing their resources in a more efficient tool to eliminate poverty. What the present approach will show is whether MFIs contributed to deepening financial markets in the region during the study period. If so, then MFIs which mainly are engaged

in business lending have expanded the frontier of finance and include previously excluded marginal clientele known as micro-businesses.

## Conceptual Model

If the cost disadvantage of external finance is small...firms will simply use external funds to smooth investment when internal finance fluctuates, if the cost disadvantage is significant...firm's investment should be driven by fluctuations in internal cash flow (Fazzari et al. 1988). 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 (Hartarska, et al 2008). This model is similar in that it looks for how dependent a firm is on internal funds. A pooled regression of all firms will be run with the following model:

$$I=f(X_i, Y_i, K_i, IO_i, CF_i)$$

$X_i$  is a vector of specific demographics and other characteristics of the entrepreneurs and their respective firm;  $Y_i$ , a vector of country characteristics, IO stands for investment opportunity; and CF for cash flows or internal funds; K is the capital stock. The vector of firm characteristics covers things such as age, type of business, and locations. Macro variables measuring the country's economy include variables such as GDP per capita based on purchasing power parity and commercial bank lending volume. All of these factors must be accounted for, for they have the potential to make a tremendous

difference when running a business. The dependent variable,  $I$  is total investment in fixed assets.

Equation (1) will be estimated separately for firms that had access to an MFI in that particular year and another for the firms that didn't have access and the results will show whether firms with and without access rely more or less on their cash flows for investment. A statistically significant difference between the two groups will assume that one group is more credit constrained than the other. With more favorable investment opportunities all firms invest more. However, unconstrained firms can also raise external capital to finance additional investment.

Theoretically, the firms with access should rely less on their own cash when deciding how much to invest. Firms that lack access should be more dependent on their own cash flows. Therefore, the cash flow parameter should be greater in firms without access, all other factors being equal.

It is also important to control for country-specific characteristics. Different countries have different institutions in place which make comparing businesses across country lines difficult, especially in this study. Some of the countries in Central Europe have better financial institutions, infrastructures, more mature markets, and so on. Country dummies must be included to control for these differences. It is important to note that some countries with very stable economies may be a disincentive for microfinance banks to locate because there will be better access to credit and most businesses will have enough collateral to take out loans from credit unions or commercial banks. Poverty may be a smaller problem in more advanced countries; therefore

microfinance institutions with goals of alleviating extreme poverty may be better off serving their objectives in less advanced countries.

## Empirical Model

As discussed previously, this model only measures the financial impact of MFIs opposed to the social impact. The first step is to run a pooled regression which can be viewed below:

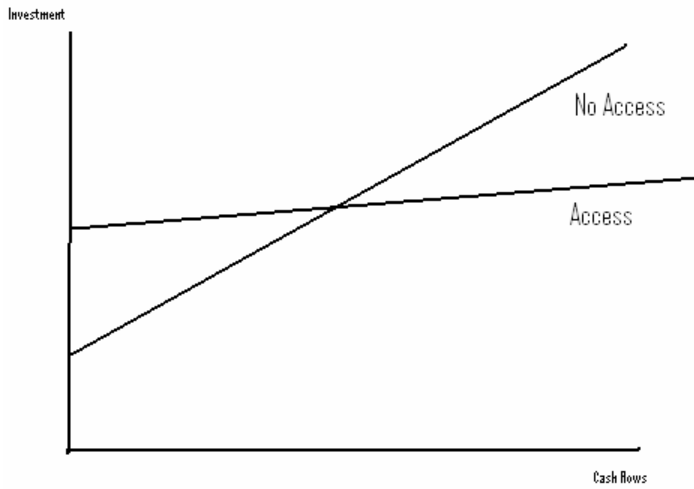
$$(1) \text{ Investment} = \beta_0 + \beta_1 \text{Investment Opportunity} + \beta_2 \text{Firm Size} + \beta_3 \text{Cash Flow} + \beta_4 \text{Firm Age} + \beta_5 \text{GDP/capita} + \beta_6 \text{Access} + \beta_7 \text{Country Lending Rate} + \beta_8 \text{Production dummy} + \beta_9 \text{Country dummies} + \beta_{10} \text{Country Lending Rate} + \beta_{11} \text{Cash Flow} * \text{access} + \sum$$

Along with *access*, *cash flow* will be the other variable of interest due to it showing the relationship between firm's cash flows and how much they invest from internal funds.

Theoretically, firms that have access to an MFI should be less dependent on their cash flows (internal investment) when investing compared to firms without access. This is opposed to a micro-firm that doesn't have access to an MFI which will need a higher proportion of cash generated through sales in order to cover the same level of investment because it cannot get the extra money from the external markets. Thus, constrained firms rely on internal funds more than on external credit. It is important to note that cash flows and external investment should both theoretically be positively correlated in any environment; however, the elasticity of firms without access to an MFI should be greater than those with access.

**Figure 2**

**Expected Slope of Firms Internal Investment Behavior**



The graph above gives a representation of the theoretical investment by a micro-firm. A firm that has access to an MFI will invest a higher percentage initially; however, that firm will be less dependent on their cash flows for further investment, since the firm has an ample supply of capital already. The theory reverses for a firm without access, in that the firm will be more dependent on their own cash for future investment.

## DATA

A region wide survey called *Business Environment and Enterprise Performance Survey* (BEEPS) is used for this analysis. It was conducted in July of 2002 and July of 2005 and collected information from 2,758 businesses in the ECA region. These businesses were asked a number of questions ranging from their type of industry, to how they plan to finance new business ventures, to whether they pay off organized crime units or not. Since the analysis is focused on micro-firms which are defined as businesses with 10 employees or less, the sub-sample of micro-businesses consists of 999 observations.

The original survey covers 13 countries from Central and Eastern Europe: Albania, Bulgaria, Croatia, Czech Republic, Estonia, FYR Macedonia, Hungary, Latvia, Lithuania, Poland, Romania, Slovak Republic, and Slovenia. The survey also covers 12 countries from the Commonwealth of Independent States including: Armenia, Azerbaijan, Belarus, Georgia, Kazakhstan, Kyrgyzstan, Moldova, Russia, Tajikistan, Turkmenistan, Ukraine and Uzbekistan.

The next step was to identify micro-firms' locations into cities, towns, and country regions. The variable that identified these cities was obtained with a special permission from the World Bank unit that conducted the surveys. The next step was identifying if this city/town in that country had an MFI in 2001-2 and then in 2004-5.



All MFIs in each country were contacted and asked if they or their competition offered loans in that city/town in the specific time period. The answers were cross-checked and each city was determined to have access to a microfinance institution if a representative from the country answered “yes” to the question of “was there a microfinance institution operating in the respective city in the years of 2002 and/or 2005?”

It is also important to note that credit unions were disqualified from counting as microfinance institutions due to their size and behavior to lend to members and larger businesses similar to commercial bank practices. After accounting for this the Baltic countries of Estonia, Latvia, and Lithuania as well as Belarus, were eliminated from the study. Slovenia was eliminated for the same reason, and Azerbaijan was eliminated due to no firms containing all of the needed variables to qualify for the regression. Hungary and the Czech Republic were dropped due to not having a significant presence of MFIs. Their institutions were much more advanced and didn't operate like microfinance institutions in the rest of the countries. Poland and Ukraine were also dropped because there was only data for regions in which MFIs operated and not cities, and since these are relatively large countries, it was not possible to make a precise classification of availability of microfinance for micro-firms in these countries. This left the study with 15 countries and 424 micro-firms to run the regressions. The descriptive statistics by country can be viewed below.

**Table 2**

**Micro-businesses operating in cities with or without an MFI by country**

country	2002 With Access	2002 No Access	2005 With Access	2005 No Access	Total
Albania	20	4	13	2	39
Armenia	19	1	20	0	40
Bulgaria	16	15	30	0	61
Croatia	5	13	6	12	36
Georgia	16	11	14	9	50
Kazakhstan	5	5	14	0	24
Kyrgyzstan	2	0	1	0	3
Macedonia	10	4	14	1	29
Moldova	9	1	11	1	22
Romania	3	10	4	10	27
Russia	3	2	5	2	12
Serbia and Montenegro	15	1	18	1	35
Slovakia	3	6	3	6	18
Tajikistan	3	0	3	0	6
Uzbekistan	0	11	11	0	22
Total	129	84	167	44	424

As can be seen, the sample is pretty even throughout the years in terms of availability of MFIs in the city/town. Another interesting trend is how many micro-firms obtained access to microfinance over the three year period. This table can be viewed below.

**Table 3**

**Micro-businesses that have gained access from 2002 to 2005, by country**

country	Freq.
Armenia	2
Bulgaria	15
Georgia	1
Kazakhstan	6
Macedonia	4
Uzbekistan	11

The dependent variable of interest in this study is the percentage change of investment in fixed assets over the past three years (from 1999 to 2002 or from 2002 to 2005). In the survey the question was worded as, “Over the last 36 months what is the percent change for your company’s fixed assets (land, buildings, machinery, and equipment) in real terms?” This question will be the proxy for investment. Other important questions from the survey include questions on their competition, increases or decreases in labor, and sales information. The proxy for investment opportunity will be taken from the questions of number of workers. Specifically BEEPS question 66 was worded: “How many permanent, full-time employees does your firm have now and how many did it have 36 months ago (give an estimate number)?” The next question is worded exactly the same except that it asks about part-time workers. Since very few of the firms in the sample have had part-time employees it is not used in the analysis. This study will assume that the more opportunity for growth an entrepreneur foresees, the more labor they will hire. The other important question used in the data is: “Over the last 36 months how have sales changed for your company in real terms (i.e. after allowing for inflation)?” The answer will be used to proxy for available internal capital or cash flows since the more (less) sales would be correlated with more (less) money on hand. A production dummy will also be included in the regressions: equaling one if more than half the firm’s revenue came from production industries such as mining, manufacturing, or construction; and equaling zero if not. This is necessary because micro-businesses in production are probably more capital intensive and thus will need more investment in fixed capital.

For 2005 models there are a few more accurate measurements that can be used in the reduced form investment equation, than the variables listed above. The variables above are spread out over three years which may be problematic due the larger span of time. The BEEPS Survey asked firms in 2005 how much their firm invested in fixed assets (new buildings, machinery, and equipment) in the past 12 months. Total sales minus costs of inputs, labor, and energy will be the new variable for cash flows. The answer to the question asking the “estimate of the replacement value of physical production assets owned and used by your firm” is the stock of capital.

Certain variables will also be used to control for specific marketplace characteristics such as the GDP per capita calculated using the purchasing power parity method. GDP using purchasing power was determined the most accurate to use due to the wide range of countries and different costs of living in different countries. The lending rate or interest rate will measure the cost of doing business within each country. The level of corruption will be a measure of the percentage of profits each firm paid to an organized crime unit. A summary of the variables are listed below:

**Table 4**

**Variables Description:**

<b>Variable</b>	<b>Description of Variables used for Panel Data</b>	<b>Description of Variables used for 2005 Data</b>
Investment	Percentage change in fixed assets in previous 3 years, 1999-2002 and 2002-2005 (real terms)	Amount invested in fixed assets in 2004
Investment Opportunity	Percentage change in labor in previous 3 years, 1999-2002 and 2002-2005	Percentage change in labor from 2002-2005
Cash Flow	Percentage change in sales in previous 3 years, 1999-2002 and 2002-2005 (real terms)	1) Revenue-Costs for 2004 2) Percentage of profits reinvested from 2004

Capital		Replacement Value of Fixed Assets
Firm Size	Value of sales in previous year	Value of sales in previous year
Firm Age	Age of firm	Age of firm
Country	Country dummy	Country dummy
Access	Access =1 if MFIs operated in this city in this year, Access=0 otherwise	Access =1 if MFIs operated in this city in this year, Access=0 otherwise
Production dummy	Takes the value of 1 if revenue from production industry (mining, construction, and manufacturing) is more than 50 percent; 0 otherwise.	Takes the value of 1 if revenue from production industry (mining, construction, and manufacturing) is more than 50 percent; 0 otherwise.
Yhat	Instrumented Access	Instrumented Access
Banktranspercent <sup>8</sup>	Percent of transactions company made with a bank	Percent of transactions company made with a bank
Lending Rate <sup>9</sup>	Cost to borrow money in country and year	Cost to borrow money in country and year
Positive Sales	Takes the value of 1 if firm responded that sales increased over the past 36 months, and equal to zero otherwise	Takes the value of 1 if firm responded that sales increased over the past 36 months, and equal to zero otherwise
Negative Sales	Takes the value of 1 if firm responded that sales decreased over the past 36 months, and equal to zero otherwise	Takes the value of 1 if firm responded that sales decreased over the past 36 months, and equal to zero otherwise
Corruption	Percentage of profits the firm paid to an organized crime unit the previous year	Percentage of profits the firm paid to an organized crime unit the previous year

**Table 5**

**Description of Interacted Variables**

<b>Variable</b>	<b>Description of Variables used for Panel Data</b>	<b>Description of Variables used for 2005 Data</b>
Access* Cash Flow	Cash Flow interacted with access dummy	Cash Flow interacted with access dummy
Access*Reinvested Profits 04		Reinvested Profits interacted with access dummy

<sup>8</sup> Question 50b and 51b from BEEPS Survey averaged per city for each firm

<sup>9</sup> International Monetary Fund, IMF International Financial Statistics Yearbook, 2006

Yhat* Reinvested Profits 04		Reinvested Profits interacted with instrumented access
Yhat*Cash Flow	Cash Flow interacted with instrumented access	Cash Flow interacted with instrumented access

**Table 6**  
**Summary Statistics of Variables**

Variable	Unit	Access		No Access		All Variables		Statistical Significance T-Value
		Obs	Mean	Obs	Mean	Min	Max	
Investment	% change	286	17.43	126	14.2	0	300	
Investment Opportunity	% change	296	14.45	128	9.98	84.4	400	
Cash Flow	%change	289	30.33	122	27.63	0	600	
Sales Value	\$1,000	228	111.1	110	114.3	4	950	
Firm Age	Years	296	9.81	128	8.67	3	73	
Access*Cash Flow		289	30.33	122	0	0	600	5.27***
GDP per Capita (PPP)	PPP Units	296	5.43	128	7.11	0.95	15.47	4.92***
Investment 04	\$1,000	121	4.98	35	19.03	0	249	3.08***
Cash flow	\$1,000	135	15.92	40	27.15	-16	230	2.3**
Capital	\$1,000	182	76.63	72	104.6	0	2000	
Interest Rate	Percent	266	17.74	112	18.34	6.68	35.43	
Production Dummy		296	0.16	128	0.15	0	1	
Predicted Access (yhat)		153	0.73	44	0.55	0.36	0.95	6.87***
Yhat*cash flow		127	12.33	40	16.41	-8.3	171.9	
Positive Sales (Dummy)		296	0.42	128	0.43	0	1	
Negative Sales (Dummy)		296	0.36	128	0.34	0	1	
Corruption (percent)		290	0.23	125	0.5	0	10	1.91*
Predicted Access 2 (yyhat)		296	0.77	128	0.53	0.41	0.96	11.77***
Yyhat*Cash Flow		289	24.08	122	14.37	0	457.3	2.3**
Yhat*Reinvested Profits		115	27.59	41	23.65	0	95.31	
Investment/Capital		93	0.24	30	0.13	0	5	

Table 6 shows that there is a significant difference between the average amount firms with and without access invested in 2004. Firms without access invested significantly more than firms that had access to an MFI. Most of this difference can be explained from two outliers, however. Two firms invested well over \$100,000 that didn't have access which increased the standard deviation and most likely skewed the results; these firms were kept in the data set though, due to the chance of this kind of investment being very common. Firms without access also have a significantly greater cash flow amount, almost twice as high as firms with access. This could be due to these firms being located in more prosperous areas where MFIs aren't as common, most likely this is why the GDP per capita is higher for firms without access as well. Alternatively, it could indicate that only the most profitable firms are able to function in the absence of access to credit while smaller firms may either not start or exit quickly.

## RESULTS

This section focuses on results from models described in the previous section. All regressions were conducted in ordinary least squares (OLS), unless noted. The standard errors are below the coefficients. All models were run with robust standard errors, due to heteroskedasticity as a possible issue. The panel regressions used unbalanced panel data from years 2002 and 2005. The 2005 regressions were restricted to year 2005 due to certain variables only being available for 2005.

The first two regressions were with all of the variables while controlling for country and also with an access dummy and an *access\*cashflow* interaction. The results show that the data fits the model rather well, and the coefficient estimates for the main variables of interest (IO and CF) are of the correct sign and statistically significant;

One of the main variables of interest, *access*, is positive and significant at the 10 percent level in both regressions; indicating that micro-firms with access invest over 10 percent more than micro-firms without access, all else being equal. The *production dummy* was also included in the regressions to signify whether more than half of a firm's revenue came from a production sector including mining, construction or manufacturing. This variable was positive and significant which makes intuitive sense since these types of businesses require much more capital to purchase fixed assets compared to service sectors.



The *investment opportunity* variable and *cash flow* variable were both significant at five percent in each of the pooled regressions. However, while *firm age* was of the expected sign (negative) it wasn't significant, along with *sales value*, which was used to control for size of the firm.

The interaction between access and cash flow; *access\*cash flow*, was negative, and not significant (Model 1 in Table 7). A significance would indicate that micro-businesses with access to credit (in towns with functioning MFIs) rely less on their internal funds for investment and therefore is suggestive that MFIs presence might have alleviated micro-businesses financing constraint.

The *GDP per capita* is not statistically significant. The coefficient on *lending rate*, measured by the prevailing real lending rate in the country, is not statistically significant indicating that the country level price of capital did not seem to influence investment in micro-firms. Theoretically, the variable should be negatively correlated with business investing.

The next step was to run separate regressions for firms with access and firms without access (regressions 3 and 4) and use a Chow test to determine if there was a difference between the two. A Chow Test was then conducted:

$$\frac{415707.755 - (308728.274 + 89511.3945)}{(308728.274 + 89511.3945)} * \frac{292 - 2(23)}{23}$$

The Chow statistic was .469; this was too low to reject the null hypothesis; indicating there was no difference between the two regressions. This problem could be due to some possible selection bias by the banks choosing to enter more favorable cities

and countries, as opposed to locations that are less profitable. Although the *access* dummy shows that firms near an MFI invest more than firms without access, the dependence on cash flows is not valid, due to the inability to reject the Chow Statistic. Results are presented in Table 7 below.

## Panel Regressions I

**Table 7**

### Panel Dataset Regressions

COEFFICIENT	Investment 1	Investment 2	Investment 3 (Access)	Investment 4 (No Access)
Investment Opportunity	0.201** (0.0916)	0.208** (0.0890)	0.187* (0.0999)	0.284 (0.2100)
Cash Flow	0.518* (0.2710)	0.294** (0.1440)	0.241 (0.1500)	0.425 (0.3000)
Sales Value	0.000732 (0.0133)	0.000307 (0.0129)	0.00422 (0.0165)	0.000439 (0.0277)
Firm Age	0.00695 (0.1690)	-0.0177 (0.1600)	0.0197 (0.2420)	0.161 (0.2940)
GDP	-0.0169 (0.0329)	-0.00782 (0.0301)	-0.0126 (0.0339)	0.0437 (0.0562)
Lending Rate	0.319 (0.4870)	0.383 (0.4630)	0.566 (0.6270)	-1.54 (1.3040)
Production dummy	9.285 (7.5030)	8.345 (7.5040)	12.75 (10.5200)	8.141 (10.5500)
Access	12.40* (7.1330)	6.065 (4.5130)		
Access*Cash Flow	-0.262 (0.3080)			
GDP/ Capita (PPP)	1.707 (1.9210)	1.585 (2.0300)	2.69 (2.7470)	-11.81 (8.7000)
Alb	26.99 (16.4000)	25.12 (16.4400)	38.08* (20.8900)	-68.18 (43.0700)
Arm	1.464 (8.3660)	2.131 (8.3640)	4.102 (9.7310)	-70.48* (42.3100)
Bul	2.161 (9.9700)	3.414 (10.0700)	3.527 (18.8900)	-33.05 (19.9300)
Cro	1.51	4.225	-6.601	22.39

	(14.8900)	(15.1500)	(29.1000)	(23.6900)
Geo	-1.905	-2.097	-2.543	-57.42
	(7.1650)	(7.1640)	(9.3090)	(36.5100)
Mac	-6.872	-7.074	-8.103	-28.7
	(9.5230)	(9.3400)	(16.2400)	(19.8100)
Mol	-1.926	-2.411	2.559	-91.79*
	(9.2600)	(9.5790)	(9.3410)	(53.8900)
Rus	-6.974	-10.62	-13.59	-30.79
	(19.1900)	(16.2800)	(24.8400)	(28.2000)
SAM	-9.636	-10.58	-8.537	-67.17*
	(9.4160)	(9.6060)	(12.6400)	(39.4500)
Slk	9.541	16.09	-16.16	74.21
	(23.1800)	(29.5000)	(35.7500)	(55.2700)
Constant	-22.04	-17.39	-21.15	127.2
	(16.8800)	(17.0400)	(15.9300)	(88.5900)
Observations	292	292	198	94
R-squared	0.307	0.295	0.289	0.458

A possible issue could be the endogeneity of the *access* variable. Perhaps MFIs chose to enter more profitable markets and cities such as more populous cities, and chose not to enter more rural, less populous cities. After reviewing the data, it is obvious that MFIs were much more likely to enter capital cities and other cities a greater amount of people. This makes intuitive sense, and there is evidence of it in the data. The results of a simple regression with *access* as the dependent variable and a city over 1,000,000 people and a city (*large city*) with less than 50,000 people (*small city*) look as follows:

There is definite correlation with city size, as can be seen from the results above. To correct for this, a probit model to predict *access* will be used and will be instrumented for *access*. It is important to note that the probit model only used observations for 2005 due to some variables being unavailable in 2002. The following variables in the correlation matrix below will be used in the probit regression.

**Table 8**

**Correlation between Access and Predictors**

	access	largeci-y	smallic-y	econfr-m	banktr-t
access	1.0000				
largeci ty	0.3278 0.0000	1.0000			
smallic ty	-0.3654 0.0000	-0.4284 0.0000	1.0000		
econfreedom	-0.1073 0.0568	0.0339 0.5369	-0.0034 0.9500	1.0000	
banktransp-t	0.0863 0.1177	0.2987 0.0000	-0.2418 0.0000	-0.1063 0.0523	1.0000

Probit: access= f(*largecity*, *smallcity*, *banktranspercent*<sup>10</sup>, *econfreedom*)

The results of the probit model can be viewed below:

**Table 9**

**Predicted Access Results**

Probit regression	Number of obs =	316
	LR chi2(4) =	45.03
	Prob > chi2 =	0.0000
Log Likelihood = -173.94688	Pseudo R2 =	0.1146

access	Coef.	Std. Err.	z	P> z	[95% Conf. Interval]
largeci ty	.84338	.2351154	3.59	0.000	.3825622 1.304198
smallic ty	-.5693019	.1721046	-3.31	0.001	-.9066207 -.2319831
econfreedom	-.3355855	.1395782	-2.40	0.016	-.6091537 -.0620174
banktransp-t	-.0016589	.0027098	-0.61	0.540	-.00697 .0036523
_cons	2.814441	.9518262	2.96	0.003	.9488955 4.679986

All of the variables are assumed to influence whether or not a microfinance institution locates in a city or not, but be uncorrelated with the decision of an entrepreneur to invest or not. All of the variables are significant and of the expected signs, besides the *banktranspercent* (Percent of transactions made with a bank).

<sup>10</sup> question 51b of 2005 BEEPS Survey-percentages were averaged per city (percentage of supplier transactions with a bank in each city)

However, this variable was left in the regression because of its theoretical importance. *Large city* is a dummy variable determining whether a city had over 1,000,000 people or not, while *small city* is a dummy variable indicating when a city had less than 50,000 people or not. *Economic freedom* is a country-level variable taken from *The Economic Freedom of the World*, which is an index ranging from 1 to 10 measuring the degree to which the policies and institutions of countries support economic freedom. The cornerstones of economic freedom are personal choice, voluntary exchange, freedom to compete, and security of privately owned property.<sup>11</sup> This variable is negative because MFIs have incentive to locate in areas with lower freedoms due to those locations being with the lowest access and possessing the potential to provide the largest impact on the poor. For example, countries located closer to Western Europe have a lower proportion of MFIs than countries located further east. The countries nearer to Europe also have sounder financial institutions in place and potentially tougher competition from existing financial institutions. That is also the main reason that Hungary and Czech Republic observations were dropped from the sample. This probit model will be used to predict *access* through instrumental variable regressions and the access variable listed in future regressions is actually the predicted *access*.

Due to the predictor being limited to 2005, the next set of regressions used strictly 2005 data. *Yhat* is instrumented for *access* in the IV regressions below:

---

<sup>11</sup> Gwartney, James and Lawson, Robert. Economic Freedom of the World 2007 Annual Report. Pg 3.

Instrumental Variable Regressions (year 2005 only)

**Table 10**

**Regressions with 2005 Variables, Instrumented Access**

COEFFICIENT	Investment	Investment 04	Investment 04
	04		
	1	2	3
Access	15.26	8.034	9.867
	(16.1800)	(14.9100)	(11.1000)
Cash Flow	1.921	1.632	
	(1.4400)	(1.4630)	
Capital	0.0219	0.0163	0.0108
	(0.0183)	(0.0195)	(0.0149)
Investment Opportunity	0.0889	0.0932	0.056
	(0.0624)	(0.0586)	(0.0791)
Lending Rate	-0.609		-2.125
	(1.0340)		(1.7330)
Production dummy	29.52**	28.00*	20.42**
	(14.2400)	(14.7200)	(9.9550)
GDP/Capita (PPP)	1.328	2.662	-0.366
	(1.9280)	(2.6020)	(1.7650)
Firm Age	0.401	0.128	0.0166
	(0.2790)	(0.1950)	(0.2230)
Yhat*cashflow	-2.56	-2.15	
	(1.9370)	(1.9620)	
Positive Sales (Dummy)	19.13**		15.87*
	(9.1190)		(8.6570)
Negative Sales (Dummy)	14.06*		-0.74
	(7.7680)		(6.3000)
Alb	0	15.38	0
	0.0000	(14.2700)	0.0000
Arm	-16.96*	-2.777	-16.41*
	(9.5090)	(12.9600)	(9.0120)
Bul	-12.93	-4.254	-26.37*
	(11.4900)	(11.0600)	(15.0000)
Cro	-20.88	-15.05	-4.235
	(19.9100)	(19.3000)	(14.2800)
Geo	11.14	17.22	11.83
	(12.1700)	(17.3100)	(14.7600)
Kaz	0	-21.12	0

	0.0000	(16.8500)	0.0000
Mac	-10.56	-2.807	-4.279
	(12.8300)	(13.5200)	(9.0630)
Mol	-5.162	7.849	-17.53*
	(9.8230)	(17.4700)	(10.0700)
Rus	1.546	-1.541	-9.273
	(9.0980)	(7.1670)	(10.4100)
SAM	-1.887	9.557	3.921
	(8.6810)	(12.7800)	(8.5080)
Corruption		0.778	
		(2.5270)	
Profits Reinvested 04			1.129*
			(0.5850)
Yhat*profits reinvested 04			-1.502*
			(0.7970)
Constant	-23.4	-28.18	29.05
	(36.2300)	(31.6500)	(33.7300)
Observations	110	114	95
R-squared	0.413	0.367	0.454

The regressions contain the instrumented access variable, *yhat*, as well as an interaction between *yhat* and cash flow (*yhat\*cashflow*). Regressions 1 and 2 look as to be expected; besides *access* not being significant. Moreover, the interaction variable *yhatcash* was negative but not significant. In regression 3, *profits reinvested 04* was used as the cash flow variable instead of the previous measure of cash flow. These results show that when the more precise variable is used *profits reinvested 04* is positive and significant at 10 percent while its interaction with *access* is negative and significant at 10 percent. The coefficient of 1.12 on the profits reinvested indicates that for each dollar in profits investment increases in 1.12 percent while for those without access it increases with the -1.502 on the interaction signifies that firms with access to an MFI invest \$1.50 less from their internal funds for every 1\$ increase in profit than a similar firm without

access would invest, given all other factors being equal. The coefficients of *cashflow* and *profits reinvested profits 04* are very close to being within each other's standard errors.

Another promising sign is that *lending rate* is now negative, although not significant. A possible concern is the positive significance of the *negative sales dummy*, this occurrence does not theoretically make sense.

A fixed effects model with instrumented access can be viewed below. Fixed effects control for things that stayed constant over the three year period such as unobservable entrepreneurial ability motivation and skills.

**Table 11**

**Fixed Effects, Panel Regression with Instrumented Access**

COEFFICIENT	Investment
Access	-54.79 (82.6400)
Investment Opportunity	0.0753 (0.1460)
Cash Flow	1.110*** (0.2900)
Sales Value	0.0124 (0.0321)
Instrumented Access*Cash Flow	-0.910* (0.4940)
Age of Firm	0.349 (2.2340)
GDP	-0.0696 (0.1510)
Lending Rate	-0.197 (1.0030)
Production dummy	-26 (20.5800)
Positive Sales dummy	-0.956 (13.3200)
Negative Sales Dummy	-1.084 (12.1800)
GDP/capita (PPP)	5.885

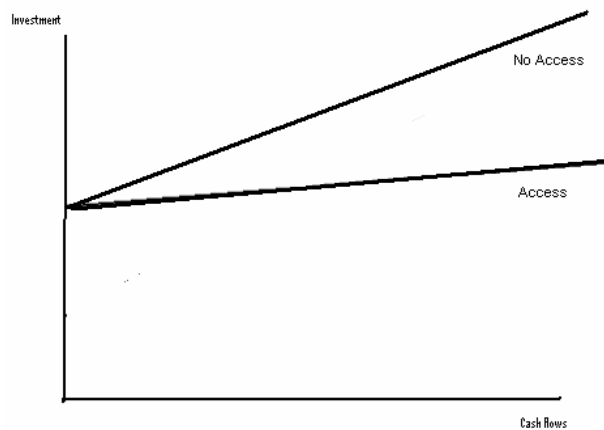


	(10.5400)
Constant	9.651
	(42.4300)
Observations	292
Number of id	202

The interaction variable of interest in the above model  $\hat{y} * cash\ flow$  is negative and significant at the 10 percent level, while *access* isn't significant. The -.91 indicates that a firm with access to an MFI will invest .91 percent less per \$1 dollar of investment from their internal funds than will an equal firm without access to an MFI in which the investment sensitivity coefficient is 1.10. This shows that there is a large statistically significant difference in how the firms use their internal funds. According to these models, firms without access to an MFI are more dependent on their cash flows than firms with access. Since there isn't a significant difference in the intercept the model would look as follows:

**Figure 3**

**Resulting Firms Internal Investment Behavior**



The estimates of the fixed effects model presented in the figure above shows that access to microfinance may relieve some financing constraint for micro-firms. Another set of instrumental regressions were scaled over capital. The models had very low R<sup>2</sup> statistics and did not fit the data well. The results can be viewed in Appendix B.

Further careful examination of the data showed that the dependent variable was truncated at zero due to many businesses not making any investment in fixed assets during the time period. In addition, those that might have disinvested had not indicated they did so. Therefore, the most appropriate econometrics technique to analyze the data was actually a tobit model that could truncate regressions. Thus, to address this issue as well as the possible endogeneity of program placement, a tobit model with instrumented access was estimated.

### Tobit Regressions

The regressions below are simple tobit models censored at zero.

**Table 12**

**Tobit Models (Panel and 2005)**

COEFFICIENT	Investment Panel	Investment 2005
Cash Flow	0.890** (0.3420)	0.293* (0.1720)
Capital	0.00218 (0.0243)	0.031 (0.0200)
Investment Opportunity	0.305** (0.1400)	0.198 (0.1210)
Sales Value	-0.0158 (0.0438)	
Age	-0.331 (0.7860)	0.346 (0.4430)
Corruption	14.22**	6.516

	(5.6700)	(5.1590)
Production dummy	25.92*	38.17**
	(15.5800)	(17.6300)
Lending Rate	3.886**	0.729
	(1.7110)	(3.1340)
GDP per Capita (PPP)	9.847*	2.927
	(5.5760)	(3.8360)
Positive Sales dummy	31.27**	16.77
	(15.3500)	(10.6800)
Negative Sales dummy	5.104	16.05
	(15.9500)	(10.3900)
Access	28.89*	-6.986
	(16.5500)	(10.7000)
Access*Cash Flow	-0.625*	0.166
	(0.3690)	(0.1110)
Alb	92.30**	10.46
	(44.3400)	(29.8900)
Arm	34.69	-17.28
	(33.3800)	(19.3200)
Bul	44.91	-0.741
	(47.1500)	(14.6200)
Cro	19.84	-21.04
	(57.8500)	(25.0000)
Geo	4.354	-7.09
	(28.1100)	(15.5500)
Mac	27.02	3.291
	(43.8000)	(24.5900)
Mol	17.13	12.82
	(33.3700)	(18.1800)
Rus	-15.28	3.321
	(62.4700)	(18.3600)
SAM	34.67	5.478
	(37.0600)	(16.9900)
Slk	13.6	
	(76.3800)	
Constant	-234.2***	-64.31
	(65.0300)	(85.7900)
Observations	218	110

The panel data set above looks as expected with most of the variables being of the correct sign and significant. The access coefficient is nearly 29 and it is significant at 10 percent. 29 percent is a very large number and could have major impacts were firms to invest 29 times more than firms that didn't have access to an MFI. The interaction

variable is significant at 10 percent with a coefficient of -.625. The lending rate is positive and significant which is contrary to the expected and will need to be further examined.

The regression with data from 2005 did not produce good results, and compared to the panel data it contained about half the number of observations.

The following regressions use the full panel data set and the original variables; however, *access* is instrumented with the probit regression:

$$\text{Access} = f(\text{Large City}, \text{Small City})$$

The *bank transaction percent* and *economic freedom* variables were not available for 2002. The regressions can be viewed below:

**Table 13**

**Panel Regression with Instrumented Access (Tobit Model)**

COEFFICIENT	Investment
access	10.85 (23.8600)
Investment Opportunity	0.218* (0.1270)
Cash Flow	1.090** (0.4810)
Sales Value	-0.00185 (0.0333)
Firm Age	-0.191 (0.7060)
GDP	-0.17 (0.1220)
Lending Rate	1.773 (1.3330)
Production dummy	20.94 (12.8400)
Positive Sales	38.51***

dummy	
	(14.5900)
Negative Sales dummy	10.46
	(13.9800)
Corruption	-0.607
	(5.2530)
Yyhat*Cash Flow	-1.006*
	(0.6090)
GDP/Capita (PPP)	6.606
	(4.8710)
Alb	44.08
	(31.0400)
Arm	13.78
	(27.0600)
Bul	16.72
	(29.7900)
Cro	6.26
	(37.6400)
Geo	-7.717
	(22.3300)
Mac	0.113
	(29.7900)
Mol	6.135
	(28.8200)
Rus	56.28
	(66.5800)
SAM	17.72
	(25.4400)
Slk	9.04
	(53.4900)
Constant	-146.2***
	(52.3500)
Observations	287

The above model was a tobit regression censored at zero due to over half of the dependent variable (*investment*) being equal to zero. These results look as to be expected; the *access* variable is positive but not significant while the cash flow interaction (*yyhat\*cash flow*) is negative and significant at 10 percent. The *lending rate* variable is positive again but not significant. The *positive sales dummy* is significant at the 1 percent level suggesting that a firm with an increase in sales over the previous three

years invested a much greater amount than firms without an increase.<sup>12</sup> The *negative sales* dummy ended up being insignificant in the above regression, which was a concern in prior regressions.

**Table 14**

**2005 Regression with Instrumented Access (Tobit Model)**

COEFFICIENT	Investment 04
Access	23.79
	(23.3100)
Cash Flow	2.173
	(1.5290)
Capital	0.0153
	(0.0257)
Investment Opportunity	0.111
	(0.0956)
Corruption	9.454
	(6.5640)
Production dummy	42.95**
	(18.6400)
Lending Rate	0.0575
	(1.4850)
GDP per capita (PPP)	1.075
	(2.4930)
Age	0.0607
	(0.4560)
Cash Flow * Access	-2.713
	(2.0560)
Arm	-48.31**
	(19.8400)
Bul	-23.19
	(16.7100)
Cro	-23.57
	(23.5300)
Geo	-17.67

<sup>12</sup> Note that tobit regressions coefficients aren't interpreted in the same method as OLS coefficients and can't be compared.

	(15.0800)
Mac	-18.31
	(19.3400)
Mol	-12.08
	(14.5500)
Rus	-3.218
	(15.1500)
SAM	-3.473
	(10.7700)
yhat	
Constant	-29.82
	(47.0200)
Observations	110

## Possible Issues

The models still may have an omitted variable issue which stems from the difficulties associated with controlling for all the factors that influence a businesses decision to invest and if so, how much to invest. Although investment opportunity and business environment were controlled for, there are still a lot of factors that aren't measurable, the main one being the attitudes and behavior of the customers, which goes back to the investment opportunity variables. The low  $R^2$  statistics confirm that a lot of the explanation for investment is undetermined.

## CONCLUSION

Microfinance has been viewed for many years as one of the key drivers of eliminating poverty throughout the world someday, or at least, reducing it by a significant margin. Lending small amounts to poverty-stricken people has existed for decades through outlets such as loan sharks or family members. Muhammad Yunus has contributed to making microfinance more main stream by starting his Grameen Bank in Bangladesh and then watching the practice spread across the globe. 2006 was deemed the year of microfinance and Yunus was awarded the Nobel Peace Prize in 2007, however, that in no way marks the end or even the peak of microfinance. Microfinance lending has continued to flourish after he was awarded the prize, and will most likely continue to do so.

There are vast amounts of literature, impact studies, and books on microfinance, and the collection has continued to grow over the past decade. Many experts believe that it has a tremendous effect not only on poverty stricken individuals but on society and mankind as well. Many believe that it helps the less fortunate and contributes to poverty alleviation. Others such as Coleman, among others, don't buy into all the hype and believe that there are major problems with the practice of microfinance. Coleman believes that "poor people are poor for other reasons aside from lack of access to credit." He also argues that many studies which measure the impact of microfinance are ill advised or flawed in some way; causing the studies to show impact when there are other



explainable reasons as to why the impact occurred aside from lending money to poor people. Although Coleman's and other's studies may sound ruthless or harsh by suggesting that microfinance does not affect economic and social wellbeing, they are as important, if not more important than impact studies that do show microfinance having a positive impact. Perhaps, in some areas and countries lending to poverty-stricken people is a bad idea and puts the poor in the middle of a "poverty trap" or a circle of revolving debt in which they can't recover and are ultimately worse off than if they had never known of a microfinance institution.

There are a number of studies that show the opposite and conclude that microfinance has a positive impact on some societies in some countries and they suggest that microfinance should be expanded even more. Hietalahti's study concludes that microfinance should be restricted to entrepreneurs with business talent, opposed to lending to all customers. Hartarska's study concludes that in cities with three or more MFIs that micro-firms rely on internal funds for capital significantly less than firms that don't have as easy access to MFIs, inferring that easier access to capital leads results from microfinance institutions doing what they are supposed to do namely alleviating financing constraints. It is important to note that these studies were constricted to very specific areas; Coleman's in Northeast Thailand, Hietalahti's in South Africa, and Hartarska's in Bosnia and Herzegovina. These studies furthermore only cover a small number of the lending institutions that exist today.

Is it possible that microfinance has an impact in some areas but does not have impact in others? That is one of the unique aspects of this study in that it covers a wide

geographic area ranging from Central European countries such as Slovakia and Croatia all the way to Central Asia with countries that were once part of the Soviet Union such as Uzbekistan and Kyrgyzstan. Another unique aspect of this study is that it studies access in cities level giving it a unique local aspect. The study controls for country-wide characteristics with country dummies and GDP statistics, as well as controls for individual city and region characteristics with variables such as access to an MFI and the percentage of bank transactions with customers.

Theoretically, countries with sounder financial institutions and property rights laws should make for a better environment to do business. However, when studying microfinance's impact this idea must be compromised due to the goal of microfinance. If MFIs operated as a standard entity who's goal is to maximize profit, then yes, MFIs would choose to locate in more "free" areas or they would increase their costs in less safe areas to do business in order to offset the riskier environment and still make profit. However, MFIs goals are a bit slanted in that their main goal is to alleviate poverty, with their second objective either sustainability or profitability as the best case-scenario.

Non-random program placement bias is one of the main challenges of this study, along with most other selection bias studies in program evaluation. If selection bias isn't controlled for it can skew the impact or even show one when there isn't one at all. This model attempted to eliminate this bias with an instrumental variable model that controls for access. Another selection bias issue is that only business-savvy entrepreneurs borrow capital to expand their business, while people without entrepreneurial skills choose not to utilize an MFI. These types of studies usually over-estimate the impact, since it only

measures results of members that borrowed funds. This study's model eliminates that problem in that it only measures how dependent on cash flow an entrepreneur is and doesn't measure the social impacts that microfinance could potentially have; that is, the study measures MFIs impact on cost of doing business for micro-firms. In simplest terms if an entrepreneur is more dependent on their own cash for investment, their business' growth is restricted to how much they currently sell, whereas if there is easier access to capital they have a much better chance at growing, and ultimately leaving their poverty-stricken life in the past.

The results from this study are mixed, but some very positive conclusions can be drawn. One of these results is that access variable was positive and statistically significant at the five percent level, and it indicates that that microfirms that were located in a city with at least one MFI in either 2002 or 2005 invested over 10 percent more capital than firms that didn't have access. 10 percent is not a small number and should not be taken lightly; if all businesses in areas without access eventually gain access and begin to invest an additional 10 percent of capital into their businesses the impact could be enormous, assuming they are wise and profitable investments.

In the OLS and fixed effects model however, there was not statistically significant difference in the sensitivity of investment to internal capital. After the sample was split into firms with access and firms without access, and a Chow test performed, the null hypothesis of no difference could not be rejected therefore, no conclusions could be drawn as to how dependent each group was on their own cash flow.

In the second round of regressions which attempted to correct for endogeneity of access stemming from possible random program placement only data for 2005 was used. These results were different. In the instrumented regression, although *yhat* (the predicted access variable) was not statistically significant, the reaction of predicted access and cash flow (*yhatcash*) was negative and significant at 1 percent. From this result, the study can conclude that firms with access rely less on internal funds for investment and are less credit-constrained than firms that don't have access to an MFI. When re-running the panel regressions with the instrumented variable the results also showed that the access variable is positive and significant at 10 percent while the cash flow interaction is negative and significant at the 5 percent level. Thus, it can be concluded that MFIs in the towns and cities in ECA included in the present sample have alleviated the constraints of businesses with less than 10 employees. Whether they have achieved other goals including social impact is a subject to future research.

While this study is for a specific group of countries and region there is much work to be done in order to conclude whether microfinance has a positive impact on alleviating poverty worldwide, and if so, how much? Further issues to be addressed will most likely involve location, customer base, and business model. For example, does an institution in Southeast Asia work better than an institution in sub-Saharan Africa, all other things equal? Should MFIs target women as so many do, strictly men, strictly individuals with specific education levels, etc? Do MFIs that also help clients open up savings accounts and conduct seminars on basic finance perform better than institutions that focus solely on lending to as many people as possible?

## REFERENCES

- Armendariz de Aghion, Beatriz and Morduch, Jonathan.** 2000. Microfinance Beyond Group Lending. *Economics of Transition* Volume 8, Issue 2, Pages 401-420.
- Benjamin, McDonald and Ledgerwood, Joanna.** 1999. Case Studies in Microfinance: Albania-Albanian Development Fund. The World Bank, May.
- Binswanger, H.P., S.R. Khandker, and M.R. Rosenzweig.** 1988. The Impact of Infrastructure and Financial Institutions on Agricultural Output and Investment in India. *Journal of Development Economics* Volume 41, Issue 2, August 1993, Pages 337-366.
- Chowdhury, M, Ghosh, D. and Wright, Robert.** 2005. The Impact of Micro-credit on Poverty: Evidence from Bangladesh. *Progress in Development Studies*. Vol. 5, No. 4, 298-309.
- Coleman, B.E.** 1999. The impact of group lending in Northeast Thailand. *Journal of Development Economics* 60, 105–41.
- Conning, J.** 1999. Outreach, Sustainability and Leverage in Monitored and Peer Monitored Lending. *Journal of Development Economics*, 60, 51-77.
- Fazzari, S., Hubbard, G., Petersen, B.,** 1988. Finance constraints and corporate investment. *Brookings Papers on Economic Activity* 1, 141–195.
- Gwartney, James and Lawson, Robert.** *Economic Freedom of the World 2007 Annual Report*. 2007.
- Hartarska V. and D. Nadolnyak,** (2008) “An impact Analysis of Microfinance in Bosnia,” *World Development* 26(12), p.2605-2619.
- Hartarska, V. and C. Gonzalez-Vega,** 2006. What Affects New and Established Firms’ Expansion? Evidence from Small Firms in Russia. *Small Business Economics* 27, 195-206.

**Hietalahti, J. and Linden, M.** 2006. Socio-economic Impacts of Microfinance and Repayment Performance: A Case Study of the Small Enterprise Foundation, South Africa. *Progress in Development Studies*. Vol. 6, No. 3, 201-210.

**International Monetary Fund**, IMF International Financial Statistics Yearbook, 2006.

**International Monetary Fund**, IMF World Outlook Database, April 2006.

Grameen Bank, Banking for the Poor. <http://www.grameen-info.org>.

**Gwartney, James and Lawson, Robert.** 2007. Economic Freedom of the World 2007 Annual Report. The Fraser Institute.

**Lyandres, Evgeny.** 2007. Costly External Financing, Investment Timing, and Investment-Cash Flow Sensitivity. *Journal of Corporate Finance* 13, 959-980.

**Morduch, Jonathan.** 1999. The Role of Subsidies in Microfinance: Evidence from The Grameen Bank. *Journal of Development Economics*. Vol. 60, No. 1, 229-248.

**Pytkowska, Justyna and Rataj, Marcin.** 2007. 2006 The State of Microfinance Industry in Eastern Europe and Central Asia. Microfinance Centre for Central and Eastern Europe and New Independent States.

**Remenyi, J.,** 1991. Where Credit is Due: Income-Generating Programmes for the Poor in Developing Countries (Book). Intermediate Technologies Publications, London.

**Yunus, M.** 2008. Creating a World Without Poverty: Social Business and the Future of Capitalism. Public Affairs.

## APPENDIX CORRELATION TABLES

### Correlation Tables

#### Regression set 1 (2002 and 2005 variables)

	pchsal es	pchfi xas	pchl abor	vsal es	age i ntere-e	GDP	
pchsal es	1.0000						
pchfi xas	0.3767	1.0000					
pchl abor	0.1092	0.2051	1.0000				
vsal es	-0.0102	0.0526	0.0100	1.0000			
age	-0.0963	-0.0734	-0.1168	0.0703	1.0000		
i nterestrat e	0.0636	0.0149	0.0402	-0.2587	-0.1509	1.0000	
GDP	-0.0393	-0.0837	0.0056	0.1890	0.0596	-0.4195	1.0000
access	-0.0020	0.0576	0.0156	-0.0456	0.0520	0.0765	-0.1451
gdppconppp-s	-0.0701	0.0064	-0.0490	0.3960	0.1691	-0.7332	0.5444
	access gdppco-s						
access	1.0000						
gdppconppp-s	-0.2562	1.0000					

#### Regression set 2 (2005 variables)

	i nv04	cashfl ow	cap i tal	pchl abor	corrup-ti on	produc-ti on	gdppco-s	
i nv04	1.0000							
cashfl ow	0.2320	1.0000						
cap i tal	0.3903	0.3102	1.0000					
pchl abor	0.1530	0.0473	-0.0698	1.0000				
corrup-ti on	0.1508	-0.0104	0.0056	-0.0131	1.0000			
produc-ti on	0.2981	-0.0062	0.2491	-0.0342	0.0057	1.0000		
gdppconppp-s	0.2333	0.2474	0.1483	-0.0490	0.0116	0.0694	1.0000	
age	-0.0137	0.0405	0.0184	-0.1168	-0.0417	0.0580	0.1691	
yhat	-0.1088	0.1124	-0.0211	-0.0172	-0.0611	0.0048	-0.0608	
yhatcash	0.1686	0.9780	0.2759	0.0524	-0.0311	-0.0184	0.2131	
i nterestrat e	-0.2095	-0.1623	-0.0969	0.0402	-0.0057	-0.0359	-0.7332	
possal es	0.2043	0.0570	-0.0155	0.2498	-0.0316	0.0708	-0.0802	
negsal es	-0.0937	-0.0100	0.0039	-0.2363	0.0162	-0.1257	0.0484	
	age		yhat yhatcash		i ntere-e		possal es negsal es	
age	1.0000							
yhat	0.0238	1.0000						
yhatcash	0.0421	0.2285	1.0000					
i nterestrat e	-0.1509	-0.0150	-0.1470	1.0000				
possal es	-0.0997	0.0524	0.0592	0.0751	1.0000			
negsal es	0.0363	-0.0356	0.0040	-0.0422	-0.5920	1.0000		