

CERGE  
Center for Economic Research and Graduate Education  
Charles University Prague



## Measuring the Impact of Microfinance

Nargiza Alimukhamedova

Dissertation

Prague, March 2014



**Dissertation Committee:**

Jan Hanousek (CERGE-EI, Chair)

Randall K. Filer (CERGE-EI, Hunter College)

Štěpán Jurajda (CERGE-EI)

**Referees:**

Prof. Dr. Martin Brown (Universitat St. Gallen)

Prof. Rustam Ibragimov (Imperial College Business School)

## **Acknowledgements**

I would like to express my deep gratitude to my supervisors Jan Hanousek and Randall K. Filer for their continuous support, dedicate team work and overall guidance in completion of the Dissertation.

My special gratitude also goes to Deborah Novakova, Andrea Downing and Sarah Peck for continuous support in English editing of the chapters.

I would also like to thank the managers of Microfinance Institutions and the local survey company in Uzbekistan for invaluable assistance during the data collection for second and third chapters of the Dissertation. Finally, thanks to CERGE-EI and all its employees for continuous institutional support during the entire Dissertation completion journey.

Last but not least, I am grateful to my family and parents for their invaluable support, motivation and encouragement.

Prague, Czech Republic  
March 2014

Nargiza Alimukhamedova

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## Abstract

Microfinance emerged in the 1970's, aiming to help lift people out of poverty and promote economic growth by providing financial services to low-income households. Despite its global popularity, evidence supporting its net benefits is mixed; therefore, more comprehensive empirical testing is called for. This Dissertation aims to contribute to the on-going debate in microfinance in the following three dimensions:

In the first chapter, the impact of microfinance on macro economies is analysed. Motivated by limited knowledge of the economy-wide effects of microfinance, we aim to measure its impact on economic growth, financial sector development and reductions in income inequality. Measuring aggregate effects including those on non-recipients of microfinance programs constitutes an important contribution. We identify the “promised” impact of microfinance on economic growth measured by real GDP per capita, financial intermediation captured by broad money per capita and income inequality measured by the Gini coefficient. We also estimate the reverse feedback of macro fundamentals on microfinance itself. To estimate the dynamic equations, we use panel vector autoregressions (VARs) based on Arellano-Bover's (1995) and Blundell-Bond's (1998) instrumental variable system estimator, which enables us to control for potential endogeneity of microfinance and macro fundamentals. To address potential parameter heterogeneity in a dynamic panel, we divide countries into three broad clusters based on economic development, poverty, financial sector development, and levels of control of corruption. Such clustering also enables us to address the external environment for microfinance, which is multidimensional. In general, the results indicate an important and significant impact of microfinance at the macro level. In particular, the growth of microfinance is found to be positively and significantly associated with economic growth. We further find support for the impact of microfinance on financial sector development captured by broad money circulation in an economy. A one percent increase in microfinance borrowers in a country leads to a USD 314 increase in broad money per capita, which is equivalent to 13.8% of the mean value for the whole sample. The effect clearly differs across clusters in response patterns of microfinance. Finally, we find a positive impact of microfinance on reductions in poverty, as indicated by measurable lessening of income inequality. The result is stable for sample integrity of the Gini coefficient and trimming for outliers. Overall results indicate a significant role of microfinance and its potential to affect the broader economy. The impact and transfer dynamics, however, differ substantially by macro-institutional environment.

The second and third chapters are devoted to analysis of the microfinance environment in Uzbekistan, based on the primary dataset, which constitutes the first evidence of the impact of microfinance from the Central Asia region.

The second chapter describes the microfinance environment in Uzbekistan, emphasizing two types of non-bank microfinance institutions - Credit Unions and Microcredit Organizations. The specific nature of these institutions provides new evidence of the commercially oriented microcredit model and SME lending, which is an emerging trend in mainstream microfinance. The chapter offers two important contributions. On the supply side of microcredits, we analyse the determinants of initial placement of MFIs in districts of Uzbekistan. We find that MFIs follow general economic principles when choosing locations. On the demand side, we analyse the actual margins of excess demand for microcredits by considering only the pool of eligible applicants. We find that the total probability of microcredit approval is, on average, only 0.5, which implies that actual margins of untapped market may be much lower than projected when the narrow definition of eligible applicants is taken into account.

In the third chapter, the causal impact of improved access to microcredits is measured in terms of geographical distance to the nearest non-bank MFI. Proximity matters because of travel, time and other pecuniary costs and, more importantly, in terms of knowledge diffusion and (dis)connection from the microfinance network causing "signal dissipation". The methodology is based on propensity score matching as a second best solution for program evaluation in the absence of experimental intervention. We match the 25% of households residing the closest to MFIs with the 25% residing the farthest, which defines the "treatment" as having easy or difficult geographical access to microcredits. To ensure the validity of the matching technique, we re-create pre-treatment covariates using a set of retrospective questions embodied in a single cross-sectional design. The accuracy and memory recall of retrospective data is ensured by the use of "fundamental events" analogues to event studies in general finance literature. We therefore provide an additional contribution to impact assessment and program evaluation. Overall results indicate a positive and significant effect of improved access to microcredits. For the business channel, we find that having better access to microcredit results in clients running more efficient enterprises in terms of higher business income and profits, and reducing the numbers of employees under competitive pressures. We also observe significant changes in household consumption patterns. Households with better access to MFIs tend to invest more in human capital, captured by expenditures on health and education, and to reduce spending on non-durable items such as weddings. The findings suggest that better access to microcredits improves household consumption patterns, which is in line with theoretical predictions.

## Abstrakt

Mikrofinancování se objevilo v 70. letech 20. století s cílem vyvést lidi z chudoby a podpořit hospodářský růst pomocí poskytování finančních služeb pro domácnosti s nízkými příjmy. I přes celosvětovou popularitu tohoto nástroje jsou výsledky výzkumu hodnotící přínosy mikrofinancování smíšené, komplexnější empirické testování tohoto nástroje je tedy žádoucí. Tato práce si klade za cíl přispět k probíhající diskuzi o mikrofinancování v následujících třech dimenzích.

V první kapitole je analyzován dopad mikrofinancí na ekonomiku z agregátního pohledu. Motivováni omezenými znalostmi dopadů mikrofinancí na makroekonomické úrovni si klademe za cíl změřit jejich dopady na hospodářský růst, rozvoj finančního sektoru a snížení příjmových nerovností. Důležitým přínosem této části práce je měření agregátních účinků mikrofinancování včetně dopadů na osoby neúčastnící se mikrofinančních programů. Identifikujeme "slibovaný" dopad mikrofinancování na ekonomický růst měřený pomocí reálného HDP na obyvatele, na finanční zprostředkování pomocí širokých peněz (broad money) na jednoho obyvatele a na příjmové nerovnosti měřené Giniho koeficientem. Dále odhadujeme zpětnou vazbu základních makroekonomických ukazatelů na mikrofinancování samotné. K odhadu dynamických rovnic používáme vektorových autoregresních modelů (VAR) s instrumentálními proměnnými podle Arellano-Bover (1995) a Blundell-Bond (1998), který umožňuje kontrolovat potenciální endogenitu mikrofinancování a makroekonomických ukazatelů. Abychom vyřešili problém potenciální heterogenity parametrů v dynamickém panelu, rozdělili jsme země do tří hlavních skupin na základě jejich hospodářského rozvoje, chudoby, rozvoje finančního sektoru a úrovně kontroly korupce. Toto rozdělení zemí nám také umožňuje zachytit multidimenzionální rozdíly ve vnějším prostředí, které jsou důležité pro mikrofinancování. Obecně lze říci, že výsledky naznačují velmi významné dopady mikrofinancování na makroekonomické úrovni. Výsledky ukazují, že růst mikrofinancování je pozitivně a signifikantně spojen s ekonomickým růstem. Výsledky také potvrzují dopad mikrofinancování na rozvoj finančního sektoru měřený pomocí oběhu širokých peněz (broad money) v ekonomice. Nárůst mikrofinančních dlužníků o jedno procento vede ke zvýšení širokých peněz v ekonomice o 314 dolarů na jednoho obyvatele, což odpovídá 13,8 % z průměrné hodnoty širokých peněz v celém vzorku. Dopady mikrofinancí jsou navíc velmi rozdílné v různých skupinách zemí. Výsledky konečně potvrzují i vliv mikrofinancování na zmenšení příjmové nerovnosti, což naznačuje i pozitivní dopad na snížení chudoby. Výsledky se nemění, ani když interpolujeme chybějící hodnoty Giniho koeficientu a vynecháme odlehlá pozorování. Celkově výsledky ukazují na velmi významnou úlohu mikrofinancování a jeho potenciál ovlivnit ekonomiku na makroekonomické úrovni. Velikosti a dynamika dopadu mikrofinancování se ale podstatně liší podle makroekonomické situace a institucionálního prostředí v dané zemi.

Druhá a třetí kapitola je věnována analýze mikrofinančního prostředí v Uzbekistánu, a to na nově nasbíraných datech, která tak přináší první důkaz dopadu mikrofinancování v oblasti Střední Asie.

Druhá kapitola popisuje mikrofinanční prostředí v Uzbekistánu, a to s důrazem na dva typy nebankovních mikrofinančních institucí a to na družstevní záložny (Credit Unions) a mikroúvěrové organizace. Zvláštní povaha těchto institucí nabízí nová svědectví o komerčně orientovaném modelu mikroúvěrů a o úvěrech malým a středním podnikům, které jsou novým trendem v hlavním proudu mikrofinancování. Tato kapitola má hlavní přínos ve dvou bodech. Na straně nabídky mikroúvěrů analyzujeme determinanty původního rozmístění mikrofinančních institucí v jednotlivých oblastech Uzbekistánu. Zjistili jsme, že mikrofinanční instituce při výběru lokality dodržují obecné ekonomické principy. Na straně poptávky analyzujeme skutečný rozsah převisu poptávky po mikroúvěrech tím, že zvažujeme pouze skupinu způsobilých žadatelů. Zjistili jsme, že celková pravděpodobnost schválení mikroúvěru je v průměru pouze 0,5. To znamená, že když vezmeme v úvahu úzkou definici způsobilosti žadatele, ukazuje se, že skutečný nevyužitý potenciál trhu může být mnohem nižší, než se předpokládalo.

Ve třetí kapitole měříme kauzální efekt zlepšení přístupu k mikropůjčkám, a to pomocí geografické vzdálenosti k nejbližší nebankovní mikrofinanční instituci. Vzdálenost je důležitá kvůli nákladům na

cestování, strávenému času a ostatním finančním nákladům, ale především kvůli šíření znalostí a možné „ztrátě signálu“. Metodika je založena na metodě párování pomocí pravděpodobnostního skóre, a je zvolena jako nejlepší možné hodnocení programu v nepřítomnosti experimentální manipulace. Spárovali jsme 25% domácností s bydlištěm nejbližší u mikrofinanční instituce s 25 % domácností, které bydlí nejdále, čímž definujeme manipulaci jako snadný, respektive obtížný geografický přístup k mikroúvěrům. Pro zajištění platnosti metody párování využíváme zpožděné nezávislé proměnné, které jsme získali z retrospektivních otázek začleněných jinak v jednorázovém průřezovém šetření. Přesnost a paměťové vyvolání retrospektivních dat jsou zajištěny použitím metody "základních událostí", která je analogií podobných studií z obecné finanční literatury. Dodatečným přínosem je proto přínos k metodice hodnocení dopadu programů. Celkové výsledky ukazují pozitivní a statisticky významný vliv zlepšení přístupu k mikroúvěrům. Pro podnikatelské aktivity jsme zjistili, že lepší přístup k mikroúvěrům způsobuje, že klienti řídí podniky efektivněji, pokud se jedná o vyšší příjmy z podnikání a zisky, a o snižování počtu zaměstnanců v prostředí konkurenčních tlaků. Pozorujeme také významné změny ve struktuře spotřeby domácností. Domácnosti s lepším přístupem k mikrofinančním institucím mají tendenci více investovat do lidského kapitálu, počítáno vyšší výdajů na zdravotnictví a vzdělávání, a naopak snížit výdaje na krátkodobou spotřebu, kam patří třeba svatby. Výsledky tak naznačují, že lepší přístup k mikroúvěrům zlepšuje strukturu spotřeby domácností, což je v souladu s teoretickými predikcemi.

## Introduction

About 1.4 billion<sup>1</sup> people globally live on less than one dollar per day and face extreme poverty, social and financial exclusion. Historical evidence reveals that not all poverty eradication programs efficiently reach the poorest of the poor. Microfinance has emerged as a promising tool to address this problem, as it requires less investment yet still serves a large percentage of poor clients whom traditional banking finds unprofitable.

Microfinance is a non-standard provision of a broad range of financial services such as collateral free loans, savings deposits, insurance, remittances, leasing and money transfers to low-income households that are used to support a family business or other types of productive activities (Armendáriz and Morduch, 2010). Bangladesh was the first country to establish a microfinance institution (MFI) - Grameen bank - on the initiative of Dr. Muhammad Yunus in 1970, and since then its successful lending practices, impact on poverty alleviation and empowerment of women has spread globally, attracting the attention of a large community. The United Nations proclaimed 2005 as the Year of Microcredit, and Dr. Yunus was awarded the Nobel Peace Prize in 2006 for his innovative microfinance practices.

The historical evolution of microfinance institutions has been different from cooperatives, self-help and informal credit groups such as rotating savings and credit associations (ROSCAs). NGOs appeared as new players in the late 1970s, which laid further foundations for Microfinance Institutions (Vanroose, 2007). The industry is rapidly growing; according to Maes and Reed (2012) around 205 million clients are served by 3,500 MFIs worldwide. The success of microfinance is characterized by high (almost 95%) repayment rates, low probability of default and, most importantly - social impact. Poor people running a tiny business thanks to microfinance loans also improve their knowledge, skills, health and housing and often have alternative employment opportunities. Further, through access to microfinance, women's participation in societies has rapidly increased, which is especially important for the least developed countries where family and child-rearing responsibilities inherently fall exclusively to women.

Most microfinance institutions catering to micro-borrowers have evolved under several ownership structures: credit unions, specialized NGOs and specialized microfinance banks. Most obtain their funds in the form of subsidies from donor organizations and governments, which are further channelled to microfinance borrowers at adjusted rates. In microfinance jargon, MFIs are also referred to as "double-bottom line" organizations, as they require the meeting of two objectives which involve a trade-off: first, achieving financial sustainability (profitability) and becoming independent from the donor

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<sup>1</sup> World Bank estimates of poverty line.

subsidy by serving more, but less poor, clients (i.e. the extent of outreach) versus, second, pursuing a social mission to help the poorest of the poor and continuing to rely on donor subsidies even in the long run (i.e. the depth of outreach). There has been a continuous debate between advocates of these two camps, though recent evidence claims that financially strong MFIs which adopt the rationales of good banking will also be able to meet the poverty alleviation mission (Mersland, 2005).

Theoretical fundamentals of microfinance are characterized by its potential to address adverse selection, moral hazard and the reduction of transaction costs. They also have the ability to serve clients in a risky business environment with a weak judicial system. These are obstacles that plague traditional commercial lending and lead to market imperfections (Morduch, 1999). Group lending, flexible collateral requirement, early repayment rates, peer monitoring, deposit funds requirements, assortative matching of risky and safe borrowers, female clientele (who are generally more reliable), and progressive lending schemes are among the driving forces of the microfinance mechanism that address problems of asymmetric information and help to reduce the transaction cost of servicing many micro-borrowers but with small scale business operations.

There is a wide range of literature on microfinance, its diverse services, socio-economic impact and overall promised success in combating poverty by reaching low-income households. However, adequate empirical testing of theory and impact evaluation remains a challenging task due to limited good quality, comparable data and the difficulty of designing appropriate methodologies. Self-selection of borrowers, non-random placement of MFIs, difficult to identify treatment and control groups, endogeneity and other measurement issues create inconsistency in results which lead to mistaken conclusions about the ultimate benefit of microfinance programs. As a result the evidence is mixed, biased or limited to anecdotal surveys and subject to various critiques (Karnani, 2007; Dichter & Harper, 2007; Morduch, 2001).

Motivated by this lack of empirical evidence, this dissertation aims to contribute to the microfinance literature in three ways. In particular, each chapter aims to shed more light on the impact of microfinance through various angles and levels, i.e. aggregate macro (Chapter 1), country and microfinance institutions (Chapter 2) and finally households, the end beneficiaries of microcredits (Chapter 3). The overall dissertation therefore provides a comprehensive evaluation of the impact of microfinance based on a multi-dimensional approach.

The **first chapter** opens the Dissertation and aims to measure the impact of microfinance at the aggregate level using cross-country data. Since its birth in the 1970s, microfinance has transformed vastly and today is a global and self-sustaining industry of more than 3,500 reported microfinance finance institutions servicing 205 million clients (Maes & Reed, 2012). The globalization of microfinance today is characterized by two important trends: (1) the growing trend of mature MFIs to transform from

being NGOs to licensed and regulated financial institutions, thus integrating more with national financial systems, and (2) the entry of commercial banks into the microfinance market sector by offering new products, establishing separate branches or providing external financing for MFIs. All of these factors signal that microfinance is no longer an isolated marginal sector of informal means of financing, but rather constitutes a separate, lower-end segment of the broader financial system. Despite this, the net contribution of microfinance to broader economies remains ambiguous, given complementary or rivalry relationships with traditional banks and long-run redistributive effects (Ahlin et al. 2011; Buera et al. 2012).

Because most impact studies in microfinance primarily focus on finding the effect on a limited group of beneficiaries or analyse a particular country setting, a lack of systematic evidence at the aggregate level identifying general patterns across countries remains. More importantly, the effect of microfinance on whole populations remains unstudied. This motivates the study of microfinance impact at an aggregate country level, considering the spillover effects on the whole population and in a dynamic setting, which enables a researcher to trace the evolution of the impact over time. The aim of this chapter is therefore to provide a set of stylized empirical findings on the impact of microfinance on a broad economy and reduction in income equality at the cross-country level. We analyse both dimensions of the impact - via microfinance loan portfolios and number of borrowers, using the global data from Microfinance Information eXchange (MIX) for 1292 MFIs, in 101 countries for 1995-2011 span.

We identify the “promised” impact of microfinance on economic growth measured by real GDP per capita, financial intermediation captured by broad money per capita and inequality measured by the Gini coefficient. To estimate the dynamic equations, we use panel vector autoregressions (VARs) based on the Arellano-Bover (1995) and Blundell-Bond (1998) instrumental variable system estimators, which enable us to control for potential endogeneity of microfinance and macro fundamentals. To address potential parameter heterogeneity in a dynamic panel, we divide countries into three broad clusters based on economic development, levels of income inequality, financial sector development, and control of corruption. Such clustering also enables us to address the external environment of microfinance, which is multidimensional. We benefit from the earlier established empirical findings of Ahlin et al. (2011), Armendáriz & Vanroose (2009), Hermes & Meesters (2011), which identify the complementary or rivalry nature of microfinance on a number of macro-institutional factors. Finally, we perform impulse response functions to predict the evolution of the shock from microfinance at the bottom to macro fundamentals.

Overall results indicate an important and significant impact of microfinance at the aggregate level. Expansion of microfinance in terms of intensive margin (loan portfolio of MFIs) is positively and

significantly associated with economic growth measured by real GDP per capita. The transfer dynamics, however, clearly differ across clusters. We further find evidence of a positive impact of microfinance on financial sector development measured in terms of broad money per capita. In line with previous empirical findings of Ahlin et al.(2011), greater financial depth is strongly associated with the lower default and operating costs of MFIs. We also find support for the market failure hypothesis that microfinance institutions flourish in weaker environments where formal financial institutions tend to fail. We find an aggregate impact of microfinance on reductions of inequality measured by the Gini coefficient. To conclude the analysis, we plot impulse response functions projecting the evolution of shock at the bottom of microfinance to macroeconomic fundamentals. The response clearly differs across clusters. As such, in more stable environments (cluster 1 and 2) strong growth potential is observed, which is in line with previous findings that the outreach of MFIs is more developed in stable countries and operational costs are recovered when economic growth is stronger (Ahlin et al. 2011; Vanroose 2008; Armendáriz & Vanroose, 2009). In a weak environment (cluster 3), microfinance evolution is transferred through a concave function and “dies out” after a certain critical point. Impulse response function analysis generates interesting patterns and calls for further research to actually identify the state under which microfinance shifts from a complement to a substitution.

To the best of our knowledge, the analysis and findings in Chapter 1 provide the first empirical evidence of the aggregate effect of microfinance, thus this is an important contribution to the literature. Overall results indicate a significant role of microfinance and its potential to affect the broader economy. The impact and transfer dynamics, however, differ substantially by macro-institutional environment.

Chapters 2 and 3 are based on primary data on microfinance institutions and recipients of microcredits (household survey) in Uzbekistan, Central Asia region. The survey and data collection took place during 2010 – 2011 with the financial support of the Global Development Network (GDN), the Economics Education and Research Consortium (EERC) and the University Meets Microfinance (UMM) project of the European Microfinance Network. The data collection was greatly leveraged by local institutions in Uzbekistan, specifically the United Nations Development Program (UNDP) “Support to Microfinance Sector Development” Project, Westminster International University in Tashkent and the Center for Social Studies “TAHLIL”. Finally, the contribution of the managers of local non-bank microfinance institutions as well as all the participants in the survey is invaluable and gratefully acknowledged.

The survey and the database provide the following two contributions. First, the dataset is the first evidence for Uzbekistan and the Central Asia region collected with academic rigour and a conceptual framework. More importantly, the specific evolution of microfinance in Uzbekistan has enabled evolution

of two types of non-bank financial institutions (i.e. Microcredit Organizations and Credit Unions). While most impact studies on microfinance in general literature focus on conventional (mostly donor funded) Grameen type group lending models, non-bank MFIs in Uzbekistan operate on a private commercial microcredit lending scheme corresponding to a so-called meso-finance or SME lending model, which is an emerging trend in the literature. The second contribution of this chapter is based on impact assessment methodology. In particular, the household survey and aftermath impact assessment is based on a retrospective design. We have developed and implemented a novel approach for conducting the impact assessment of development programs in a specific application on microfinance. While experimental studies, so-called Randomized Control Trials (RCT), constitute the leading robust methodology for evaluating the impact of development programs, they are very costly, require extensive logistics, and tend to have quite a limited experimental intervention. Retrospective methodology is thus considered one potential method for rigorous impact evaluation which achieves time and cost efficiency, especially when RCT is not feasible or when the results are required promptly. The reliability and thus, the application of retrospective methodology is critically dependent on accuracy and memory recall as not all information about past events could be recalled accurately. Given the objectives of impact assessment and the aim of retrieving general events, a standardized interview method was applied where retrospective questions are embodied in a survey questionnaire. The retrospective methodology is based on a set of retrospective questions; respondents were asked about the *year of* and *cost* incurred for particular events which are psychologically significant, discrete, and therefore easily memorable. The accuracy of recall was additionally ensured through application of timelines, public landmarks and specific training of interviewers. We therefore consider that a retrospective methodology may be a promising and robust method of impact assessment.

**Chapter 2** provides a description of the microfinance environment in Uzbekistan, the historical evolution of bank and non-banking microfinance institutions, legal changes and benchmarking with regional and international peers for comparison. Special emphasis is given to two types of non-bank microfinance institutions - Credit Unions (CU) and Microcredit Organizations (MCO). Their private commercial nature provides new evidence of the commercially oriented microcredit model and SME lending, which is an emerging trend in mainstream microfinance. The chapter provides two important contributions. On the supply side of microcredits, the determinants of initial placement of MFIs are analysed. Using district level data, we find that the determinants of MCO growth are closely associated with the household/family nature of business to which the microcredits are disbursed. In contrast, CUs serve middle class enterprises on a higher business and economic level, for which the economic development of the region and industrial composition is an important factor. The results suggest that

non-bank microfinance institutions in Uzbekistan follow general economic principles. Given that MFIs represent the local financial segment functioning based on competitive market principles, historical changes in the legal framework and other exogenous changes did not impede their free market functioning.

On the demand side, the excess demand for microcredits is analysed. A specific contribution includes the identification of eligible non-participants, as not all visitors to MFIs end up eventually being granted a microcredit. Analysing the ratios from MFI managers and credit officers, we find that the total probability of microcredit approval is, on average, 0.5. This data is potentially important for policy makers, as the actual margins of the untapped market could shrink by as much as half when the narrow definition of eligible applicants is taken into consideration.

**Chapter 3** estimates the impact of microfinance on recipients of microcredits and a comparison group of households. In particular, we aim to measure whether geographical barriers to access to microcredits has any effect on business indicators and household consumption. Despite substantial improvement of access to finance, physical barriers to reaching financial institutions continue to constitute significant impediments. Over recent decades, microfinance institutions have gained worldwide recognition, reaching billions of poor people who are ineligible for traditional banking services. Despite greater flexibility in the provision of loans, geographical barriers to access to MFIs constitute an important obstacle.

We aim to measure the causal impact of better access to microcredits in terms of distance to the nearest MFI on business indicators and household consumption behaviour. Additionally, the direct effect of distance is considered as a proxy for broader learning and spillover effects of microcredits, as beneficiaries share their knowledge and experience with others. Close or distant location from the nearest MFI thus indicates the strength of the knowledge diffusion operating as a “dissipating signal”. The data is based on a survey of 1,086 microcredit borrowers and non-borrowers in Uzbekistan. The microfinance environment in Uzbekistan provides evidence of private commercial non-bank MFIs supporting both consumer and business loans. The country’s geographical landscape validates the use of distance to the nearest MFI as an informative proxy.

The results indicate positive and significant effects of closer geographical location to microcredits. In particular, households with easier access to MFIs reveal more likelihood of starting a new business. A positive effect is found on business revenue and profit, but not enterprise size, as entities tend to reduce the number of employees. The findings are in line with a conventional microcredit model, which centers entrepreneurship activity as a primary channel for the impact. This is also justified by the private and commercial nature of MFIs in the study, which operate mostly with higher profile clients whose income levels are above the poverty line. On the consumption side, households with

better access to microcredits are found to engage in more rational decision making. They invest more in human capital such as education and health and reduce spending on non-durable items such as weddings and other social events. The findings are in accord with experimental studies in the field which indicate that having access to microcredits incentivizes households to shift consumption patterns, to reduce expenditures on unnecessary goods and to re-invest more into business and other durable items. Finally, the diffusion effect of the distance to nearest MFI is analysed by comparing business and consumption outcome variables between the 1st- 3rd and 1st- 4th distance quantiles. The indicative distance between two quantiles equals roughly 40 km, which allows us to trace the learning effects. We find similar patterns of business and consumption behaviour across two distance quantiles, revealing the uniformity of the “radar signal” going in the same direction. This is a potential indication of a diffusion effect and the concept that geographical proximity matters.

The overall results of the study are in line with theoretical predictions of credit expansion and access to finance. Better access to microcredits causes positive changes in household behaviour. However, the dataset does not provide a clear division of the mechanism, i.e. whether it is entirely due to geographical proximity or knowledge diffusion. This calls for further research and empirical work.

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# Chapter 1

## What Do We Know About Microfinance at Macro Glance?<sup>2</sup>

### Abstract

Motivated by a lack of empirical evidence of aggregate effects of microfinance on a broader economy, in this chapter we aim to identify the so-called “microfinance promise” by identifying the links between microfinance and economic growth, and financial sector development and reductions in income inequalities. Given that the majority of microfinance impact studies focus on finding the effect on a specific group of beneficiaries, we aim to identify the impact on whole economies, which is an important policy concern not previously addressed. To address heterogeneity across countries, we employ a novel approach by grouping countries into three broad clusters delineated by a set of macro-institutional determinants. We find evidence of a positive impact of microfinance on macroeconomic fundamentals and reductions in income inequality. The findings indicate a significant role of microfinance and its potential to affect broader economies in the long-term. However, the impact and transfer dynamics differ substantially across clusters determined by the macro-institutional environment. The microfinance effect is more pronounced in weaker environments and tends to “die out” when reaching more stable environments where formal institutions are strong.

### 1. Introduction and Motivation

Microfinance emerged in the 1970s, with its primary mission aimed to reduce poverty by means of improved access to finance for low-income households. Since then microfinance has transformed vastly and has become a global and self-sustaining industry of more than 3,500 reported microfinance finance institutions (MFIs) serving 205 million clients (Maes & Reed, 2012). Today, microfinance is no longer perceived as a “magic bullet”, automatically lifting poor people out of poverty through microenterprise. Rather, it focuses on the graduation from poverty of low-income households by delivering a variety of good-quality financial services.

The dramatic changes currently observed in the microfinance landscape are driven by two important phenomena. First, there is a growing trend of mature MFIs transforming from NGOs to licensed and regulated financial institutions, thus integrating more closely with established national financial systems<sup>3</sup>. Second, perceived profitability and a new market niche lure commercial banks into the microfinance segment. The banks then offer new products, establish separate branches or provide external financing for MFIs<sup>4</sup>. All of these factors signal that microfinance is no longer an isolated

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<sup>2</sup> An earlier version of this work was published in Maksudova, N. (2010). Macroeconomics of Microfinance: How Do the Channels Work?, CERGE-EI Working Paper Series, 2010, No. 423. All errors remaining in this text are the responsibility of the author.

<sup>3</sup> For example ACLEDA Bank in Cambodia; Xac Bank in Mongolia; Spandana and SKS in India.

<sup>4</sup> For example ICICI Bank, ABN-AMRO, Citibank, HSBC in India and China and ANZ Bank in Fiji.

marginal sector of informal means of financing, but rather constitutes a separate, lower-end segment of broader financial systems. Despite this fact, the net contribution of microfinance to the broader economy remains ambiguous, given a complementary or competitive relationship with commercial banks and long-run redistributive effects (Ahlin et al. 2011; Buera et al. 2012).

Despite global promotion of financial inclusion, current estimates show that 2.5 billion adults, roughly half of the world, remain without a bank account (Demirguc-Kunt & Klapper, 2012). This signals a large untapped demand for banking services and potential profit opportunities, indicating that microfinance might continue to expand, diffusing through specialist MFIs and banks. However, the speed and the nature of these processes have not been well explored. Moreover, little is known about the aggregate impact of microfinance expansion on national economic growth rates and national-level poverty rates, as acknowledged by Morduch (2013). What are the transfer channels of microfinance to the broader economy and how do they differ given the macro-institutional development of countries? Why does microfinance flourish in some countries and remain modest in others? These are specific questions that we address in the paper.

While there have been numerous idiosyncratic and isolated studies measuring the impact of microfinance in various settings,<sup>5</sup> a lack of systematic evidence at aggregate level general patterns across countries remains. The degree to which microfinance fulfils its promise of promoting identifying financial sector development and poverty reduction at a macro level remains unclear. More importantly, most recognized impact studies focus on measuring the impact of microfinance on limited groups of beneficiaries, while the general effect on larger population remains unstudied. This motivates our study of the impact of microfinance at aggregate country level, considering the spillover effect on national population, in a dynamic setting which enables us to trace the evolution of the impact over time. The aim of this chapter is therefore to provide a set of stylized empirical findings on the impact of microfinance to broad economies and reduction in income inequality at cross-country level. We analyse both dimensions of the impact - through microfinance loan portfolios and the number of borrowers.

We identify the “promised” impact of microfinance on economic growth measured by real GDP per capita, financial intermediation captured by broad money per capita and inequality measured by the Gini coefficient. We also estimate the reverse feedback of macro fundamentals on microfinance itself. To estimate the dynamic equations, we use panel vector autoregressions (VARs) based on the Arellano-Bover (1995) and Blundell-Bond (1998) instrumental variable system estimators, which enable to us control for potential endogeneity of microfinance and macro fundamentals. To address potential parameter heterogeneity in a dynamic panel, we divide countries into three broad clusters based on economic development, income inequality, financial sector development, and measured levels of

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<sup>5</sup> See Bauchet et al. (2011) for summary and review of recent randomized control trials in microfinance.

corruption. Such clustering also enables us to address the external environment for microfinance, which is multidimensional. We benefit from the earlier established empirical findings of Ahlin et al. (2011), Armendáriz & Vanroose (2009), Hermes & Meesters (2011), which identify the nature of microfinance as being complementary or competitive to a number of macro-institutional indicators. Finally, we perform impulse response functions to predict the evolution of the shock generated at the bottom from microfinance to macro fundamentals.

Overall results indicate the important and significant impact of microfinance at the aggregate level. Expansion of microfinance in terms of intensive margin (loan portfolio of MFIs) is positively and significantly associated with economic growth measured by real GDP per capita. The transfer dynamics, however, clearly differ across clusters. We further find evidence of the positive impact of microfinance on financial sector development measured in terms of broad money per capita. In line with the previous empirical findings of Ahlin et al.(2011), greater financial depth is strongly associated with lower default and operating costs of MFIs. We also find the support for the market failure hypothesis that microfinance institutions flourish in environments where the formal financial institutions are weaker. We find an aggregate impact of microfinance on reductions of inequality measured by the Gini coefficient. Finally, we plot impulse response functions projecting the evolution of shock at the bottom of microfinance to macroeconomic fundamentals. The response clearly differs across clusters. As such, in stronger environments (cluster 1 and 2) strong growth potential is observed, which is in line with previous findings that the outreach of MFIs is more developed in stable countries and operational costs are recovered when economic growth is stronger (Ahlin et al. (2011), Vanroose (2008), Armendáriz & Vanroose (2009). In a weak environment (cluster 3), microfinance evolution is transferred through concave function and “dies out” after a certain critical point. Several potential interpretations are provided for this. The findings generate interesting patterns and call for further research to actually identify the state under which microfinance transforms from a complement to a substitution.

## **2. Literature Review**

### **2.1. Economy-Wide Effect of Microfinance: Theory and Empirics**

The positive contribution of financial sector development to economic growth through banks and equity markets is proven and has been widely tested at the cross-country, industry and firm levels (King & Levine, 1993; La Porta et al., 1998; Rajan & Zingales, 1998; Beck, Levine & Loayza, 2000). While the main role of the financial sector is to reduce information, enforcement and transaction costs, Levine (2004) outlines five functions that a financial system serves in facilitating growth: savings mobilization,

provision of investment information, monitoring/governance, risk management and facilitation in goods and service exchange. Through these functions, the financial sector not only promotes private sector development, but also supports the public sector, infrastructure and the ability of households to invest in human capital and smooth consumption. Karlan & Morduch (2010) claim that the general empirical linkages between finance-and-growth cannot be directly projected to the expansion of household financial access, which is different than with firms, including the spread of microfinance. However, considering the fact that, in some developing countries microfinance already has a significant penetration, we could potentially draw reasonable inferences about their broad economy-wide impact. The contribution of microfinance to the economic growth at a country level could be measured through production created by small entrepreneurship, improvements in human development indicators (health, nutrition, education) and reduction in poverty (Ravallion, 2001).

The second important aspect of financial expansion is related to its distributional impact affecting poverty and inequality<sup>6</sup> (Hermes & Lensink, 2011). Loury (1981) develops a model of intergenerational transmission of inequality, where redistribution due to financial deepening can improve economic efficiency. The basic result is that borrowing constraints reduce efficiency and exacerbate inequality by diverting capital from low-income households with high-return investments. Greenwood & Jovanovic (1990) build a model in which financial development can increase inequality as richer segments of a population invest in financial infrastructure first. Over time, a broader segment of the economy benefits, so that inequality first widens then narrows with financial development. Other mainstream theoretical literature explores the aggregate and distributional impacts of financial intermediation in models of occupational choice and financial frictions (Banerjee & Newman, 1993; Aghion & Bolton, 1997; Lloyd-Ellis & Bernhardt, 2000; Erosa & Hidalgo Cabrillana, 2008). According to the theoretical predictions of these studies, improved financial intermediation leads to more entry into entrepreneurship, higher productivity and investment, and increases in wages - which is considered a general equilibrium effect in the long-run.

In direct application of microfinance, Buera et al. (2012) develop a model to analyse the economy-wide effect when microfinance programs are first introduced. The authors quantitatively evaluate the short run (Partial Equilibrium) and long run (General Equilibrium) aggregate impact of microfinance in a model that incorporates occupational choice, endogenous wages and interest rates. Theoretical model predictions are then used to quantify the impact of microfinance on key macroeconomic indicators such as output, capital, TFP, wage, interest rate, and distributional effects. The redistributive impact of microfinance is found to be stronger in general equilibrium than in partial

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<sup>6</sup> See Karlan & Morduch (2010, pp. 4713-4714) for a detailed review of theoretical models on financial deepening and poverty reduction.

equilibrium, but the impact on aggregate output and capital is smaller in general equilibrium. Buera et al. (2012) claim that in the long run, the scaling up of microfinance programs will have only a small impact on per-capita income. Despite this fact, the vast majority of a population will be positively affected by microfinance through the increase in equilibrium wages (Buera et al. 2012). The bottom line of the theoretical model and calibration is that introduction of typical microfinance programs can have significant aggregate and distributional impacts economy wide.

The empirical evidence testing the general effect of microcredit expansion is based mainly on two experimental studies. First, Kaboski and Townsend (2012) evaluate the short- and long term impact of Thailand's "Million Baht Village Fund" program, which is considered the largest scale government microfinance initiative, from which the funds have been injected randomly into 77,000 villages. This has been found to increase short-term credit, consumption, agricultural investment and income growth, but to decrease overall asset growth. There is also evidence of (localized) general equilibrium effects in terms of positive impacts on village-level wages.

Banerjee et al. (2010) conducted one of the biggest randomized expansions of "Spandana" MFI branches in the new urban market of Hyderabad, India. Fifty two communities were randomly selected for the opening of new MFI branches offering loans to self-formed groups of mostly women. The follow-up survey to evaluate its impact was conducted 18 months after the loans had been disbursed. The results indicate a heterogeneous effect of access to microcredits. Existing business owners were found to invest more in durable goods, while their nondurable consumption did not change. Households with a high propensity to start a new business increased their durable goods spending and decreased nondurable consumption, given the need to pay a fixed cost as a business start-up. Households with a low propensity to become business owners increased their nondurable spending. The study indicates a positive and significant effect of microfinance economy-wide, including both program participants and non-participants.

The theoretical models and experimental studies to date indicate a significant effect of microfinance at the aggregate level. The effect, however, is expected to differ in short- and long-run contexts. We therefore empirically estimate the economy-wide effect of microfinance on the whole sample of countries, thus capturing regions that are heterogeneous in microfinance evolution and socio-economic development.

## 2.2. Macroeconomic Determinants of Microfinance Performance

Analysis of macroeconomic factors determining the uneven distribution of MFIs and the impact of country-level aggregates is an emerging trend in the literature.

**Macro economy:** The most relevant study to date is by Ahlin et al. (2011), and is based on data from 373 MFIs, determining their success based on macroeconomic and macro-institutional features. Evidence is found of complementarity between MFI performance and broader economy. MFIs are more likely to cover costs when economic growth is stronger. Not only the level of growth, but its composition also matters: microfinance loans grow faster where the share of the manufacturing sector is high, foreign direct investment is large, and labor force participation is extensive (Ahlin et al. 2011; Leegwater & Shaw, 2008). In contrast, a rivalry or substitutability is also observed. In particular, higher workforce participation is associated with slower growth in MFI outreach. Performing a cross-country analysis for 115 countries, Vanroose (2008) finds that the microfinance sector is more present in the richer countries of the developing world. MFIs are also found to have better outreach in countries that receive more donor aid and where population density is high. Based on stylized facts, Armendáriz & Vanroose (2009) find that, contrary to the original poverty eradication mission of microfinance, the outreach of MFIs is more developed in regions that are relatively less poor such as Latin America and in fast-growing South Asian countries.

**Financial sector development:** The maturity of the financial sector is an important determinant of MFI performance. Hermes et al. (2009) investigate the direction of causality between a country's financial development and the efficiency of MFIs through cost reduction. Using data on 435 MFIs for 1997–2007, the authors find that a stronger financial environment tends to generate more efficient MFIs, as intense banking competition provides incentives for MFIs to improve their operational efficiencies. Ahlin et al. (2011) find that greater financial depth is strongly associated with lower default and operating costs of MFIs, thus benefiting micro-borrowers in the end. Hermes & Meesters (2011) find a clear and robust association of MFI cost efficiency with economic growth and financial sector development.

The market failure hypothesis suggests that microfinance is normally a good complement to mainstream banking, as it fills the gaps where standard banking services are not used. Therefore, the rapid growth of the microfinance sector may signal weaknesses in the formal banking sector. In such cases, MFIs tend to be used as a substitute for conventional banks. Empirically investigating this claim, Cull et al. (2009) find positive and robust evidence of competition from formal banks pushing micro-banks. The intensity of the competition is associated with micro-banks serving poorer markets and more women. Using data on 1,073 MFIs for 1997-2006, Vanroose & D'Espallier (2009) empirically test the market failure hypothesis and find that MFIs reach more clients and are more profitable where access to

the formal financial system is low. In line with the hypothesis, MFIs are found to respond to needs that banks do not fulfill and to flourish where the formal banking sector fails. In addition, Vanroose & D'Espallier (2013) find that MFIs are less profitable when interest rates and inflation are high, which indicates their dependency on banking systems for external financing and the stability of formal financial system.

**Formal institutions and their quality:** The institutional environment and its quality is an important determinant of a business and microfinance development. Hermes and Meesters (2011) define the following measures of institutional environment as relevant to microfinance: rule of law, establishment of property rights, regulatory quality, government effectiveness and control of corruption and political stability (based on methodology and data collected by Kaufmann, Kray, Mastruzzi (2008)). Ahlin et al. (2011) also include a set of "ease of doing business" indicators based on the World Doing Business survey dataset. The influence of the institutional environment on microfinance operations can go in both directions. On one side, an environment with well-developed institutions and controlled corruption is favorable for business activity and hence ensures sufficient demand for microfinance products. On the other side, a strong environment reflected by effective government implies a significant number of regulations imposed on business owners, which in turn translates into an increase in their cost of operations. Due to this, there may be less demand for MFIs in a well-developed and controlled environment. Empirical evidence suggests a mostly negative relationship, meaning that better institutions increase transaction costs for business owners, which in turn translates into higher cost for MFI operations (Crabb, 2007; Hermes & Meesters, 2011; Ahlin et al. 2011).

**Age of microfinance and industrialization stage:** Based on their analysis of stylized facts and empirical findings, Armendáriz & Vanroose (2009) claim that the age of microfinance, as proxied by the number of years since the sector was introduced, is an important determinant when trying to explain the scale, scope and rapid growth of microfinance activity. They claim that there is a potential country-wide learning curve which could explain the growth of the microfinance sector. This argument is in line with the different recognized stages of microfinance industrialization, which consist of evolution, expansion and then consolidation of MFIs. Complete industrialization of microfinance is a long process and requires substantial public reforms, enormous subsidies, and deep transformations in government decision-making. It also requires an acceptance of microfinance as a separate segment, which is in contrast to the concept of heavily subsidized lending or extensive reliability on donor funds (Morduch, 1999; Hulme & Moore, 2005). Pioneering countries in microfinance such as Bangladesh, Bolivia, India and Indonesia have passed through long decades of such deep transformations. Grameen models originated in these countries have been frequently replicated in both developed and developing parts of the world as successful models of microlending (Hulme & Moore, 2005; Martowijoyo, 2007). In support

of this argument, Bateman (2010) claims that the financial systems of many developing countries are significantly restructured towards microfinance, through progressive lending to the SME sector. There is, however, either little or no evidence of the performance of this microfinance-dominated financial sector nor, more importantly, on its impact on growth and sustainable development. The limited case studies so far suggest that the presence of a “microfinance saturated”<sup>7</sup> segment within a domestic financial system has been quite destructive for sustainable development and poverty reduction objectives, given the displacement effects and negative spillover effects to other productive sectors (Bateman, 2010).

Drawing the bottom line, existing empirical findings and stylized facts suggest that the external environment is an important factor in explaining the performance of microfinance institutions. Most studies, however, focus on the role of the external environment on microfinance performance. Conversely, in this chapter we aim to find the reverse effect - the impact of microfinance itself on a broad economy. Most related studies merely represent a correlation analysis or set of qualitative studies. The causal inference at aggregate country level remains unstudied. We therefore aim to draw a Granger-type causal link from microfinance on principle macroeconomic fundamentals, such as economic growth, financial deepening and inequality, which are also linked to the original mission of microfinance. Moreover, the myriad of macro-institutional determinants, coupled with various industrialization stages of the microfinance segment, suggest that countries are heterogeneous based on multidimensional characteristics. We therefore group countries into clusters based on identified macro-institutional determinants and try to capture unobserved heterogeneity. We also consider a dynamic setting as opposed to cross-country analysis, which enables us to trace the evolution of the impact of microfinance over time.

### **3. Methodology**

#### **3.1. Linking Economic Fundamentals and the Extent of Microfinance Development VAR Model using Dynamic Panel Data**

The primary objective is to estimate the causal link running from microfinance to macroeconomic fundamentals and reversely. Therefore, we estimate the following four vector autoregressive model (VARs) in the following dynamic panel data settings.

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<sup>7</sup> According to Bateman (2010) these markets include Bangladesh, the most famous example of a financial system structured around microfinance. In this group are also Bolivia, Mexico, Cambodia, Uganda, Mongolia, Bosnia, Peru, Nicaragua, and India.

$$GDP_{it} = \sum_{j=1}^{p1} \alpha_{1j} GDP_{i,t-j} + \sum_{j=1}^{p2} \alpha_{2j} BMoney_{i,t-j} + \sum_{j=1}^{p3} \alpha_{3j} Microfin_{i,t-j} + \epsilon_{1,it} \quad (1)$$

$$BMoney_{it} = \sum_{j=1}^{q1} \beta_{1j} BMoney_{i,t-j} + \sum_{j=1}^{q2} \beta_{2j} GDP_{i,t-j} + \sum_{j=1}^{q3} \beta_{3j} Microfin_{i,t-j} + \epsilon_{2,it} \quad (2)$$

$$Microfin_{it} = \sum_{j=1}^{r1} \gamma_{1j} GDP_{i,t-j} + \sum_{j=1}^{r2} \gamma_{2j} BMoney_{i,t-j} + \sum_{j=1}^{r3} \gamma_{3j} Microfin_{i,t-j} + \epsilon_{3,it} \quad (3)$$

$$Gini_{it} = \sum_{j=1}^{s1} \delta_{1j} Gini_{i,t-j} + \sum_{j=1}^{s2} \delta_{2j} GDP_{i,t-j} + \sum_{j=1}^{s3} \delta_{3j} Microfin_{i,t-j} + \epsilon_{4,it} \quad (4)$$

where  $i = \{1, \dots, N\}$ ,  $t = \{1, \dots, T_i\}$ , and  $\epsilon_{it}$  are i.i.d.

Equations (1) and (2) specify the dynamic effects of microfinance on real economy growth and the development of the financial sector respectively. Equation (3) describes the reverse effect of these two key macroeconomic fundamentals on the microfinance itself. Finally, equation (4) is used here to study a link from microfinance at a country level.

We will discuss definitions of variables in more detail in Section 4 (Data), but let us note here that we will measure economic growth [*GDP*] by the real GDP per capita<sup>8</sup> and financial sector development by real the real broad money per capita [*broad money*]. Though broad money is partly a decision making choice of Central Banks in domestic economies, we nevertheless use this indicator to capture the financial sector development. This is based on earlier findings of Rousseau and Wachtel (2000). Broad money (M3), as opposed to ratio of private credit to GDP, is a comprehensive measure of financial depth and includes currency, demand deposits, all time deposits, and the liabilities of money market mutual funds. Further, *Microfinance* will be captured by either the percentage of microfinance borrowers (in relation to total population) or by the gross loan portfolio of MFIs scaled by the real GDP.

To find evidence of a link from microfinance to economic growth (1) we test the null hypothesis  $H_0: \alpha_{3j} = 0$ , jointly for  $j=1, \dots, p_3$ . Similarly, to study the effect of microfinance on financial sector development (2), we test the null hypothesis  $H_0: \beta_{3j} = 0$ , jointly for  $j=1, \dots, q_3$ . Reverse effects, i.e. a link from macroeconomic fundamentals to microfinance (3) can be studied and tested via coefficients  $\gamma_{1j}$  and  $\gamma_{2j}$ , respectively. Finally, the effect of microfinance development on income inequality (4) can be tested by the null hypothesis  $H_0: \delta_{3j} = 0$ , jointly for  $j=1, \dots, s_3$ .

<sup>8</sup> We employ GDP per capita in levels and not in growth rates for consistency measures with other equations and the methodology employed.

In a dynamic model such as this, with fixed effects, classical estimation techniques yield biased (inconsistent) estimates. The magnitude of bias can be quite large for short time series with strong dynamic effects (Nickel, 1981). In order to obtain consistent estimates, we employ a dynamic panel-data model following Arellano and Bond (1991), Arellano and Bover (1995), Blundell and Bond (1998), and Blundell, Bond, and Windmeijer (2000).<sup>9</sup> Therefore, to find the existence of a link from microfinance and estimate equations (1)-(4) we use the Arellano-Bover/Blundell-Bond system estimator with two lags of dependent variables included as regressors, covariates treated endogenously and a robust variance-covariance matrix. This is a linear dynamic panel-data estimation implemented through “xtdpd” command in Stata 12.

Tests for validity of instruments used as well as specification-type test for equations (1)-(4) including the lengths of lags  $p$ ,  $q$ ,  $r$  or  $s$  will be conducted using the Sargan test (Overidentifying restriction test; e.g., Sargan, 1958; Hansen, 1982).<sup>10</sup> Estimation results revealed that, at most, the second lag was significant. Therefore, we present estimation results for all equations for two lags.

### 3.2. Unobserved heterogeneity and clustering

Given that the objective is to examine the size and direction of the dynamic relationship between microfinance and macro fundamentals, we employ panel data vector autoregressions as mentioned in the previous subsection. This focus on the nature of transition paths is more advantageous than a cross-section approach as it is more informative of identification of the causal link running from microfinance (Rousseau & Wachtel, 2000). Despite this fact, application of the panel data implies potential bias driven by parameter heterogeneity (Hsiao, 1986). As a result, there is a high probability of the Sargan test rejecting the null hypothesis and finding appropriate instruments. In addition, countries differ not only by income level; many other macroeconomic and institutional characteristics define the external environment. Therefore, we group the countries in homogeneous clusters based on similar macro-institutional determinants. This grouping enables us to address unobserved heterogeneity in a dynamic panel and capture multidimensional external environments for microfinance. To identify the variables for clustering, we benefit from the established empirical findings of Ahlin et al. (2011),

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<sup>9</sup> Arellano and Bond (1991) proposed a linear instrumental variables technique that uses the predetermined lags of the system variables as instruments to exploit a large set of overidentifying restrictions and deliver consistent coefficient estimates. Blundell and Bond (1998) show that the lagged-level instruments in the Arellano-Bond estimator become weak as the autoregressive process becomes too persistent. Building on the work of Arellano and Bover (1995), Blundell and Bond (1998) proposed a system estimator that uses moment conditions in which lagged differences are used as instruments for the level equation, in addition to the moment conditions of lagged levels as instruments for the differenced equation.

<sup>10</sup> The null hypothesis in this case is that instruments used in equations (1)-(4) are exogenous. The Sargan test is therefore a test for overidentified restrictions.

Vanroose (2007; 2008), Hermes & Meesters (2011), Vanroose & D'Espallier (2013). We select the following seven indicators for clustering:

**[1] Macroeconomic growth** [captured by real GDP per capita]. Overall economic growth in countries is a strong predictor of microfinance performance, suggesting complementarity between the two. MFIs are found to cover costs better when macroeconomic growth is higher, due in large part to lower default rates and operating costs (Ahlin et al.2011).

**[2] Financial depth** [captured by domestic credit to the private sector, as a percent of GDP]. The microfinance sector is part of the broader financial system and, therefore, overall development of the financial sector is a significant determinant. In addition, financial depth is also strongly associated with lower default and operating costs of microfinance institutions. This in turn translates into lower interest rates rather than into greater MFI self-sufficiency. Ahlin et al.(2011) claim that this suggests that (potential) financial market competition is good for micro-borrowers, if not MFIs. MFIs are found to reach more clients and are more profitable where access to formal financial systems is low (Vanroose & D'Espallier, 2013).

**[3] Foreign Direct Investment** [captured by FDI, net inflows, as a percent of GDP]: the overall business environment is a strong predictor of the competitive climate in which MFIs operate. As such, inflow of foreign direct investment reflects the business climate and the competitiveness of the local economy. In addition, Ahlin et al. (2011) find that microfinance loans grow faster where there is more FDI. Vanroose & D'Espallier (2013) find that more FDI is associated with higher microfinance outreach and profitability. This in turn implies that more open countries develop larger microfinance markets.

**[4] Industry share** [captured by industry value added, as a percent of GDP]: certain macroeconomic determinants are substitutes or rivals for microfinance. As such, Ahlin et al. (2011) find that the industry share of GDP is a negative predictor of extensive growth of MFIs captured by number of borrowers.

**[5] Inequality** [captured by the Gini coefficient]: the original mission of microfinance is to reduce poverty and income inequality. Empirical evidence of the relation of poverty and microfinance is supported by Ahlin et al. (2011). In particular, higher inequality is found to be associated with much higher default and operating costs, higher interest rates, and lower MFI sustainability.

**[6] Level of corruption** [captured by control of corruption index]: the level of control over corruption is one of the important institutional variables that determine the socio-economic development of a country. In terms of microfinance, Ahlin et al. (2011) find that MFIs grow their clientele more slowly where there is more corruption. Vanroose and D'Espallier (2013) find that countries with less corruption have higher microfinance outreach and higher profitability.

**[7] Stability** [captured by estimates of political stability and the absence of violence/terrorism]: some microfinance programs appear in post-conflict environments and in the course of peace keeping missions. Therefore, political stability and an absence of violence is an important institutional determinant (Hermes & Meesters, 2011; Vanroose, 2008). Microfinance institutions often serve more clients living in economically unstable environments, which is an indicator of the difference between MFIs and formal financial institutions (Vanroose, 2007). Ahlin et al. (2011) find that in countries in which citizens have a stronger political voice and politicians are held accountable, the costs of microlending are higher, given that MFIs have better responsiveness and transparency.

We divide all countries in the sample into more homogeneous groups with respect to their economic development and quality of institutions using clustering around the mean values of [1]-[7] identified variables. In particular, we employ *kmeans* command in Stata 12. Since the results of clustering serve as a basis for further estimation, they will be presented early in Section 5 (results). The number of clusters may range from three to more. In our setting, we identify three main broad clusters that distinguish the external environment of microfinance: rich, stable, controlled corruption defined as “rich” (cluster 1), developing or moderate (cluster 2), and underdeveloped, unstable environment and with high corruption entitled “poor” (cluster 3).

To visualize the effect of microfinance on macroeconomic fundamentals, we complement our empirical analysis by plotting impulse response functions to identify the transmission of the shock coming from microfinance. The impulse response functions represent the following autoregressive AR(p) process:

$$y_{it} = \mu + \alpha_1 y_{i,t-1} + \dots + \alpha_p y_{i,t-p} + \varepsilon_t \quad (5)$$

Consider  $y_t = [y_{1t}, y_{2t}, \dots, y_{kt}]$  and application of the same model will result in the following vector autoregression model (VAR), where instead of coefficients, we have matrices of coefficients:

$$y_t = m + A_1 y_{t-1} + \dots + A_p y_{t-p} + \varepsilon_t \quad (6)$$

Therefore, we estimate the VARs by clusters for the three main dynamic equations: growth, broad money, and microfinance, and we will use their interactions in the impulse response function.

## 4. Data, Descriptive Statistics and Data Cleaning

### 4.1 Data sources

**Microfinance data:** was downloaded from Microfinance Information eXchange (as of September 2012). This is a global microfinance platform and captures 1292 MFIs, in 101 countries for 1995-2011. We use two main indicators to capture microfinance: [i] gross loan portfolio of MFIs scaled by real GDP in USD to unify the currency and [ii] number of borrowers scaled by country population. We also collect institutional determinants of MFIs including age, legal, regulatory and profit status, share of microfinance operations, and data quality captured in diamonds<sup>11</sup>.

**Macroeconomic data:** [i] Economic growth is captured by real GDP per capita, PPP in constant 2005 international USD, and was retrieved from the World Development Indicators (September 2012 release). [ii] Financial sector development is proxied by broad money in constant USD, retrieved from World Development Indicators (September 2012 release). [iv] Income inequality measures is based on the Gini coefficient. We use the UN World Income Inequality Database and World Development Indicators (September 2012 release) to create the balanced coefficient for the entire sample. Further, we employ a linear interpolation of the Gini coefficient within the sample to ensure a sufficient number of observations. Even though there are direct measures of poverty (i.e. poverty gap at the national poverty line (%)), we employ the Gini coefficient, given its sample representation and coverage of data across all countries. Data on direct measures of poverty available at the World Bank World Development Indicators is rather scant and does not allow panel data estimation, which is essential for our research question.

**Institutional data:** [i] Foreign Direct Investment is captured by FDI, net inflows, as a percent of GDP is based on World Development Indicators (September 2012 release). [ii] Industry share is captured by industry value added, as a percent of GDP is based on World Development Indicators (September 2012 release). [iii] Levels of corruption are captured by control of corruption index (-2.5 to 2.5) from World Governance Indicators. [iv] Stability is captured by an estimate of political stability and absence of violence/terrorism (-2.5 to 2.5) from World Governance Indicators. Summary statistics of these variables are presented in Table 1.

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<sup>11</sup> In this version of the chapter we do not distinguish between MFI institutional and legal status. Respective sensitivity analysis could be performed further, which remains as a focus for further research.

**Table 1. Summary statistics of the variables**

Category:	Name:	Description:	Countries/ Year (2009) obs:	No. of obs.	Mean	Std. dev.	Min	Max
Microfinance	Portfolio	Loan portfolio/real GDP in USD	96	1091	7.8	15.6	0.0	147.5
	Borrowers	Percent, number of borrowers/population*100 people	96	1091	1.26	2.26	0.0	16.18
Macroeconomic	Economic growth	Real GDP per capita in constant prices	95	1069	4331	3891	248	24080
	Poverty	Gini coefficient	38	781	43.0	8.7	22.3	67.4
	Financial development	Broad money per capita, real USD	90	1043	2277	3236	12.0	29763
Institutional	FDI	Foreign direct investment, net inflows (% of GDP)	96	1070	4.1	5.2	-14.4	46.8
	Industry share	Industry, value added (% of GDP)	84	1009	29.8	10.6	10.8	77.4
	Lack of corruption	Control of corruption index (-2.5 to 2.5)	91	800	-0.6	0.5	-1.8	1.6
	Stability	Political Stability and Absence of Violence/Terrorism: Estimate (-2.5 to 2.5)	91	802	-0.6	0.8	-3.1	1.1

Source: authors' computation

## 4.2 Data cleaning

To ensure the homogeneity of the sample and to minimize the impact of outliers, we perform two types of data cleaning. First, we drop observations where the percentage of microfinance borrowers is lower than 0.05% of the whole population in an economy. This ensures that there is a certain “critical mass” of microfinance borrowers in an economy, which is also justified by the self-reported nature of MFIs into the MIX database. Second, acknowledging the multi-dimensional nature of clusters, we performed a procedure to identify outliers in multivariate data. The procedure is based on identification of multiple outliers in multivariate data, using the blocked adaptive computationally efficient outlier nominators algorithm proposed by Billor, Hadi, Velleman (2000).<sup>12</sup> We performed identification of the outliers based on 5-15% trimming. Different trimming levels can serve as a sensitivity analysis and also improve the power of the underlying Sargan test.

<sup>12</sup> The algorithm is implemented in Stata 12 as a procedure BACON (Stata Journal, 2010). The procedure typically creates a new variable equal to 1 if an observation is an outlier and equal to 0 otherwise. As a parameter  $p$  we set a maximum percentage of outliers to be potentially identified. As shown in the Stata Journal (2010), the BACON procedure is scale-invariant, which is a necessity when dealing with variables of different magnitudes or with different units.

## 5. Results, Discussion and Implications

### 5.1. Cluster analysis

Based on the methodology of clusters presented in section 3.2., we provide descriptive statistics (Table 2). Countries grouped in stable environments (cluster 1) are characterized by having USD 10,941 real GDP per capita. In comparison, in “moderate” countries (cluster 2), mean GDP is USD 5,422 while in “poor” (cluster 3) countries - it is USD 1,722. Clusters differ substantially in terms of the stability of environment and control of corruption. Table 3 summarizes the difference across clusters in terms of macro-institutional factors and their interpretation.

**Table 2. Summary statistics of clusters**

		Real GDP	Stability	Control of corruption	Gini	Private Credit	FDI	Industry share
<b>Cluster 1 Stable</b>	no. of obs.	14	14	14	14	14	14	14
	min	8373	-1.11	-0.97	27	15	1.31	17
	mean	10941	0.02	0.02	45	45	4.37	31
	max	15122	0.89	1.39	61	135	10.57	50
<b>Cluster 2 Moderate</b>	no. of obs.	22	22	22	22	22	22	22
	min	3784	-1.75	-1.21	30	9	1.51	19
	mean	5422	-0.43	-0.49	44	40	3.95	33
	max	7744	0.54	0.30	67	114	12.2	53
<b>Cluster 3 Poor</b>	no. of obs.	48	48	48	48	48	48	48
	min	414	-2.51	-1.62	28	3	0.13	12
	mean	1722	-0.83	-0.75	41	17	3.29	28
	max	3534	0.62	-0.04	58	59	11.86	75
<b>Total</b>	no. of obs.	84	84	84	84	84	84	84
	min	414	-2.51	-1.62	27	3	0.13	12
	mean	4228	-0.58	-0.55	42	28	3.65	30
	max	15122	0.89	1.39	67	135	12.21	75

Source: authors' computation

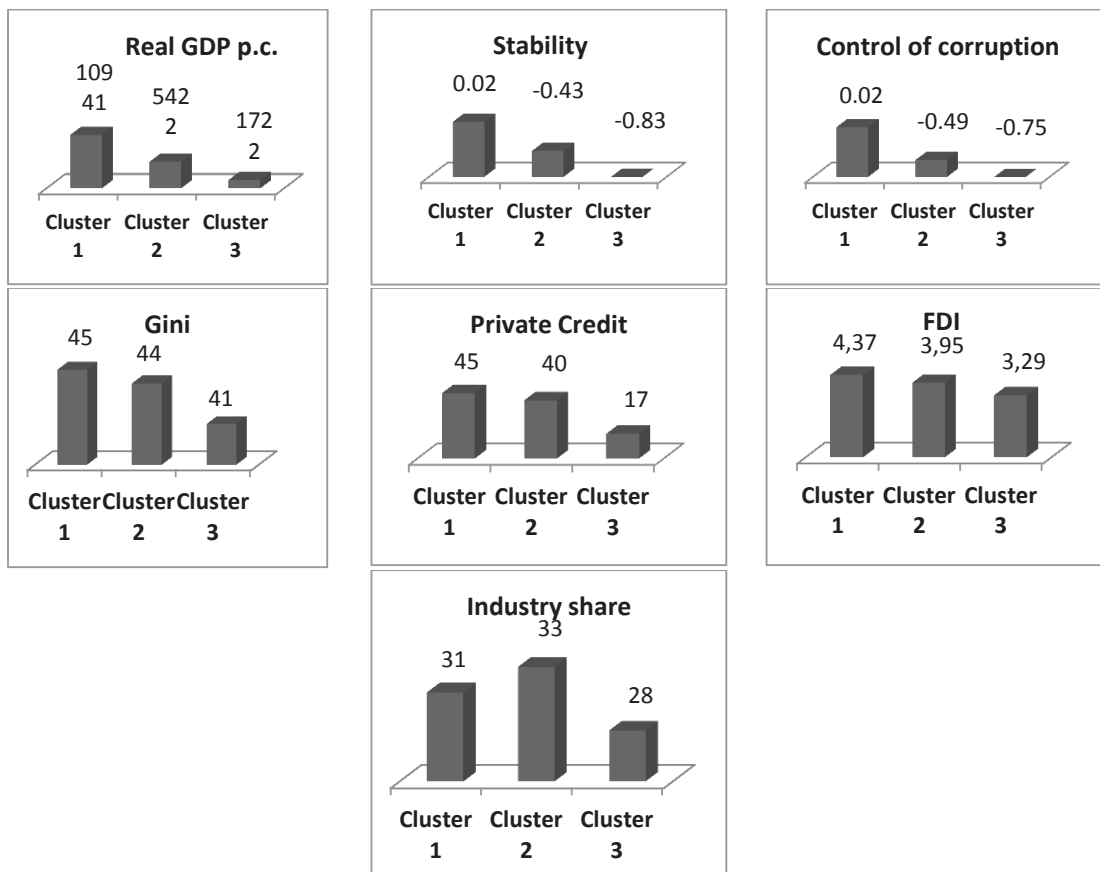
**Table 3. Interpretation of clusters**

	<b>Cluster 1 - Stable</b>	<b>Cluster 2 - Moderate</b>	<b>Cluster 3 - Poor</b>
Real GDP	rich	developing (less rich)	poor
Stability	stable	moderately stable	unstable
Control of corruption	controlled	less controlled	uncontrolled
Inequality	greater inequality	greater inequality	moderate inequality
Private Credit	banking is developed	banking is less developed	banking is underdeveloped
FDI	developed business environment/ country openness	less developed business environment/ country openness	underdeveloped business environment/ country openness
Industry share	industrialized	most industrialized	less industrialized

Source: authors' computation

We also visualize clusters by plotting the mean value of macro-institutional determinants (Figure 1). As can be seen, for each individual variable there is a clear separation by three clusters. This in fact ensures that countries in the sample are grouped appropriately and clusters are homogenous, which ensures the validity of methodology and clear identification of a link to microfinance.

**Figure 1. Comparison of clusters, mean values**



We also characterize the clusters in terms of geographical coverage (Table 4) and income group (Table 5). As can be seen, most countries in a stable environment are in East Asia and the Pacific and South Asia regions. In contrast, Cluster 2 (moderate) includes mostly the emerging economies of Europe and Central Asia, and Latin American countries.

**Table 4. Clusters by geographical regions**

	Cluster 1 - Stable	Cluster 2 - Moderate	Cluster 3 - Poor	Total:
Other		22 (1)		22 (1)
East Asia and the Pacific	51 (4)	3 (1)	46 (4)	100 (9)
Europe & Central Asia	30 (1)	56 (5)	65 (6)	151 (12)
Latin America & the Caribbean	14 (1)	97 (9)	107 (8)	218 (18)
Middle East & North Africa	8 (1)		66 (6)	74 (7)
South Asia	65 (5)		9 (1)	74 (6)
Sub-Saharan Africa	281 (25)	16 (2)	33 (3)	330 (30)
Total:	449 (37)	194 (18)	326 (28)	969 (83)

Source: authors' computation

Notes: The table reports the total number of observations per country and year and total number of countries in 2009 (in parentheses).

**Table 5. Clusters by income groups**

	Cluster 1 - Stable	Cluster 2 - Moderate	Cluster 3 - Poor	Total:
High income: OECD		15 (2)		15
High income: non-OECD		7 (1)		7 (1)
Low income	276 (22)			276 (22)
Lower middle income	173 (15)		207 (18)	380 (33)
Upper middle income		172 (17)	119 (10)	291 (27)
Total:	449 (37)	194 (18)	326 (28)	969 (83)

Source: authors' computation

Notes: The table reports the total number of observations per country and year and total number of countries in 2009 (in parentheses).

As can be seen from the descriptive analysis, there is clear and definite identification of clusters, which ensures they are homogenous and correctly grouped. The latter is important for econometric identification and further panel data estimation.

## 5.2. Dynamic panel estimation of the VAR components

We present estimation results of panel VARs based on (1) – (4) equations: growth, broad money, microfinance and inequality. We provide both extended version of results reporting coefficients for all lags, as well as equilibrium conditions in two versions: the sum of all coefficients and sums of only significant coefficients (available in the Appendix).

Given that the whole sample combines various countries with different levels of macro-institutional development, there is a potential significant unobserved heterogeneity (Table 6a). This is particularly observed in the example of growth equation as instruments are weak. Therefore, we control unobserved heterogeneity by grouping the countries into the clusters described in the previous section

## 5.2.1. Economic growth

Table 6a. Growth equation (levels), full specification

	Whole sample		Cluster 1 - Stable		Cluster 2 - Moderate		Cluster 3 - Poor	
	MF borrowers	MF portfolio	MF borrowers	MF portfolio	MF borrowers	MF portfolio	MF borrowers	MF portfolio
GDP p.c. -1	-0.447*** (0.151)	0.057 (0.146)	-0.787** (0.377)	-0.038 (0.286)	0.562 (0.373)	0.671*** (0.172)	0.426** (0.183)	-0.313 (0.239)
GDP p.c. -2		0.492*** (0.128)			-0.918** (0.439)	-0.010 (0.186)		
Microfinance -1	<b>365***</b> (74.0)	<b>56.6***</b> (11.4)	<b>826***</b> (280)	<b>-1.8</b> (4.022)	<b>67.5</b> (125)	<b>35.6***</b> (8.885)	<b>-80.4*</b> (45.7)	<b>268***</b> (67.5)
Microfinance -2		<b>-10.8</b> (11.6)		<b>11.3*</b> (6.326)	<b>241</b> (151)		<b>146.6**</b> (59.3)	
BMoney p.c. -1	0.937*** (0.136)	0.740*** (0.127)	1.102*** (0.374)	1.027*** (0.314)	0.925*** (0.286)	0.459** (0.205)	0.432* (0.225)	0.688*** (0.233)
BMoney p.c. -2		-0.807*** (0.122)		-0.329 (0.341)	0.001 (0.341)	-0.608*** (0.207)	-0.046 (0.229)	
Constant	3593*** (351)	1480*** (263)	11745*** (2071)	982*** (267)	3795*** (1230)	1645*** (301)	560*** (159)	9217*** (1369)
No of obs.	709	604	104	246	210	210	246	96
Sargan test, value	86.6	36.8	15.4	9.6	16.5	25.7	17.6	25.4
Sargan test, p-value	0.000	0.024	0.162	0.380	0.056	0.262	0.610	0.185

Notes: The table reports estimation results from the Arellano-Bover/Blundell-Bond system estimator with two lags of dependent variables included as regressors, endogenous covariates and a robust variance-covariance matrix based on equation (1) The dependent variable is real GDP per capita in constant prices. Data was cleaned, limiting microfinance borrowers at a minimum of 0.05% and using the identification procedure for outliers (BACON) with maximum trimming less than 15%. \*, \*\*, and \*\*\* denotes 10%, 5% and 1% significance levels, respectively.

At first glance, there is evidence of a link running between microfinance and economic growth. The effect is more pronounced through extensive margin [borrowers] compared to intensive margin [portfolio]. A 1% increase in the share of MF borrowers in the country leads to a USD 365 increase in real GDP per capita, which is equivalent to 8.4% of mean GDP per capita of whole sample (Table 6a). The effect clearly differs across clusters. In relative terms, an increase in the percent of microfinance borrowers leads to an increase of mean GDP per capita for each cluster: USD 826 or 7.5% of cluster mean GDP in cluster 1 [rich-stable-controlled corruption] and USD 66.2<sup>13</sup> or 3.8% of cluster mean GDP in cluster 3 [poor-unstable-corrupt]. The effect is insignificant in cluster 2. The microfinance effect measured in terms of loan portfolio is relatively modest: USD 56.6 or 0.5% of cluster mean GDP in cluster 1, USD 11.3 or 0.2% of cluster mean GDP for cluster 2 and USD 268 or 15.6% of cluster mean GDP for cluster 3 (Table 6b).

The effect of microfinance is therefore stronger when measured in terms of loan portfolio, in developing and more stable environments: cluster 1 and cluster 2. The result is consistent with Vanroose (2008) and Armendáriz & Vanroose's (2009) stylized facts that microfinance is more

<sup>13</sup> Based on sum of both lags.

developed in regions that are not less relatively poor, such as Latin America and fast-growth South Asia countries. In fact, cluster 1 and cluster 2 in our sample include countries from these regions such as Argentina, Brazil, Peru, Chile, Bolivia, Colombia and Venezuela (Table 10 in Appendix).

The dynamics of microfinance transfer also differs across clusters. As poorer and more corrupt environments [cluster 3], where microfinance was originally born and where the demand for it is stronger, its impact is transferred through the second lag. In countries with more stable and developed institutions, the effect dies out, as the transfer occurs in the first lag [cluster 1 and 2].

**Table 6b. Growth equation, equilibrium conditions based on sum of all coefficients**

	Whole sample		Cluster 1 - Stable		Cluster 2 - Moderate		Cluster 3 - Poor	
	MF borrowers	MF portfolio	MF borrowers	MF portfolio	MF borrowers	MF portfolio	MF borrowers	MF portfolio
<b>GDP p.c.</b>	-0.447*** (0.151)	0.548*** (0.128)	-0.787** (0.377)	-0.038 (0.286)	-0.356 (0.381)	0.661*** (0.168)	0.426*** (0.183)	-0.313 (0.239)
<b>Microfinance</b>	365*** (74.0)	45.8*** (9.88)	826*** (280)	9.47** (3.73)	309* (162)	35.6*** (8.88)	66.2** (27.7)	268*** (67.5)
<b>BMoney p.c.</b>	0.937*** (0.136)	-0.067 (0.160)	1.102*** (0.374)	0.698** (0.238)	0.92** (0.422)	-0.148 (0.297)	0.386* (0.199)	0.688*** (0.233)
<i>No. of obs.</i>	709	604	104	246	210	210	246	96

*Notes:* The table reports estimation results from the Arellano-Bover/Blundell-Bond system estimator with two lags of dependent variable included as regressors, endogenous covariates and a robust variance-covariance matrix. The dependent variable is real GDP per capita in constant prices. Coefficients represent equilibrium moments. In the case of two lags, corresponding standard errors were computed from the variance-covariance matrix using Stata procedure LINCOM. %, \*, \*\*, and \*\*\* denotes 10%, 5% and 1% significance levels, respectively.

We also estimate the impact of microfinance on economic growth measured by the growth rate of real GDP per capita (Table 6aa and Table 6bb). This is in line with common growth-and-finance literature (i.e. King and Levine, 2993), where the growth rate of GDP is used to estimate the link between finance (microfinance) and economic growth.

As can be seen from an overall comparison of Table 6a and Table 6aa the impact of microfinance on economic growth when measured by growth rates remained the same. In particular, the sign of the coefficient is the same when in levels and growth rates, although the magnitude of coefficients has decreased when measured in growth rates.

There are, however, slight changes in the impact across clusters. In the group of rich and developed countries (Cluster 1), the impact of microfinance on the economic growth rate is found to be positive (0.031) when measured in growth rates, whereas it was negative when measured in levels (-1.8) in first lag (Table 6aa). However, the equilibrium conditions reveal an overall positive and significant impact of microfinance on the growth rate of GDP (Table 6bb).

**Table 6aa. Growth equation (growth rates), full specification**

	Whole sample		Cluster 1 - Stable		Cluster 2 - Moderate		Cluster 3 - Poor	
	MF borrowers	MF portfolio	MF borrowers	MF portfolio	MF borrowers	MF portfolio	MF borrowers	MF portfolio
GDP growth rate -1	-0.301*** (0.179)	-0.638*** (0.237)	-0.413** (0.199)	-0.387* (0.259)	-0.413** (0.237)	-0.438** (0.253)	0.755** (0.221)	-0.387* (0.259)
GDP growth rate -2	-0.172** (0.108)	-0.237* (0.322)				0.097 (0.198)		
Microfinance -1	-0.006 (0.010)	0.002** (0.004)	0.038** (0.018)	0.031*** (0.016)	0.038** (0.015)	0.002*** (0.002)	-0.087*** (0.014)	0.031*** (0.016)
Microfinance -2	0.012 (0.010)	-0.002	-0.014 (0.022)		-0.014 (0.050)			
BMoney p.c. -1	0.000*** (0.000)	0.000*** (0.000)	-0.000 (0.000)	0.000 (0.000)	-0.000 (0.000)	0.000 (0.000)	0.000** (0.000)	0.000 (0.000)
BMoney p.c. -2	-0.000*** (0.000)	-0.000*** (0.000)	-0.000 (0.000)		-0.000 (0.000)	-0.000 (0.000)		-0.000*** (0.000)
Constant	0.116*** (0.021)	0.151*** (0.036)	0.064*** (0.020)	0.285*** (0.081)	0.064*** (0.027)	0.055** (0.033)	-0.337** (0.103)	0.285*** (0.081)
<i>No of obs.</i>	606	599	241	81	241	254	205	81
<i>Sargan test, value</i>	30.5	27.0	22.7	10.4	22.1	21.7	15.0	0.886
<i>Sargan test, p-value</i>	0.135	0.211	0.333	0.886	0.333	0.355	0.181	0.187

Notes: The table reports estimation results from the Arellano-Bover/Blundell-Bond system estimator with two lags of dependent variables included as regressors, endogenous covariates and a robust variance-covariance matrix based on equation (1) The dependent variable is the growth rate of real GDP per capita in constant prices. Data was cleaned, limiting microfinance borrowers at a minimum 0.05% and using the identification procedure for outliers (BACON) with maximum trimming less than 15%. \*, \*\*, and \*\*\* denotes 10%, 5% and 1% significance levels, respectively.

**Table 6bb. Growth equation, equilibrium conditions based on the sum of all coefficients**

	Whole sample		Cluster 1 - Stable		Cluster 2 - Moderate		Cluster 3 - Poor	
	MF borrowers	MF portfolio	MF borrowers	MF portfolio	MF borrowers	MF portfolio	MF borrowers	MF portfolio
GDP growth rate	-0.301 (0.115)	-0.858*** (0.193)	-0.413** (0.199)	-0.387* (0.259)	-0.413** (0.237)	0.427 (0.985)	0.755** (0.221)	-0.387* (0.259)
Microfinance	0.006 (0.008)	0.002** (0.004)	0.024 (0.015)	0.031*** (0.016)	0.024 (0.015)	0.002*** (0.002)	-0.087*** (0.014)	0.031*** (0.016)
BMoney p.c.	-0.000** (0.000)	-0.000** (0.000)	-0.000 (0.000)	0.000 (0.000)	-0.000 (0.000)	-0.000 (0.000)	0.000** (0.000)	-0.000** (0.000)
<i>No. of obs.</i>	606	599	241	81	241	254	205	81

Notes: The table reports estimation results from the Arellano-Bover/Blundell-Bond system estimator with two lags of dependent variable included as regressors, endogenous covariates and a robust variance-covariance matrix. The dependent variable is the growth rate of real GDP per capita in constant prices. Coefficients represent equilibrium moments. In case of two lags, corresponding standard errors were computed from variance-covariance matrix using Stata procedure LINCOM. %, \*, \*\*, and \*\*\* denotes 10%, 5% and 1% significance levels, respectively.

## 5.2.2. Financial Sector Development

Given the original mission of microfinance to improve access to finance, we estimate the promised impact on financial intermediation captured by broad money circulation in the economy (Table 7a, 7b). Microfinance has a positive and significant effect on broad money, both through extensive [MF

borrowers] and intensive [MF portfolio] margins. A one percent increase in microfinance borrowers in a country leads to a USD 314 increase in broad money per capita, which is equivalent to 13.8% of the mean value for the whole sample. In comparison, a dollar increase in microfinance loan portfolios causes a USD 40 increase in broad money per capita (Table 7b).

**Table 7a. Broad money equation, full specification**

	Whole sample		Cluster 1 - Stable		Cluster 2 - Moderate		Cluster 3 - Poor	
	MF borrowers	MF portfolio	MF borrowers	MF portfolio	MF borrowers	MF portfolio	MF borrowers	MF portfolio
<b>BMoney p.c.</b> <sub>1</sub>	-0.068 (0.136)	0.089 (0.144)	0.558*** (0.092)	-0.291 (0.317)	0.774*** (0.055)	0.359** (0.156)	0.758*** (0.076)	0.462*** (0.120)
<b>BMoney p.c.</b> <sub>2</sub>	-0.631*** (0.139)	-0.661*** (0.134)		-0.235 (0.268)				
<b>Microfinance</b> <sub>1</sub>	<b>137.6*</b> (81.1)	<b>40.0***</b> (8.7)	<b>24.57*</b> (13.6)	<b>-0.26</b> (1.9)	<b>40.9**</b> (18.0)	<b>31.4**</b> (12.3)	<b>31.2</b> (24.4)	<b>271***</b> (87.3)
<b>Microfinance</b> <sub>2</sub>	<b>176.5*</b> (95.8)					<b>-7.2</b> (14.0)		
<b>GDP p.c.</b> <sub>1</sub>	0.705*** (0.197)	0.495*** (0.174)	0.261*** (0.085)	0.474** (0.232)	0.078 (0.055)	0.125 (0.161)	0.116* (0.070)	
<b>GDP p.c.</b> <sub>2</sub>	0.488** (0.225)	0.701*** (0.152)		0.768** (0.340)		0.188 (0.174)		
<b>Constant</b>	-1934*** (452.6)	-2083*** (442.7)	-148** (73.9)	-911*** (291.9)	195 (186.6)	-143 (303.4)	69.1 (242.7)	2402*** (440)
<i>No. of obs.</i>	611	604	291	246	239	210	212	96
<i>Sargan test, value</i>	47.1	44.7	78.3	10.2	87.4	34.5	46.2	20.0
<i>Sargan test, p-value</i>	0.001	0.003	0.184	0.329	0.103	0.043	0.063	0.520

Notes: The table reports estimation results from the Arellano-Bover/Blundell-Bond system estimator with two lags of dependent variable included as regressors, endogenous covariates and a robust variance-covariance matrix based on equation (2). The dependent variable (broad money per capita in real USD) data was cleaned, limiting microfinance borrowers to minimum 0.05% and using the identification procedure for outliers (BACON) with a maximum trimming of less than 15%. \*, \*\*, and \*\*\* denotes 10%, 5% and 1% significance levels, respectively.

Disentangling the impact by clusters, we observe that microfinance outreach is more pronounced in more stable and developed environments, i.e. cluster 1. In relative terms, a one percent increase in microfinance borrowers causes a USD 24.5 [equivalent to 0.9% of cluster mean value] increase in broad money in cluster 1, USD 40.9 [equivalent to 0.8% of cluster mean value] in cluster 2, and USD 31.2 in cluster 3 [equivalent to 6.5% of cluster mean value] (Table 7b). The result is consistent with Ahlin et al's (2011) findings that greater financial depth is strongly associated with lower default and operating costs for MFIs, which ultimately is beneficial for micro-borrowers. The impact of microfinance through the intensive margin [USD 40] is found to be mainly driven by cluster 2 [USD 31.4] and cluster 3 [USD 271], i.e. less developed and weaker environments (Table 7a). This finding is line with the market failure hypothesis and related findings of Vanroose and D'Espallier (2013) that MFIs flourish where the formal financial sector fails.

**Table 7b. Broad money equation, equilibrium conditions based on sum of all coefficients**

	Whole sample		Cluster 1 - Stable		Cluster 2 - Moderate		Cluster 3 - Poor	
	MF borrowers	MF portfolio	MF borrowers	MF portfolio	MF borrowers	MF portfolio	MF borrowers	MF portfolio
<b>BMoney p.c.</b>	-0.698** (0.205)	-0.571** (0.213)	0.558*** (0.092)	-0.526 (0.395)	0.774*** (0.055)	0.359* (0.156)	0.758*** (0.076)	0.462*** (0.120)
<b>Microfinance</b>	314*** (62.2)	40.0*** (8.7)	24.57* (13.6)	-0.26 (1.9)	40.9** (18.0)	24.2** (10.4)	31.2 (24.4)	271*** (87.3)
<b>GDP p.c.</b>	1.19*** (0.204)	1.19*** (0.209)	0.261*** (0.085)	1.24** (0.359)	0.078 (0.055)	0.31** (0.100)	0.116* (0.070)	
<i>No. of obs.</i>	611	604	291	246	239	210	212	96

Notes: The table reports estimation results from the Arellano-Bover/Blundell-Bond system estimator with two lags of dependent variable included as regressors, endogenous covariates and a robust variance-covariance matrix. The dependent variable is broad money per capita in real USD. Coefficients represent equilibrium moments. In the case of two lags, corresponding standard errors were computed from variance-covariance matrix using Stata procedure LINCOM. %, \*, \*\*, and \*\*\* denotes 10%, 5% and 1% significance levels, respectively.

### 5.2.3. Microfinance

Table 8a, 8b and 8c present the estimation result of reverse effect and the impact of macroeconomic fundamentals [GDP, broad money] on microfinance itself. First, the observed significant coefficient of microfinance first lag indicates a potential auto regression or diffusion effect.

**Table 8a. Microfinance equation, full specification**

	Whole sample		Cluster 1 - Stable		Cluster 2 - Moderate		Cluster 3 - Poor	
	MF borrowers	MF portfolio	MF borrowers	MF portfolio	MF borrowers	MF portfolio	MF borrowers	MF portfolio
<b>Microfinance -1</b>	1.211*** (0.220)	1.046*** (0.127)	0.490* (0.255)	0.081 (0.276)	1.740*** (0.388)	1.309*** (0.167)	1.225*** (0.258)	0.350** (0.164)
<b>Microfinance -2</b>				0.461** (0.180)	-0.628* (0.332)		-0.410 (0.270)	
<b>BMoney p.c. -1</b>	-0.002 (0.002)	-0.006 (0.011)	-0.006*** (0.002)	-0.002 (0.002)	0.004* (0.002)	-0.001 (0.008)	-0.001** (0.000)	-0.018 (0.032)
<b>BMoney p.c. -2</b>	-0.008*** (0.002)	-0.040*** (0.009)	0.001 (0.003)			-0.006 (0.006)		-0.093*** (0.036)
<b>GDP p.c. -1</b>	0.002 (0.002)	-0.011 (0.012)	0.005* (0.003)	0.001 (0.002)	-0.003* (0.002)	-0.003 (0.004)	0.001** (0.000)	0.072* (0.041)
<b>GDP p.c. -2</b>	0.006*** (0.002)	0.046*** (0.012)	0.002 (0.002)			0.003 (0.007)		0.042 (0.036)
<b>Constant</b>	-10.8* (5.5)	-50.8 (31.5)	-5.7** (2.3)	-2.3 (10.7)	6.3 (4.7)	13.6 (10.2)	-3.9* (2.2)	-92.7*** (27.4)
<i>No. of obs.</i>	611	604	246	81	210	210	88	246
<i>Sargan test, value</i>	20.0	9.9	20.6	7.1	12.9	6.0	14.7	11.1
<i>Sargan test, p-value</i>	0.029	0.441	0.421	0.621	0.226	0.810	0.677	0.265

Notes: The table reports estimation results from the Arellano-Bover/Blundell-Bond system estimator with two lags of dependent variable included as the regressors, endogenous covariates and a robust variance-covariance matrix based on equation (3) The dependent variable is the number of microfinance borrowers scaled by country population, in '000 people [MF borrowers] and the outstanding gross loan portfolio of microfinance institutions scaled by real GDP in USD [MF portfolio]. Data was cleaned limiting microfinance borrowers at a minimum 0.05% and using the identification procedure for outliers (BACON) with maximum trimming to be less than 15%. \*, \*\*, and \*\*\* denotes 10%, 5% and 1% significance levels, respectively.

The impact of the financial sector development [broad money] is mostly negative, which could be interpreted as indicating that a stronger financial sector has negative effects on microfinance performance, both in terms of depth [MF portfolio] and outreach [MF clients]. The effect becomes smaller when it reaches cluster 3 (Table 8a). The finding is consistent with the initial hypothesis that in more developed and stable environments where formal institutions are strong, there is limited scope for microfinance. The impact of economic growth on microfinance is clearly heterogeneous across clusters. A positive and significant coefficient of GDP per capita implies that stronger economic growth fosters the development of microfinance. The patterns clearly differ across clusters. In cluster 3, the environment is potentially more favourable for microfinance origination and an increase in GDP slightly boosts microfinance [a 0.001% increase in microfinance borrowers] (Table 8b). In cluster 2, with moderate development, where microfinance is expected to reach its peak, more economic development in fact has a negative effect on microfinance outreach [a -0.003% decrease in microfinance borrowers]. Reaching the most developed and stable region captured by cluster 1, the effect increases [0.007%] (Table 8b).

In this regard, we can potentially draw a concave curve of microfinance evolution as a function of a country's macro-institutional economic development. Microfinance is born in mostly weak and unstable environments [cluster 3], reaches its peak in moderately developed economies with high growth potential [cluster 2], and dies out when reaching the richer and more stable environments where formal financial institutions are assumed to be strong and mature [cluster 1].

**Table 8b. Microfinance equation, equilibrium conditions based on sum of all coefficients**

	Whole sample		Cluster 1 - Stable		Cluster 2 - Moderate		Cluster 3 - Poor	
	MF borrowers	MF portfolio	MF borrowers	MF portfolio	MF borrowers	MF portfolio	MF borrowers	MF portfolio
<b>Microfinance</b>	1.211*** (0.220)	1.046*** (0.127)	0.490* (0.255)	0.54** (0.219)	1.11** (0.371)	1.309*** (0.167)	0.815*** (0.149)	0.350** (0.164)
<b>BMoney p.c.</b>	-0.009** (0.002)	-0.046** (0.016)	-0.005** (0.003)	-0.002 (0.002)	0.004* (0.002)	-0.007 (0.009)	-0.001** (0.000)	-0.11*** (0.035)
<b>GDP p.c.</b>	0.007** (0.002)	0.035* (0.015)	0.006* (0.002)	0.001 (0.002)	-0.003* (0.002)	0.000 (0.005)	0.001** (0.000)	0.113*** (0.032)
<i>No. of obs.</i>	611	604	246	81	210	210	88	246

Notes: The table reports estimation results from the Arellano-Bover/Blundell-Bond system estimator with two lags of dependent variable included as regressors, endogenous covariates and a robust variance-covariance matrix. The dependent variable is the number of microfinance borrowers scaled by country population, in '000 people [MF borrowers] and the outstanding gross loan portfolio of microfinance institutions scaled by real GDP in USD [MF portfolio]. Coefficients represent equilibrium moments. In the case of two lags, corresponding standard errors were computed from variance-covariance matrix using Stata procedure LINCOM. %, \*, \*\*, and \*\*\* denotes 10%, 5% and 1% significance levels, respectively.

## 5.2.4. Income inequality

Finally, we estimate the keystone “microfinance promise” of reduction in income inequality<sup>14</sup>. Tables 9a, 9b and 9c report the estimation result of microfinance impact on income inequality captured by the Gini coefficient<sup>15</sup>. To ensure comparable units with income inequality measure, the impact of microfinance is captured in terms of borrowers only and not in the loan portfolio. Given the low number of available observations, we use both versions: raw data and linear interpolation of the Gini coefficient for missing years and countries within the sample. We present two versions of results: first, those of the whole sample without any procedures for outliers and second, those derived from multidimensional trimming using BACON at 5%, given the potential effect of influential observations (Billor et al. 2000).

The microfinance effect on reduction of income inequality is presented in Tables 9a, 9b and 9c. Observed negative coefficients on lagged values of the Gini coefficient indicate a lessening of income inequality.

**Table 9a. Inequality equation, full specification**

	No trimming for outliers		BACON at 5%	
	Gini	Linear interpolation of Gini	Gini	Linear interpolation of Gini
	MF borrowers	MF borrowers	MF borrowers	MF borrowers
<b>Gini</b> <sub>-1</sub>	-1.345*** (0.330)	-0.869*** (0.185)	-1.369*** (0.349)	-0.904*** (0.184)
<b>Gini</b> <sub>-2</sub>	-1.143*** (0.297)	-0.724*** (0.165)	-1.155*** (0.307)	-0.789*** (0.171)
<b>Microfinance</b> <sub>-1</sub>	<b>6.719</b> (4.273)	<b>5.083**</b> (2.373)	<b>6.957</b> (4.263)	<b>4.488**</b> (2.223)
<b>Microfinance</b> <sub>-2</sub>	<b>-9.043*</b> (4.623)	<b>-6.029**</b> (2.862)	<b>-9.432**</b> (4.689)	<b>-5.306**</b> (2.689)
<b>GDP p.c.</b> <sub>-1</sub>	0.005 (0.005)	-0.001 (0.003)	0.006 (0.005)	-0.000 (0.003)
<b>GDP p.c.</b> <sub>-2</sub>	-0.007 (0.006)	-0.000 (0.004)	-0.008 (0.006)	-0.002 (0.004)
<b>Constant</b>	11.854 (9.325)	5.507 (3.482)	12.848 (8.968)	6.217* (3.252)
<i>No. of obs.</i>	183	582	180	571
<i>Sargan test, value</i>	5.360	9.691	4.842	14.389
<i>Sargan test, p-value</i>	0.718	0.287	0.774	0.072

*Notes:* The table reports estimation results from the Arellano-Bover/Blundell-Bond system estimator with two lags of dependent variable included as regressors, endogenous covariates and a robust variance-covariance matrix based on equation (4) The dependent variable is the Gini coefficient. Data was cleaned, limiting microfinance borrowers at minimum 0.05% and using the identification procedure for outliers (BACON) with a maximum trimming to be less than 5% in last two columns. \*, \*\*, and \*\*\* denotes 10%, 5% and 1% significance levels, respectively.

<sup>14</sup> To estimate the impact of microfinance on poverty and thus to derive stronger statements on poverty reduction, one should use direct poverty measures, which is beyond the scope of this chapter and remains for further research.

<sup>15</sup> For interpretation of coefficients, a low Gini coefficient indicates a more equal distribution, with 0 corresponding to complete equality, while a higher Gini coefficient indicates a more unequal distribution, with 1 corresponding to complete inequality. In our case, the Gini coefficient is expressed in percent varying from 0 to 100.

Negative and significant coefficients in GDP per capita imply that, as countries strive for better economic growth, they experience improvements in inequality. There is evidence of microfinance causing reductions in income inequality. The impact varies from -0.946 [linear interpolation of the Gini coefficient] to -2.324 [linear interpolation of the Gini coefficient], reflecting sensitivity to sample integrity (Table 9b). The results are robust to trimming procedures where the poverty reduction effect is more pronounced when using the BACON procedure.

**Table 9b. Inequality equation, equilibrium conditions based on the sum of all coefficients**

	No trimming for outliers		BACON at 5%	
	Gini	Linear interpolation of Gini	Gini	Linear interpolation of Gini
	MF borrowers	MF borrowers	MF borrowers	MF borrowers
<b>GINI</b>	-2.48*** (0.616)	-1.59*** (0.343)	-2.52*** (0.644)	-1.69*** (0.348)
<b>Microfinance</b>	-2.32* (1.29)	-0.946 (0.730)	-2.47** (1.329)	-0.818 (0.693)
<b>GDP</b>	-0.002 (0.001)	-0.001 (0.000)	-0.002 (0.001)	-0.001** (0.000)
<i>No. of obs.</i>	183	582	180	571

Notes: The table reports estimation results from the Arellano-Bover/Blundell-Bond system estimator with two lags of dependent variable included as regressors, endogenous covariates and a robust variance-covariance matrix. The dependent variable is the Gini coefficient. Coefficients represent equilibrium moments. In the case of two lags, corresponding standard errors were computed from variance-covariance matrix using Stata procedure LINCOM. %, \*, \*\*, and \*\*\* denotes 10%, 5% and 1% significance levels, respectively.

### 5.3. Impulse response functions

As a conclusion to the empirical analysis, we visualize the impact of microfinance by plotting impulse response functions (Figures 2, 3 and 4). The initial level of the impulse of microfinance is set at 5%. Potential example of shock coming from microfinance could be an outside donor supporting microfinance in the country, i.e. large donor supported microfinance investment into the country and its impact on macroeconomic and financial indicators. The period of the impact of the shock is chosen for 12 periods as being the reasonable time for evolution of the impact. We visualize the effect of microfinance as disabling across three clusters. Given that the effect of microfinance is primarily captured through its outreach, we present the impulse response functions for microfinance borrowers only. We also model the microfinance market as finite and assume a saturation point at around 3% of the population.

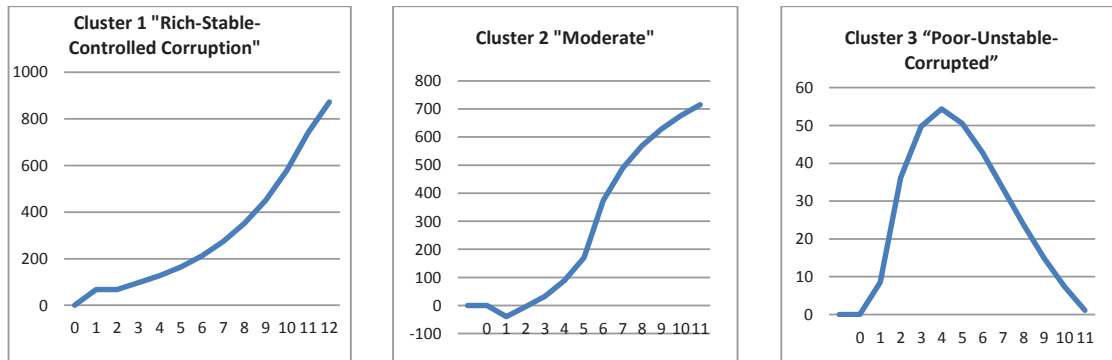
Figure 2 represents the impact of microfinance shock on economic growth measured in terms of real GDP per capita. Figure 3 - the impact on financial sector development captured by broad money per capita, and finally the effect of microfinance itself (Figure 4).

We observe that there are similar patterns in the same cluster across equations. We observe a strong growth potential of microfinance in clusters 1 and 2. This is in line with earlier findings of Ahlin et al. (2011), Vanroose (2008), Armendáriz & Vanroose (2009) that the outreach of MFIs is more developed in stable countries and operational costs are recovered when economic growth is stronger.

The most interesting situation is observed in cluster 3, which captures countries with weak and unstable environments. In this group of countries, the evolution of microfinance is transferred through a concave function and “dies out” after a certain critical point. This might potentially indicate two effects. First, it might be that in weaker environments microfinance does not have sufficient capacity to grow and expand. Second, it could be due to potential “mobility” across clusters as developing countries grow, and “graduate” from cluster 3 to cluster 2. Ahlin and Jiang (2008) develop a model examining the long-run effects of micro-credit on development in an occupational choice model. According to theoretical predictions, microcredit could raise or lower long-run GDP, inequality and poverty. In this regard, the key to microcredit’s long-run effect is the “graduation rate”, defined as the rate at which self-employed workers build up enough wealth to start full-scale firms.

A concave response to microfinance shock to economic growth might potentially indicate its cyclical or countercyclical influence in times of macroeconomic crises. For example, microfinance acted as a shock-absorber amidst severe economic collapse in Indonesia between 1998–2000, while there was an opposite situation in Bolivia, where microfinance declined even more severely than the national economy during hard times (Marconi & Mosely 2005).

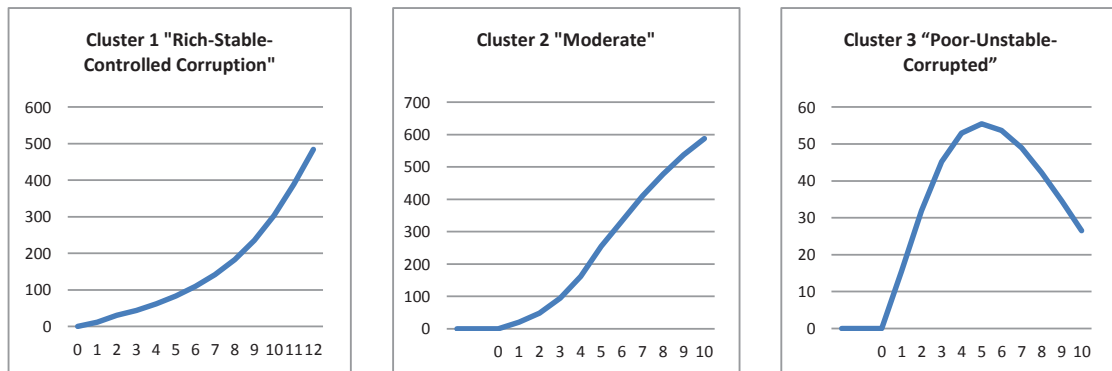
**Figure 2. Effect of microfinance (number of borrowers) on real GDP per capita**



Notes: the figure represents impulse response functions of the shock from microfinance at 0.5%. Additional modelling is made so that there is a potential saturation of microfinance market at 3%.

In particular, the rapid growth of the microfinance sector observed and its impact on financial sector development (Figure 3) in clusters 1 and 2 is connected to the relation between conventional financial institutions (commercial banks) and MFIs, which may be co-operative or competitive depending on competition on the market. Cull et al. (2009a) finds positive and robust evidence of competition from conventional banks pushing MFIs to serve poorer markets and more women. In this regard, our findings indicate a potential saturation point where microfinance clients grow and “graduate” to become clients of conventional financial institutions.

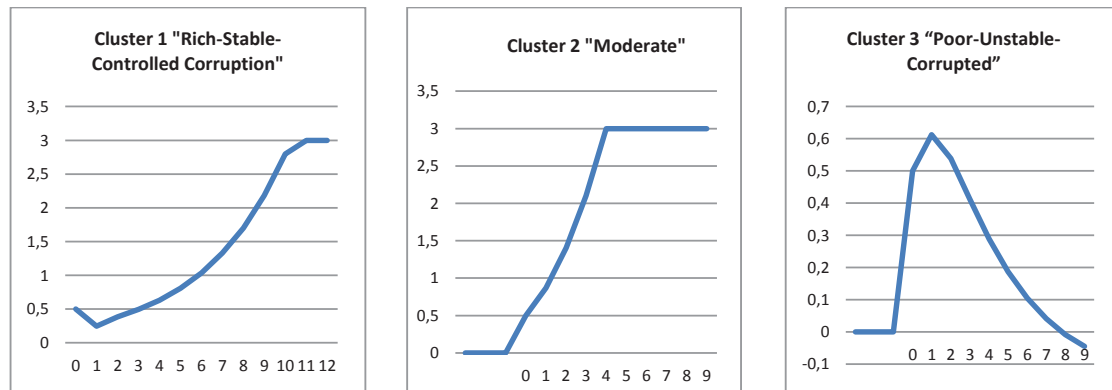
**Figure 3. Effect of microfinance (number of borrowers) on broad money per capita**



Notes: the figure represents impulse response functions of the shock from microfinance at 0.5%. Additional modelling is made so that there is a potential saturation of the microfinance market at 3%.

Finally, the observed diverse impact of microfinance across clusters could potentially be explained by the “age” of microfinance activity as proxied by the number of years since the sector was introduced in a country (Armendáriz & Vanroose, 2009). As they claim, there is a potential country-wide learning curve which could explain growth and expansion of the microfinance sector (cluster 1 and 2).

**Figure 4. Microfinance's own effect (number of borrowers)**



Notes: the figure represents impulse response functions of the shock from microfinance at 0.5%. Additional modelling is made so that there is a potential saturation of the microfinance market at 3%.

Impulse response analysis indicates that a further avenue for research could be the identification of the state under which the microfinance shifts from being a complement to being a substitution. This could potentially be done using a non-parametric discrimination analysis, where countries are placed in three types of environments and the nature of microfinance as a complement or substitute is identified.

## Conclusion

Motivated by limited knowledge of the economy-wide effects of microfinance, we aimed to measure its impact on economic growth, financial sector development and reductions in income inequality. This constitutes an important contribution to the literature, as it is the first evidence of measurement of the aggregate effect of microfinance including that on non-recipients of microfinance programs. Acknowledging the multidimensional nature of the external environment of microfinance, we divide countries into three broad clusters based on macro-institutional determinants established in the previous literature.

In general, the results indicate an important and significant impact of microfinance at a macro level. In particular, the expansion of microfinance is found to be positively and significantly associated with economic growth. The effect is stronger in developing and more stable environments when microfinance is measured in terms of the loan portfolio of MFIs. This is consistent with previous findings on the complementarity of microfinance with macroeconomic indicators (Ahlin et al. 2011). The transfer dynamics of microfinance are found to differ depending on macro-institutional development.

We further find support for the impact of microfinance on financial sector development captured by broad money circulation in economies. A one percent increase in the numbers of microfinance

borrowers in a country leads to a USD 314 increase in broad money per capita, which is equivalent to 13.8% of the mean value for the whole sample. The effect clearly differs across clusters. Greater microfinance outreach is found in more stable and developed environments. This is in line with Ahlin et al.'s (2011) findings that greater financial depth is strongly associated with lower default and operating costs for MFIs. In contrast, the effect through the loan portfolio is more pronounced in less developed and weaker environments. This is in line with the market failure hypothesis that MFIs flourish where the formal financial institutions are weak.

Finally, we find a positive impact of microfinance in reducing income inequality. The results are stable for sample integrity of the Gini coefficient and trimming for outliers. More research is needed to make a stronger claim on any direct poverty reduction effect of microfinance. Nevertheless, we believe that our findings provide evidence of a positive impact on income inequality at aggregate impact.

Overall results indicate that microfinance plays a significant role and provide evidence of its potential to affect broader economies. The impact and transfer dynamics of microfinance, however, differ substantially according to the macro-institutional environment of countries.

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## APPENDIX

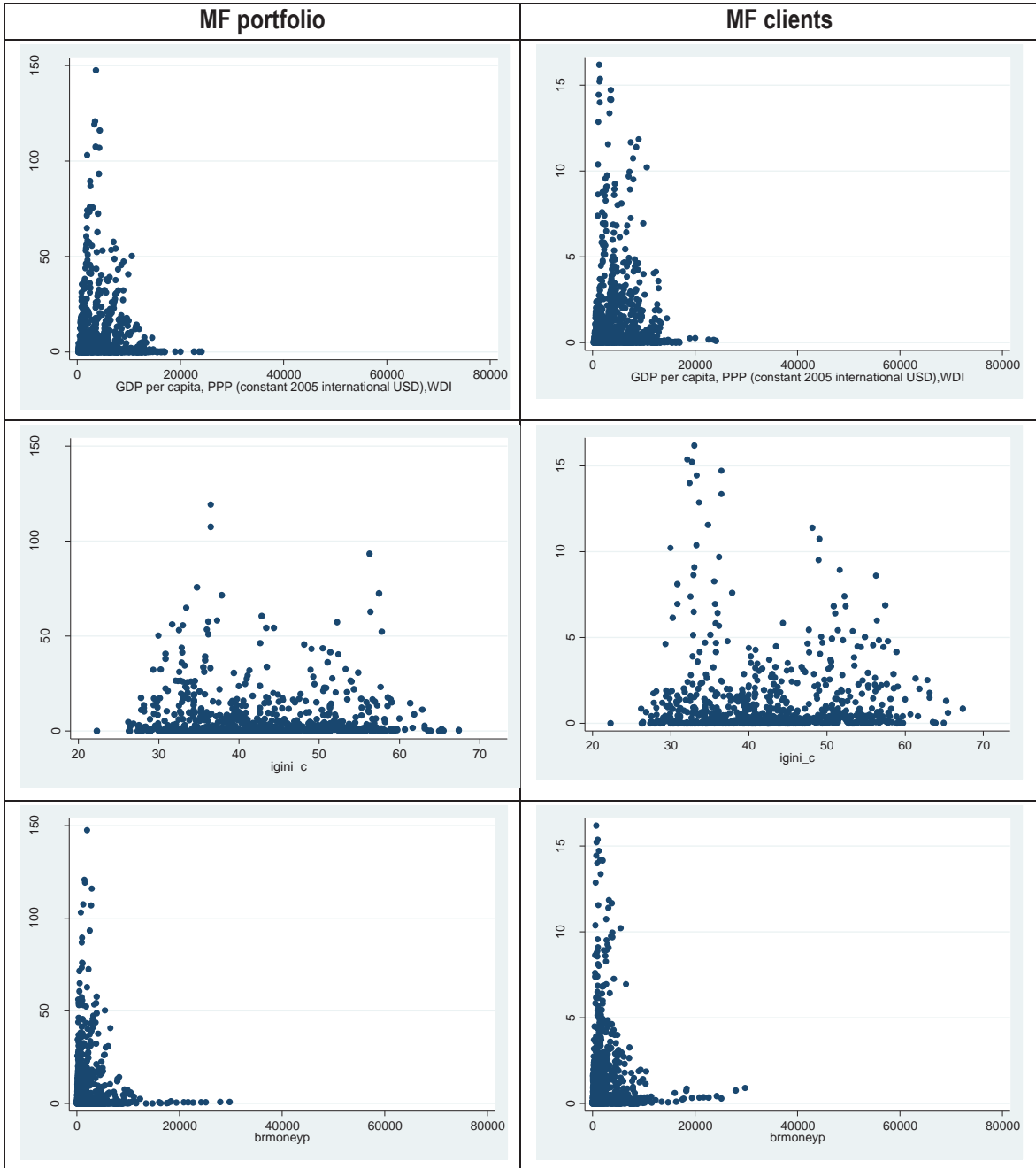
Table 10. List of countries by clusters

Cluster 1	Cluster 2	Cluster 3	
Albania	Argentina	Afghanistan	Moldova
Azerbaijan	Bulgaria	Angola	Madagascar
Bosnia and Herzegovina	Brazil	Armenia	Mali
Bolivia	Chile	Burundi	Mongolia
China	Costa Rica	Benin	Mozambique
Colombia	Croatia	Burkina Faso	Malawi
Dominican Republic	Hungary	Bangladesh	Niger
Ecuador	Mexico	Cote d'Ivoire	Nigeria
Egypt, Arab Rep.	Panama	Cameroon	Nicaragua
Guatemala	Poland	Congo, Rep.	Nepal
Jordan	Russian Federation	Ethiopia	Pakistan
Kazakhstan	Turkey	Georgia	Philippines
Macedonia, FYR	Venezuela, RB	Ghana	Papua New Guinea
Namibia	South Africa	Guinea	Rwanda
Peru		Guinea-Bissau	Senegal
Paraguay		Honduras	Sierra Leone
El Salvador		Indonesia	Chad
Syrian Arab Republic		India	Togo
Thailand		Iraq	Tajikistan
Tunisia		Kenya	Tanzania
Ukraine		Kyrgyz Republic	Uganda
		Cambodia	Vietnam
		Sri Lanka	Yemen, Rep.
		Morocco	Zambia

Table 11. Correlation table of main outcome variables by clusters

MF portfolio					MF clients				
Whole Sample:					Whole Sample:				
	MF portfolio	GDP	Gini	Broad Money		MF portfolio	GDP	Gini	Broad Money
MF portfolio	1.000				MF portfolio	1.000			
GDP	-0.091	1.000			GDP	-0.028	1.000		
Gini	-0.072	0.146	1.000		Gini	-0.044	0.138	1.000	
Broad Money	-0.097	0.813	0.074	1.000	Broad Money	-0.032	0.813	0.072	1.000
Cluster 1:					Cluster 1:				
	MF portfolio	GDP	Gini	Broad Money		MF portfolio	GDP	Gini	Broad Money
MF portfolio	1.000				MF portfolio	1.000			
GDP	0.226	1.000			GDP	0.337	1.000		
Gini	0.107	-0.033	1.000		Gini	0.121	-0.033	1.000	
Broad Money	-0.054	0.407	-0.330	1.000	Broad Money	-0.028	0.407	-0.330	1.000
Cluster 2:					Cluster 2:				
	MF portfolio	GDP	Gini	Broad Money		MF portfolio	GDP	Gini	Broad Money
MF portfolio	1.000				MF portfolio	1.000			
GDP	-0.124	1.000			GDP	-0.060	1.000		
Gini	0.089	-0.409	1.000		Gini	0.254	-0.344	1.000	
Broad Money	0.008	0.613	-0.107	1.000	Broad Money	-0.001	0.622	-0.069	1.000
Cluster 3:					Cluster 3:				
	MF portfolio	GDP	Gini	Broad Money		MF portfolio	GDP	Gini	Broad Money
MF portfolio	1.000				MF portfolio	1.000			
GDP	0.410	1.000			GDP	0.287	1.000		
Gini	-0.162	-0.141	1.000		Gini	-0.233	-0.141	1.000	
Broad Money	0.328	0.757	-0.253	1.000	Broad Money	0.419	0.757	-0.253	1.000

Table 12. Microfinance scatterplots with main indicators



## Chapter 2

# Microfinance Environment in Uzbekistan: Analysis of Supply and Demand

### **Abstract**

This chapter describes the microfinance environment in Uzbekistan, with an emphasis on two types of non-bank microfinance institutions - Credit Unions and Microcredit Organizations. The specific nature of these institutions provides new evidence of the commercially oriented microcredit model and SME lending, which is an emerging trend in mainstream microfinance. The chapter offers two important contributions. On the supply side of microcredits, we analyse the determinants of initial placement of these MFIs in districts of Uzbekistan. We find that MFIs follow general economic principles when choosing the location for establishment. On the demand side, we analyse the actual margins of excess demand for microcredits by considering only the pool of eligible applicants. We find that the total probability of microcredit approval is on average only 0.5, which implies that the actual margins of untapped market could be just half of that projected when the narrow definition of eligible applicants is taken into account.

**JEL Codes:** O16, C34

**Keywords:** microcredit, microfinance institutions, Uzbekistan

## 1. Introduction and Motivation

Since its birth in the 1970s with a simple microcredit model pioneered by Muhammad Yunus, the microfinance movement has been growing widely across the globe. Currently the sector represents 2100 registered microfinance institutions (MFIs) serving more than 160 million customers. The expansion of microfinance is determined not only by internal MFI factors but also by macroeconomic and macro-institutional features (Ahlin et al., 2011; Vanroose, 2008; Vanroose & D'Espallier, 2009). Diverse models of microlending have evolved under the common microfinance umbrella, which is primarily reflected by the different types of financial institutions.<sup>16</sup> While microfinance is present in most developing and developed countries, the landscape and microfinance models differ depending on the maturity of the overall financial system, availability of relevant infrastructure, population density, and poverty levels.

With rapid industrialization of the microfinance movement and recognized trade-offs between reaching social and sustainability objectives, increasing emphasis has been given to a commercially oriented microfinance models and small and medium enterprises (SME) lending. Critics of microcredits suggest that job creation which boosts economic growth and hence reduces poverty is better done by larger enterprises and SMEs (Karnani, 2007). Mohammed Yunus' original model assumed that small, informal microenterprises supported by microloans can be absorbed by the weak local economies of developing countries, without limit. However, these microenterprises ultimately did not have enough capacity to scale-up, diversify and innovate, resulting in economies that remained underdeveloped and creating negative externalities to existing productive businesses (Bateman, 2010). The focus of development finance thus shifted more toward middle level, growth-oriented SMEs, the so-called missing layer.

This chapter thus contributes to the general microfinance literature providing the first evidence from Uzbekistan. The particular development path of the microfinance sector in Uzbekistan has led to the emergence of two types of non-bank MFIs: Credit Unions (CUs) which follow a mid-level, a growth oriented SME lending model, and Microcredit Organizations (MCOs), which practice a canonical microfinance model, albeit with for profit status.

The chapter first describes the microfinance environment in Uzbekistan (Section 2). The description presents the historical evolution of the market and the establishment of MFIs, profiles of lending institutions and concludes with data on regional benchmarking.

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<sup>16</sup> The global Microfinance Information eXchange (MIX) platform recognizes the following types of MFIs by legal status: (i) commercial banks - some of which specialize in microfinance activities only, while others represent traditional banks that downscale part of their operations or branches into microfinance activities; (ii) non-bank microfinance institutions which are mostly non-profit oriented organizations leveraged by donor or external funding; (iii) non-profit non-governmental organizations and (iv) rural banks.

Second, using district level data the determinants of the initial placement of non-bank MFIs are described (Section 3). The analysis of initial placement is different from ex-post performance measures predominant in the literature, thus serving as an important contribution. Given their private and commercial nature, MFIs are established in urban areas where population density and the share of economically active populations are high. We also find that infrastructure quality and economic development of the regions are significant determinants of MFI placement. The determinants of MCO growth in particular are closely associated with the prevalence of household and family type businesses the microcredits are disbursed to. In contrast, CUs serve middle class enterprises with greater business prospects, and for which the economic development of the region and industrial composition are important factors.

Finally, the supply-side analysis is complemented by an analysis of the demand side, where the excess demand for microcredits is estimated (Section 4). The particular contribution of the analysis is based on the identification of overall probability of obtaining microcredits from non-bank MFIs based on non-participation of the eligible clients. Given that the overall probability of getting microcredits is found to be on average 50%, this chapter claims that careful consideration is needed when advocating that a huge demand for microcredits exists. The actual margins of the untapped market could shrink to half when considering a narrow definition in terms of eligible applicants.

The chapter also serves as a complementary reading for Chapter 2 of this dissertation work on measuring the improved access to microcredits in Uzbekistan.

## **2. Microfinance Environment**

### **2.1. Historical Evolution**

Uzbekistan is a lower middle-income country located in heart of the Central Asia and is a former member of the Soviet Union, having gained independence in 1991. With 28.2 million inhabitants, the country accounts for 40% of the population of the Central Asia region. After gaining independence, Uzbekistan adopted a gradualist approach to transition and state-led development aimed at import substitution, and energy and food supply self-sufficiency. The population of Uzbekistan is characterized by a strong human capital and entrepreneurial savvy which is a key accelerator of business and economic development, including microfinance programs. More detailed macro analysis, including a regional comparison is provided in Table 7 of the Appendix.

The microfinance movement in the country has emerged in a stable environment, mainly aimed at smoothing the hardship of the transition period, poverty alleviation and improving access to

household finance. From the perspective of industrialization stages<sup>17</sup>, overall development of the microfinance market in Uzbekistan during 1998 - 2012 can be divided into three periods (UNDP, 2011).

**(1) The first evolution (1990s):** “Microcredit” and “microfinance” were first legally introduced in Uzbekistan as a means of financing SMEs and private entrepreneurship in early transition to ease the restructuring process in the agriculture sector. Primarily commercial banks lent microcredits requiring standard collateral on an individual basis. The first non-bank microcredit programs were initiated by the United Nations Development Program (UNDP) in 1998, through the implementation of two pilot projects. The objective of these projects was to improve access to financial resources among low-income groups to support their trade, small-scale production and micro-business activities. These pilot projects heralded the establishment of the first non-profit non-bank NGO microfinance institutions (NGO-MFIs). NGO-MFIs operated similarly to the classical Grameen Bank type group lending under joint liability, dynamic incentives and no collateral terms. The NGO-MFI movement was further supported by other donor projects and by 2006, their numbers had grown to 14.

**(2) Development and establishment of MFIs (2000-2006):** During this period most of the legal framework<sup>18</sup> for microfinance was grounded, which fostered the rapid growth of the sector. The institutionalization stage of the microfinance sector of that period was also characterized by the new role of the Central Bank of Uzbekistan as a regulator and licensing body of all bank and non-bank MFIs.

On the basis of adopted laws, the CU movement was first launched in Uzbekistan with donor support from the Asian Development Bank (ADB) and the World Council of Credit Unions (WOCCU) in 2002. From a policy perspective, CUs were expected to foster access to finance for low income people and businesses through well-established branches nationwide, forming a single cooperative over the long term (Tadjibaeva & Muradov, 2010). In compliance with international standards, CUs were engaged in both microlending and the attraction of deposits. However, as a national peculiarity, by Uzbek law, business entities were allowed to be members of CUs. This led to the divergence of Uzbek CUs from a closed, professional, for-member focus and development to commercial microfinance institution status over time.

In 2006, the Uzbek government instituted two laws – “On Microfinance” and “On Microcredit Organizations” – to provide a legal basis for the operations of non-bank lending institutions. A general lack of clarity in legislation for NGO-MFIs, however, created the need for a variety of restrictions on microcredit operations (Microfinance Information eXchange (MIX), 2008). As a result, NGO-MFIs were ultimately required to re-register under the new legislation to comply with profit making activities. Since

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<sup>17</sup> Complete evolution of the microfinance sector implies four stages: first evolution, development, rapid expansion and sustainable growth with a consolidation trend of MFIs (Christen et al., 2003).

<sup>18</sup> The Law on “Credit Unions” was adopted in 2002, the laws “On Microfinance” and “On Microcredit Organizations” were adopted in 2006.

then, several donor NGO-MFIs have been closed entirely, while others have reduced their outreach. Re-registration of the remaining MFIs changed their status from NGO to Microcredit Organizations (MCOs), thus laying the foundation for a new type of non-bank MFIs. By law, MCOs may be funded by any private domestic entity and engage in profit making by channelling microlending services, except deposit attraction. It is important to note that MCOs inherited the joint liability, group-lending model of NGO-MFIs.

**(3) Rapid growth (2007-2012):** Three factors contributed to the rapid growth of the sector in this period: (i) new commercial models of MCOs and CUs boosted the demand for microcredits among the population, (ii) adoption of the “State Program of Microfinance Development for 2007-2010” in which the sector was acknowledged as an important segment of the country’s financial system and household welfare improvement and (iii) the establishment of a specialized “Mikrokreditbank” as a leading bank-MFI with extensive countrywide branches offering individual and group microcredits at subsidized interest rates below the market average<sup>19</sup> (UNDP, 2011). While “Mikrokreditbank” is dominant on the microcredit market in terms of loan portfolio features such as collateral requirement, obligatory business registration and non-cash operations constitute the disadvantages of bank microlending compared to MCO and CU lending.

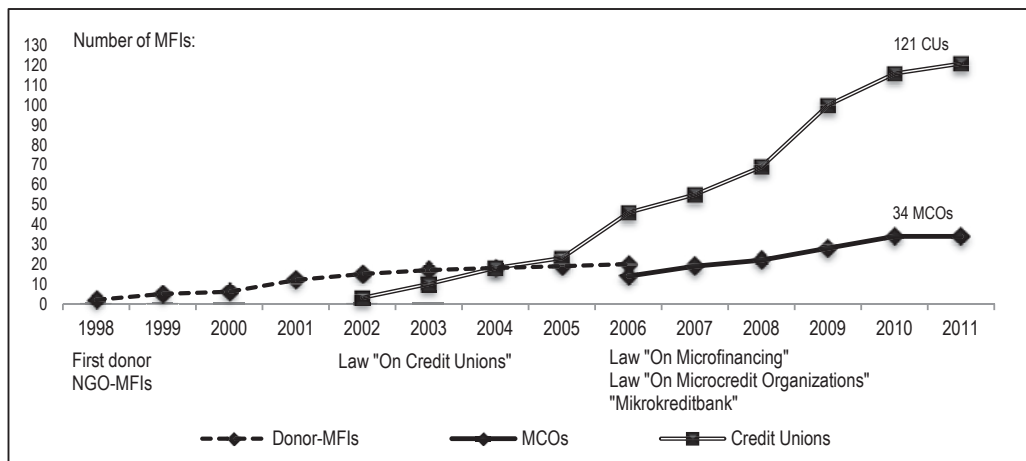
Over a relatively short period, the number of CUs increased dramatically, reaching 121 by 2011. The number of MCOs also grew, albeit moderately due to constraints on deposit attraction and restrictions on external donor support. Rapid expansion of the non-bank microfinance sector in terms of depth and outreach motivated their integration into centralized credit bureaus<sup>20</sup>. Figure 1 summarizes the entire evolution of microfinance sector in the country, visualizing the three periods in market evolution.

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<sup>19</sup> “Mikrokreditbank” is an open joint-stock company and its largest shareholder remains the Ministry of Finance. Following the required re-registration procedures of NGO-MFIs in 2006, any foreign donor funding in support of microfinance activities was assigned through “Mikrokreditbank” including further channeling to other MFIs. The latter mechanism, however, is not operationally defined for MCOs. MCOs and CUs can’t directly attract grants and loans from foreign and international donor organizations.

<sup>20</sup> There are two bureaus of credit information exchange – the National Institute for Credit Information and the Interbank Credit Bureau – which mainly serve the banking sector. Non-bank MFIs (CUs, MCOs, pawnshops) are in the process of joining the system. There is an ongoing initiative to create private information bureaus and a draft law is being reviewed by Parliament.

**Figure 1. Cumulative growth non-bank MFIs in Uzbekistan, 1998-2011**



Source: author's calculations based on official data from the Central Bank of Uzbekistan web site [www.cbu.uz](http://www.cbu.uz)

Overall, the legal umbrella has played an essential role in shaping the development of the sector. The legal framework of microfinance in Uzbekistan is characterized by the regulation of microfinance services through the issue of new licenses for non-bank MFIs with the Central Bank being the principal regulatory-supervising body. This is also a unique law in the Central Asia region, which explicitly defines the term “microfinance”<sup>21</sup> (Tadjibaeva, 2011). Rather tight regulation of the sector features the application of prudential regulation even for non-depository institutions, i.e. MCOs. This regulatory model is similar in Kyrgyzstan, Tajikistan, Russia and Malaysia. While it is essential to ensure the safety of deposits, prudential regulation is not usually applied during the early development stages, consequently the sector is tightly regulated. Prudential supervision and monitoring, however, substantially increases operational costs forcing MFIs to limit the client outreach and product variety (Cull, Demirgüç-Kunt & Morduch, 2011).

<sup>21</sup> The law “On Microfinance” adopted in 2006 expanded the legal notion of “microfinance” in terms of the amount pegged to the minimum monthly salary (MMS) rate established by the government. As of August 2012 the MMS constituted 72 300 Uzbek soums (38 USD). A “microloan” is defined as not exceeding 100 times MMS, “microcredit” as not exceeding 1000 times MMS and “microleasing” as not exceeding 2000 times MMS.

## 2.2. Current Situation<sup>22</sup>

As of January 2011, the profile of the microfinance sector in Uzbekistan is represented by downscaling banks, specialized “Mikrokreditbank”, and commercial non-bank MFIs (CUs and MCOs) (Table 1).

**Table 1. Microcredit and microdeposit services in Uzbekistan**

Microfinance providers:	Profit status	Legal status	No. of inst.	No. of borrowers	Loan portfolio, '000 USD	Average loan balance, USD	No. of depositors	Average deposit, USD	Monthly interest rate on loans
Specialized “Mikrokreditbank”	Profit	Bank	1	51074	165001	3231	56540	1511	1.2%
Downscaling <sup>23</sup> Commercial banks	Profit	Bank	2	7478	37409	5003	n/a	n/a	n/a
Credit Unions	Profit	Non-bank	121	52965	121792	2300	153063	654	3.7%
Microcredit Organizations	Profit	Non-bank	34	9574	3853	402	0	0	4.8%
Total:			138	121091	328055	10936	209603	2165	

Source: MIX, NAMOCU, UNDP (2011); n/a indicates that data is not available.

At this time, the outstanding volume of deposits of MFIs constituted 231 billion Uzbek soums (125.5 million USD), which is still 19.3 times lower than that of banks (2416.8 million USD) (UNDP, 2011). Despite their limited share, MFIs revealed a strong potential in financial intermediation, reaching the rate of 0.8<sup>24</sup> due to trust among the population and attractive returns on deposits. The high demand for and popularity of microcredits is also explained by increasing urbanization in the country due to rapid economic growth and completion of agriculture reforms. Consumer credits have become a vital tool for the young and rapidly growing urban population. In terms of outreach, with 246 400 clients, the microfinance sector has captured 0.9% of Uzbekistan’s population<sup>25</sup>. More importantly, non-bank MFIs have demonstrated the capacity to provide free market based access to microcredits, as opposed to conventional banks. A closer look at the operations of these MFIs follows:

**Commercial banks:** According to the World Bank methodology, the quantitative threshold between microcredit and SME loans is defined as 250% of GNI per capita<sup>26</sup>. Based on this methodology commercial banks in Uzbekistan offer primarily SME loans with an average loan balance above 3 200

<sup>22</sup> The analysis is as of January 2011 given the data availability.

<sup>23</sup> Existing financial institutions enter the microfinance segment by offering loans of a lower amount, i.e., direct lending to end-users.

<sup>24</sup> This implies that 80% of the loan portfolio is financed from the deposit attraction. In comparison, commercial banks reached the same indicator only in 2007.

<sup>25</sup> In comparison the average penetration ratio for the EECA region in 2011 was 2.6%. Compared to other Central Asia peers: 3.8% in Kazakhstan, 8.3% in Kyrgyzstan, 2.2% in Tajikistan (MIX & CGAP, 2011).

<sup>26</sup> The threshold is calculated as 250% of GNI per capita, Atlas method in USD (World Bank, 2007). In Uzbekistan with GNI per capita equivalent to USD 1280 in 2010, this threshold is equivalent to USD 3200.

USD. This loan amount is 1.4 times (2 300 USD) lower for CUs and 8 times lower (402 USD) for MCOs, suggesting that non-bank MFIs hold the primary niche on microcredits (Table 1). According to Uzbek legislation, there is clear distinction of the loan amount and the threshold is quantified in terms of multiplications of minimum monthly salary<sup>27</sup> (MMS) set by the government. A “microloan” is defined as not exceeding 100 times MMS (3800 USD) and “microcredit” as not exceeding 1000 times MMS (38000 USD). The upper niche of bank microlending is therefore characterized by high value transactions, well suited for larger businesses, with longer maturity and lowest interest rates, but requiring substantial collateral and relatively burdensome application procedures. Despite their dominance in loan portfolios, the client base of banks is 8.2% lower than that of non-bank MFIs (UNDP, 2011).

Despite being cheap relative to CUs and MCOs, bank microlending is distinguished by a number of obstacles that divert individuals and MSEs toward non-bank MFIs. The strongest obstacle is a limitation on cash disbursement<sup>28</sup> and repayment of loans, which is vital for entrepreneurs engaged in trade and working with liquidity. Even for consumer lending, banks require the transfer of the loan to the contractor, shop or other registered transfer system, which limits the use of loans and causes an increase in the actual cost of the credit.

**Credit Unions:** Unlike credit unions in other countries, CUs in Uzbekistan have a for-profit nature, operate far beyond the professional circle of the members, and are open to a broad layer of the population including businesses. As of January 2011, CUs had captured 95% of the credit portfolios of all non-bank MFIs<sup>29</sup>. This massive share is explained by internal (deposit mobilization) and external (wholesale loans from commercial banks) growth opportunities, which are lacking in MCOs. CUs also demonstrate a sound capacity for deposit mobilization, stronger than banks, which indicates significant trust among the population. Constituting 70% of CU assets, deposits represent mainly (90%) term deposits of individuals (Tadjibaeva, 2011). CUs issue commercial loans to medium size businesses and individual enterprises, consumer loans (16.5%)<sup>30</sup> and credits for other non-commercial purposes (3.9%). On the microfinance market, CUs issue the largest share of consumer loans and support higher scale enterprise individual lending. The average loan size is 2200 USD and the average deposit size is 600 USD (UNDP, 2011). Despite the downward trend, the interest charged on CU loans (3.7% p.m.) is still higher than comparable bank loans (1.2%) though lower than in MCOs (4.8%) (Table 1). CUs offer mainly individual loans requiring collateral or a third party guarantee similar to commercial banks. In comparison to banks, however, the loan application procedures in CUs are less burdensome and

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<sup>27</sup> As of December 2012 MMS constituted 79 590 Uzbek soums (38 USD).

<sup>28</sup> This is related to overall the macroeconomic and monetary system with elements of cash control.

<sup>29</sup> The remaining share is MCOs (3%) and pawnshops (2%) (Tadjibaeva, 2011).

<sup>30</sup> Popular ones include the purchase of cars, consumer durables, household appliances, livestock, payment of college tuition fees, housing repair.

faster<sup>31</sup>. Other attractive features include cash based disbursement, and a flexible and customized approach which is not observed in bank lending. CUs in Uzbekistan are thus characterized by their profit oriented nature and focus on higher value transactions. Though they are free from a number of obstacles typical to banks, CU loans are yet not designed for low income borrowers.

**Microcredit Organizations:** legally founded in 2006, MCOs were modelled similarly to the classical Grameen Bank type non-bank MFIs, capturing the best true social objectives of microfinance. In comparison to CUs, the growth and outreach of MCOs has been quite modest over 2006-2012, representing only 3% of the credit portfolio of all non-bank MFIs (Tadjibaeva, 2011). The number of clients in MCOs decreased substantially, constituting only 32% of the 2006 level. This is mainly explained by legal limitations on deposit mobilization, and the fact that borrowing from commercial banks is not operational as MCOs are unable to pledge sufficient collateral. MCOs issue microcredits and microloans for business and consumer purposes. Between 2006 – 2010 the average loan size in MCOs increased from 136 USD to 530 USD (3.9 times), which is still much lower compared to banks and CUs (UNDP, 2011). The smaller loan size is justified by the predominant group lending methodology inherited from NGO-MFIs<sup>32</sup>. Group lending envisages dynamic incentives and very limited collateral pledges<sup>33</sup>. The average group size is 3-4 people and members are free to initiate a group. Given that MCOs primarily grow through returns on portfolio, the interest rates charged on loans is the highest (4.8% p.m.) compared to banks and CUs. Similar to the canonical microcredit model, MCOs work predominantly with female clients given the smaller loan amount and joint liability. Individual lending is also practiced by MCOs, though MCOs require higher value collateral and limit the maximum loan amount. Application procedures, loan issue procedures and cash based operations in MCOs are very similar to CUs. Given their relatively lower outreach and dependency on portfolio yield, MCOs reveal more prudent control over repayment and delinquency than CUs. Loan officers usually investigate the group members before group loan approval, and during the disbursement. Dynamic incentives and limitations on loan size limit the growth potential of mature clients, thus motivating them to graduate to CUs or banks. MCOs thus operate with smaller size microcredits focusing primarily on group lending with active female participation.

**Regional comparison:** The microfinance sector in Uzbekistan is relatively isolated from global microfinance markets, which results in limited funding of MFIs, stunted growth and high interest rates (UNDP, 2011). Even though Uzbekistan is the most populous country in Central Asia, microfinance

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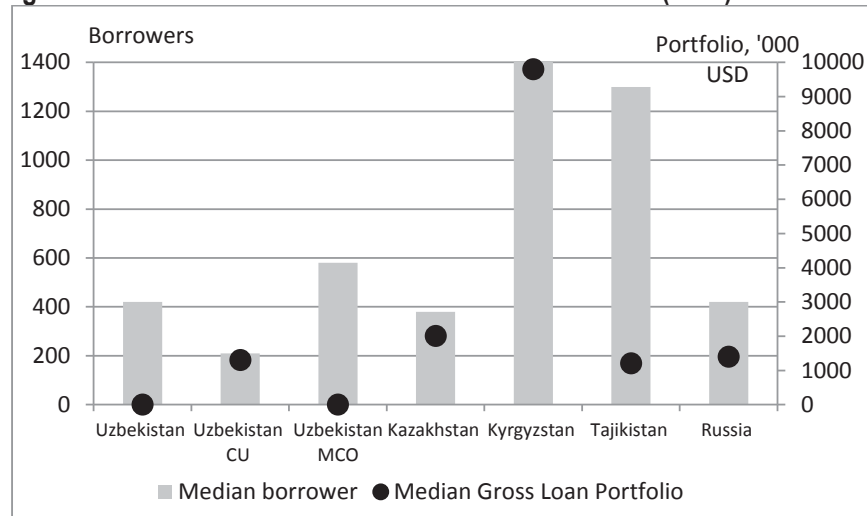
<sup>31</sup> Time for a loan approval varies from a few hours to a maximum of 5 days, depending on the previous borrowing history of clients and the purpose of the loan. A comparable loan at commercial banks (and “Mikroreditbank”) takes from two weeks to a month to complete including the required (costly) registration of the businesses.

<sup>32</sup> Compared to international practice and similar lending in Grameen Bank, this balance is still higher than 15USD - 50USD size.

<sup>33</sup> Not more than 5% of the credit amount. Typical collateral includes gold jewelry, a vehicle or a third party guarantee.

institutions are the smallest in the EECA region with a median Gross Loan Portfolio (GLP) of 179200 USD. Based on medium values, the number of borrowers of Uzbek MFIs<sup>34</sup> is most comparable to their Kazakh and Russian peers (MIX, 2011; Figure 2). Uzbek MCOs offer the lowest loan balances in the region at 358 USD, due to limitations on external financing<sup>35</sup> and upper bounds for loans (Figure 3). However, the depth of outreach<sup>36</sup> is quite similar to peers in the region with strong upward dynamics: it increased from 9% in 2005 to 33% in 2009 (UNDP, 2011; Figure 3).

**Figure 2. Trends in outreach and scale for a median MFI (2009)**



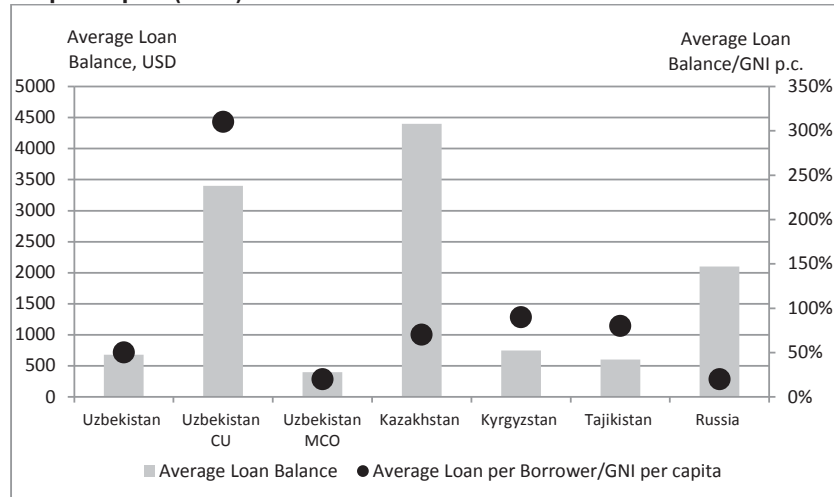
Source: MIX (2011) based on data from MIX Market, 2009. The data is based only on MFIs that voluntarily report to MIX market. Data represent medians.

<sup>34</sup> This is based on 21 MFIs (4 CUs and 14 MCOs), out of 131 total, in Uzbekistan that voluntarily report to the MIX market.

<sup>35</sup> MCOs are not allowed to attract deposits. Borrowing from commercial banks is not operational by law given that MCOs can't provide sufficient collateral.

<sup>36</sup> Measured as average loan balance as a percentage of GNI per capita.

**Figure 3. Depth of outreach: average loan balance, in USD and as percentage of GNI per capita (2009)**



Source: MIX (2011) based on data from MIX Market, 2009. The data is based only on MFIs that voluntarily report to the MIX market. Data represent medians.

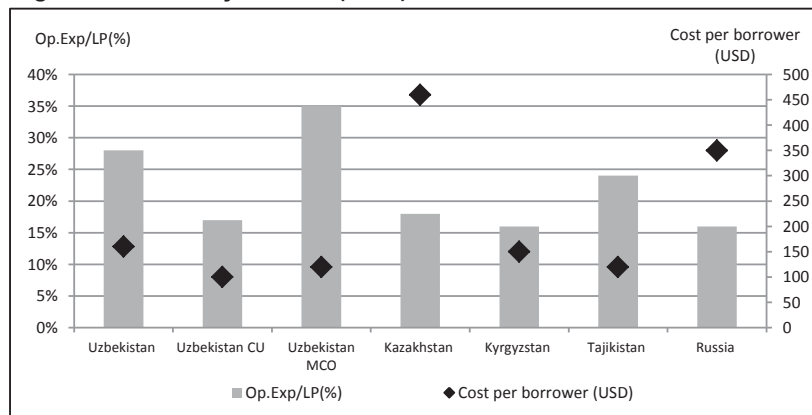
Uzbek MFIs have the highest revenues in Central Asia, with a reported ratio of financial revenues to total assets higher than 51% (MIX, 2011). Other characteristics of the Uzbek microfinance market include a wide variation of interest rates charged on microcredits. The interest rate varies depending on MFI type, loan size, lending methodology and target population (Table 1). While the global differences<sup>37</sup> in microcredit interest rates are dramatic, Uzbekistan has been cited as having among the highest worldwide (MIX, 2011). Small loan sizes are the most commonly cited reason for high interest rates, given the “high-touch” nature of microcredit business (Kneading & Rosenberg, 2008). This is particularly true in MCOs which operate with smaller amounts characterized by group lending. CUs face high operational costs associated with high financial costs on small deposits.

The high financial revenues of Uzbek MFIs are also reflected in the portfolio yield. With a median portfolio yield of 63.4%, Uzbekistan was the highest at almost double that of regional peers: 37.2% in Kazakhstan, 32.66% in Kyrgyzstan, 36.31% in Tajikistan and 31.38% in Russia (MIX, 2011). Relatively low competition and constraints on external funding have led to a high yield on loan portfolios in Uzbekistan. Judging the differential (30.5 percentage points) between the portfolio yield and operating expenses ratio, MCOs in Uzbekistan have almost double the room for external borrowing as peers in Kyrgyzstan, Tajikistan and Russia. This suggests that MFIs can access a large market that is willing to absorb loans at a very high price.

<sup>37</sup> While the global average is about 35% p.a., in Uzbekistan the average is above 80% p.a. and in Sri Lanka - around 17% p.a. (Kneading & Rosenberg, 2008).

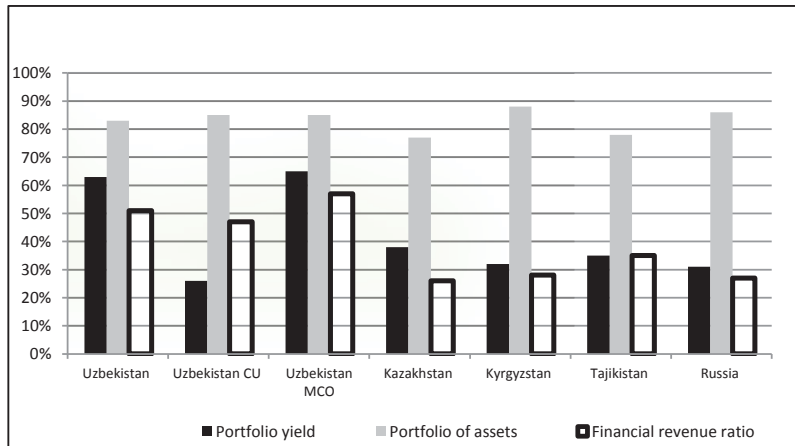
**Efficiency and productivity:** The efficiency of MFIs is illustrated by operating expenses and cost per borrower. High operating costs can be explained by the relatively young microfinance sector in Uzbekistan, where the mean operating costs in relation to loan portfolio add up to 39% (Kneading & Rosenberg, 2008). As such, the operating expenses of Uzbek MFIs remain the highest in the region at a median level of 28.7%. In terms of cost per borrower, Uzbek MFIs are as efficient as their peers in Kyrgyzstan and Tajikistan. In contrast, other peers in Kazakhstan and Russia have much higher costs per borrower (Figure 4). This difference may be explained by the higher cost of labour in these countries.

**Figure 4. Efficiency of MFIs (2009)**



Source: MIX (2011) based on data from MIX Market, 2009. The data is based only on MFIs that voluntarily report to MIX market. Data represent medians. Cost per borrower includes administrative and operational expenses.

**Figure 5. Assets productivity and returns (2009)**



Source: MIX (2011) based on data from MIX Market, 2009. The data is based only on MFIs that voluntarily report to the MIX market. Data represent medians.

Figure 5 reflects the higher productivity of MFIs in Uzbekistan compared to regional peers. With about the same level of assets, MFIs achieved an almost double yield on portfolio and financial returns.

This could be explained by the higher interest rates charged by MFIs in Uzbekistan previously discussed.

Non-bank MFIs thus represent an important, competitive market based segment of the financial sector of the economy in Uzbekistan. The chapter next identifies the determinants of their placement in the regions.

### **3. Determinants of Non-bank MFIs' Placement**

The historical evolution of non-bank MFIs in Uzbekistan reveals the efficiency of competitive market forces. The commercial nature of institutions has significantly boosted the demand for microcredits and savings mobilization demonstrates trust and the high absorptive capacity of the market. Given the private and unrestricted nature of non-bank institutions, an important remaining goal is to identify the regional determinants of their appearance. This is particularly motivated by the uneven distribution of MCOs and CUs. In comparison to the commercial banks' extensive coverage (1.97 branches per 1000 km<sup>2</sup>), which is high in Uzbekistan compared to its Central Asian neighbours<sup>38</sup>, non-bank MFIs are more concentrated nearby the capital of the country. 35% of MCOs and 39% of CUs are located in the capital and the surrounding areas.

There are 14 regions in Uzbekistan with a total of 184 districts; on average 8-16 districts per region. Non-bank MFIs are distributed unevenly with wide regional variations. The probability of CU appearance varies from 25% in the capital (Tashkent), to 17.4% in Fergana and 12.4% in Andijon regions, which represent the most densely populated areas of the country. In comparison, in remote or industrially underdeveloped regions, the probability of CU appearance is the smallest, equivalent to 1.7%. Given historical and regulatory constraints, the overall number of MCOs is 3.5 less than CUs, numbering 34 by 2011. Most MCOs are crowded in the area near the capital. The probability of MCO appearance varies from 11.8% to 2.9% in other regions.

Uneven distribution of non-bank MFIs also reflects regional variations in terms of socio-economic development and structure of the economy. While the urbanization trend is observed country-wide, the number of people living in urban areas varies from 1 000 to 275 000 people per district (Table 7). Regional variations in infrastructure provision are reflected in the coverage of water pipes, medical points and gas supply, which varies from 0% to 100% coverage depending on rural and urban areas. The structure of regional economies is highly dependent on the location and specialization of the regions in terms of manufacturing and share of agriculture production captured in gross regional product

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<sup>38</sup> In comparison this indicator was 0.15 for Kazakhstan and 1.34 in Kyrgyzstan in 2009. Source: new IMF "Financial Access Survey" indicators. Retrieved from <http://fas.imf.org/>

(GRP). Given that most of the microcredits support businesses and private entrepreneurship, regional variations persist in the share of SMEs in GRP as well (Table 7). Table 7a reports a t-test comparison of the main district level determinants across districts with MFIs and without MFIs.

In the mainstream microfinance literature, analysis of macroeconomic factors influencing MFI performance has been an emerging trend. The focus of existing studies to date can be divided into three broad categories: (a) the analysis of MFI specific determinants of performance such as contract design, lending methodology and corporate governance (Hartarska & Nadolnyak, 2007; Hermes et al., 2009; Hatarska, 2005), (b) examination of macroeconomic factors determining the uneven distribution of MFIs and the impact of country-level aggregates such as growth, inflation, poverty and corruption (Marconi & Mosley, 2005; Honohan, 2004, 2008; Vanroose, 2007, 2008; Vanroose & D'Espallier, 2009) and (c) the analysis of macro-institutional determinants of MFI success by disentangling the impact of MFI sustainability factors and the external environment they operate in (Hermes et al., 2009; Ahlin et al., 2010). The common conclusion of these studies is that the country level macroeconomic and financial environments have a significant impact on MFI performance indicators including profitability, outreach and cost reduction.

This analysis contributes to this strand of the literature in the following ways. First, we aim to identify the determinants of initial placement of MFIs, which is different from ex-post performance measures. This is an important question from the investment perspective and could serve as a useful complement to the performance indicators. Second, there are few studies that analyse within-country determinants of MFI placement, a gap to fill in (Vanroose, 2007). Use of regional and district level data to identify within-country variation is more informative than aggregate country level indicators. Third, non-random placement of MFIs has been a significant challenge for microfinance impact assessment studies. Known as supply-side selection, its direction may be upward or downward. Poverty oriented donor MFIs can emerge in poorer areas, thus causing a downward bias. In contrast, an upward supply-side bias stems from the fact that profit oriented MFIs evolve in economically advantageous areas or regions with better infrastructure and credit facilities. Given the absence of donor participation and the commercial focus of non-bank MFIs in Uzbekistan, an upward supply-side selection is expected. In this regard, we provide additional evidence of the determinants of the placement of profit oriented non-bank MFIs. Finally, given that MCOs and CUs have a specific development path, the aggregate effect is disentangled across MFI types. This allows for more clarity on the operations of these institutions and the respective niches they hold.

The data for supply-side determinants is based on district level cross-section data as of 2001. Following the historical evolution of non-bank microfinance institutions, the movement of CUs was established in 2002 after the law "On Credit Unions" was adopted. The movement of MCOs commenced

in 2006. By studying a relatively long period of data, from 2001, we control for the reverse effect of the capacity of MFIs to affect the market.

For district level determinants we include the following three sets of variables. Summary statistics of listed variables are provided in Table 6 of the appendix.

**(i) Socio-demographics indicators** mainly capture the demand for microcredits and are associated with the cost efficiency of MFIs. Ahlin et al. (2010) find that microfinance loans grow faster when there is greater work force participation. Therefore we include the economically *active population*<sup>39</sup> and *share of registered unemployed people*, which represent the overall labour force propensity to become the clients of MFIs. The share of small and medium size enterprises in gross regional product (*SME share in GRP*) controls for the entrepreneurship level. We also include the *urban population* in districts to control for urbanization trends.

**(ii) Infrastructure indicators:** Schreiner & Colombet (2001) claim that an absence of adequate infrastructure hinders the development of microfinance. The infrastructure level is therefore captured by *housing stock*, *provision of medical points*, *water pipes*, *gas* in districts and *road density*. These variables are important determinants not only for the standard of living, but also are critical factors for opening and successfully running business enterprises.

**(iii) Economic growth and structure of the economy:** Ahlin et al. (2010) find that MFIs cover costs better when macroeconomic growth in the country is higher due to lower default rates and operating costs. Integrating this finding, we include gross regional product (GRP). In addition to growth, the structure of the economy has an important influence. Ahlin et al. (2010) find that a larger service sector predicts faster MFI growth, while a larger agriculture sector predicts significantly lower default, operating costs and interest rates. With the available data, we control for the composition of the regional economy share of industrial production in GRP, trade saldo, per capita manufacturing and agricultural sales.

**Probability of MFI appearance:** First, the probability of non-bank MFI appearance is estimated using a probit model (Table 2). The dependent variable is an MFI dummy that is equal to 1 if there is either an MCO or CU in the district and 0 otherwise. There is evidence of up-side selection by non-bank MFIs. Location in the urban part of a district increases the probability of a non-bank MFI opening by 82%, and by 68% for a Credit Union, thus confirming the priori hypothesis. The economically active population has a significant marginal effect for MCO establishment only and none for CUs. This can be explained by the presumably stable occupation of MCO clients in addition to their entrepreneurship activities, whereas CUs hold a significant niche for consumer lending and deposits. The marginal effect of population density is significant for the probability of MCO establishment only and not for CUs. As

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<sup>39</sup> In Uzbekistan the economically active age constitutes 18-55 years old for women and 18-60 for men.

expected, infrastructure development is a significant factor in the establishment of non-bank MFIs, which is captured by housing stock. Housing stock could be also interpreted as a proxy of household wealth, as investments in immovable property can be seen as a savings buffer and potential collateral for borrowings.

**Table 2. Predicting probability of appearance of non-bank MFIs [Probit]**

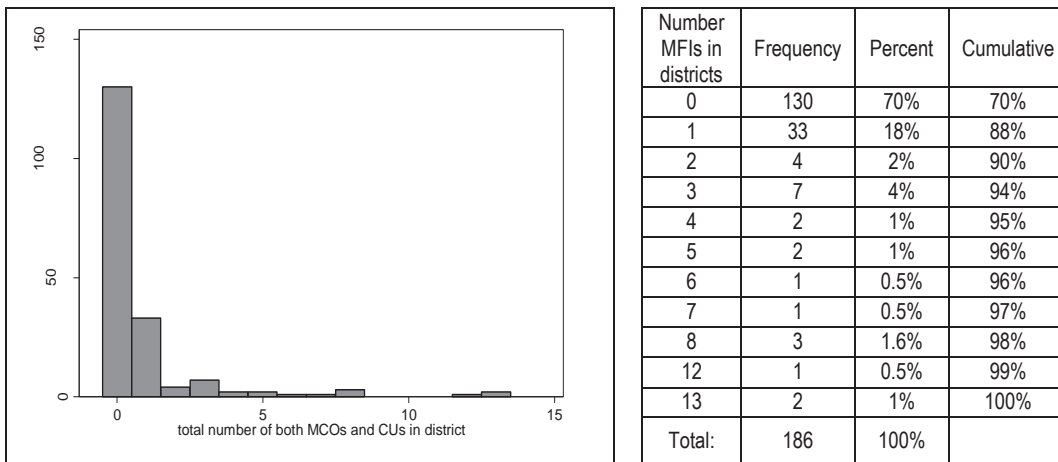
	Variables:	Var. mean:	(1) Probability of MCO and CU		(2) Probability of MCO		(3) Probability of CU	
			Coefficients	Marginal effects	Coefficients	Marginal effects	Coefficients	Marginal effects
(i) Socio-demographic	Econ. active population, '000	66.03	0.010 (0.006)	0.003	0.014* (0.007)	0.000*	0.008 (0.005)	0.002
	Unemployed, % of econ. active ppl	0.34	-0.938 (0.690)	-0.322	-0.738 (0.884)	-0.041	-0.865 (0.717)	-0.222
	Density, total ppl over territory	626	0.000 (0.000)	0.000	0.000** (0.000)	0.000**	-0.000 (0.000)	-0.000
	Urban population	46.37	0.014** (0.006)	0.005**	0.006 (0.004)	0.000	0.008** (0.003)	0.002**
(ii) Infrastructure	Housing stock, sq. meters per capita	14.13	0.090** (0.036)	0.031**	0.091** (0.045)	0.005**	0.077** (0.035)	0.019**
	Medical points, number per 10'000 ppl	152	-0.000 (0.003)	-0.000	-0.006 (0.005)	-0.000	0.001 (0.002)	0.000
	Water pipes, % provision	77.97	0.014 (0.009)	0.004	-0.003 (0.014)	-0.000	0.018* (0.010)	0.004*
	Gas, % provision	77.26	0.000 (0.007)	0.000	0.003 (0.011)	0.000	0.001 (0.007)	0.000
	Road densities	1.33	0.268 (0.276)	0.092	0.119 (0.354)	0.006	0.216 (0.249)	0.055
(iii) Economy structure	SME share in GRP	2.98	0.275* (0.156)	0.094*	0.035 (0.268)	0.002	0.288** (0.140)	0.074**
	Gross Regional Product, bln UZS	2914	-0.000 (0.000)	-0.000	-0.000 (0.000)	-0.000	-0.000 (0.000)	-0.000
	Industrial production, % of GRP	0.57	1.420** (0.591)	0.487**	0.988 (0.847)	0.055	1.157** (0.605)	0.297**
	Trade saldo, million USD	7.53	0.000 (0.000)	0.000	0.000 (0.000)	0.000	0.000 (0.000)	0.000
	Manufacturing sales, '000 UZS p. c.	2915	-1.22e-09 (3.85e-09)	-4.21e-10	-3.34e-09 (3.87e-09)	-1.87e-10	1.39e-09 (3.80e-09)	3.58e-10
	Retail sales, '000 UZS p. c.	0.57	5.79e-09 (7.70e-09)	1.99e-09	9.15e-10 (7.74e-09)	5.12e-11	7.89e-09 (6.40e-09)	2.03e-09
	Constant		-6.942*** (1.947)		-3.744 (2.966)		-7.293*** (1.860)	
	Number of obs.		184	184	184			
	Pseudo R <sup>2</sup>		0.48	0.53	0.42			
	DoF		15	15	15			
	LR chi2		108	64	87			

Note: The table reports coefficient estimates and marginal effects from *probit* regression where the dependent variable is an *MFI dummy* equal 1 if there is a non-bank MFI in the district and 0 if none. Non-bank MFIs include Microcredit Organizations (MCO) and Credit Unions (CU), as of 2011 year end. The statistical significance of the marginal effects are taken from the coefficients. Local currency is Uzbek soums (UZS). The official exchange rate is 2100 Uzbek soums to US dollar, in September 2013. Summary statistics of supply-side determinants are presented in Table 6. Standard errors in parenthesis. \*, \*\*, \*\*\* denote 10%, 5% and 0% significance levels.

**Number of MFIs:** To predict the number of MFIs in districts, the Poisson regression model is estimated. The Poisson model is the most popular model for count data and is justified in this case, given that there are few MFIs per district. Poisson regression imposes a very strong assumption that conditional variance equals a conditional mean. Therefore, we first verify the equality for all dependent variables, and plot the distributions which are found to be skewed, thus validating the Poisson regression<sup>40</sup>. Robust standard errors are used for the parameter estimates as recommended by Cameron and Trivedi (2009) to control for mild violation of the distributional assumption that the variance equals the mean.

Plotting the distribution of MFIs, a truncation around zero is observed, given that there is a sufficiently high number of a district without any MFI (Table 3).

**Table 3. Frequency distribution of non-bank MFI in districts**



Therefore we estimate the probability of observing  $y_j$  number of MFIs given that  $y_j > \tau_j$ , where  $\tau_j$  is a truncation point, is given by the following formula (Cameron and Triverdi, 1998). In this case the truncation point is around zero.

$$\Pr(Y = y_j | y_j > \tau_j, x_j) = \frac{\exp(-\lambda)\lambda^{y_j}}{y_j! \Pr(Y > \tau_j | x_j)}$$

Table 3 reports estimation results from the truncated Poisson regression. In line with the a priori hypotheses and their dual private commercial nature, MFIs are established in urban areas where population density and the share of economically active population is high. Infrastructure provision measured by housing stock, and provision of water and gas pipes is found to be a significant

<sup>40</sup> Available from the author upon request.

determinant of the presence of non-bank MFIs. Economic development of the regions also plays a significant role in institutional growth. We find industrial production as a percentage of Gross Regional Product and volume of retails sales to be significant determinants of non-bank MFI growth. This is in line with the findings of Ahlin et al. (2010) that a larger service sector predicts faster MFI growth.

Given the heterogeneity of the lending mechanism, we separate the analysis for MCOs (model 2) and CUs (model 3) (Table 4). An important finding is that we are able to identify different patterns of supply-side determinants across these MFIs. The determinants of MCO growth (population density, share of urban population, and housing stock) are closely associated with the household/family nature of business to which the microcredits are disbursed. In contrast, CUs serve middle class enterprises a higher business and economic scale, for which the economic development of the region and industrial composition is an important factor. This is exactly observed in the data and captured by industrial production and volume of retails sales. The share of the economically active population in districts is an important determinant for CU growth and reflects the employment capacity of higher profile SMEs funded by microcredits.

**Table 4. Predicting number of non-bank MFIs [Truncated Poisson]**

	Variables:	Var. mean:	(1) Number of MCO and CU	(2) Number of MCO	(3) Number of CU
(i) Socio-demogr.	Econ. active population, '000	66.03	0.008*** (0.002)	0.006 (0.005)	0.007** (0.002)
	Unemployed, % of econ. active ppl	0.34	-0.120 (0.484)	0.146 (0.846)	-0.373 (0.613)
	Density, total ppl over territory	626	0.000* (0.000)	0.000** (0.000)	0.000 (0.000)
	Urban population	46.37	0.004** (0.001)	0.008* (0.003)	0.004** (0.004)
(ii) Infrastructure	Housing stock, sq. meters per capita	14.13	0.069** (0.023)	0.088* (0.051)	0.069* (0.028)
	Medical points, number per 10'000 ppl	152.07	-0.001 (0.001)	-0.006 (0.004)	-0.000 (0.001)
	Water pipes, % provision	77.97	0.025** (0.009)	0.002 (0.018)	0.032** (0.010)
	Gas, % provision	77.26	0.019** (0.008)	0.024 (0.017)	0.019* (0.009)
	Road densities	1.33	-0.206 (0.171)	-0.608 (0.428)	-0.148 (0.198)
(iii) Economy structure	SME share in GRP	2.98	0.105 (0.111)	0.386 (0.368)	0.174 (0.121)
	Gross Regional Product, billion UZS	2914.8	-0.000 (0.000)	0.000 (0.000)	-0.000 (0.000)
	Industrial production, % of GRP	0.57	0.990* (0.424)	0.353 (1.069)	1.089** (0.495)
	Trade saldo, million USD	7.53	0.000 (0.000)	-0.000 (0.000)	0.000 (0.000)
	Manufacturing sales, 0'000 UZS p. c.	2915	-1.06e-09 (2.05e-09)	-4.79e-10 (3.44e-09)	-1.60e-09 (2.71e-09)

	Retail sales, 0'000 UZS p. c.	0.57	1.01e-08** (3.20e-09)	7.42e-09 (8.06e-09)	1.11e-08** (3.55e-09)
	Constant		-6.816*** (1.409)	-3.163 (3.843)	-8.069*** (1.604)
<hr/>					
	Number of obs.		184	184	184
	Pseudo R <sup>2</sup>		0.49	0.61	0.47
	DoF		15	15	15
	LR chi2		302	179	251

*Note:* The table reports estimation results from a *truncated Poisson regression model for count data*, with robust standard errors. The dependent variable is an *MFI number* (number of MCOs and CUs), *MCO number* and *CU number* in districts. Non-bank MFIs include Microcredit Organizations (MCO) and Credit Unions (CU). All models passed the goodness-of-fit specification test. Equality of means and variances of dependent variables have been tested and confirmed. Local currency is the Uzbek soum (UZS). The official exchange rate was 2100 Uzbek soums to US dollar, in September 2013. Summary statistics of supply-side determinants are presented in Table 6. Standard errors in parenthesis. \*, \*\*, \*\*\* denote 10%, 5% and 0% significance levels.

Overall, the results of probit and truncated Poisson models suggest that non-bank microfinance institutions in Uzbekistan follow general economic principles. Given that these institutions represent the financial segment functioning based on competitive market principles, historical changes in the legal framework and other exogenous changes did not affect their free market functioning.

We also find evidence of an upward selection of MFIs. As expected, they evolve in the areas with better infrastructure, stronger human capital and better growth opportunities. Albeit within-country evidence, the findings are in line with relevant macro-level studies by Vanroose (2008), Vanroose & D'Espallier (2009), Hermes et al. (2009) and Ahlin et al. (2010). The macro (regional) and institutional environment is a significant determinant of MFI appearance and growth.

It should also be stressed that while we are able to identify the trends and decomposition of supply side determinants, the economic significance of estimated coefficients is quite low. This might be explained by the relatively nascent development stage of the microfinance sector in Uzbekistan and large untapped potential for growth.

**Robustness checks:** Observing relatively few significant determinants in Probit and truncated Poisson regression models, we performed a diagnostic test for potential multicollinearity of the variables. A variance inflation factor (VIF) analysis did not reveal any multicollinearity issue either at the individual variable or at mean value, which is equal to 2.45 (Table 8). We also performed a sensitivity analysis<sup>41</sup> by dropping one of the variables on an identified pair of correlated variables (Table 9). The results of Probit and truncated Poisson regression results did not change in the significance of coefficients or in their sign. We therefore re-confirm the stability of the findings on the supply-side determinants of MFIs.

Finally, we performed a factor analysis for the set of infrastructure related variables (population density, housing, medical points, water pipes, road density) given that they all measure similar things. Table 9 and 10 reports eigenvalues and factor loadings of three extracted factors: Factor 1

<sup>41</sup> Results of the sensitivity analysis are available from the author upon request.

(urbanization), Factor 2 (housing) and Factor 3 (roads). Re-estimation of the Poisson model with Factor 1 (urbanization) and Factor 2 (housing) did not reveal major changes of original findings (Table 3 compared to Table 12 and Table 13).

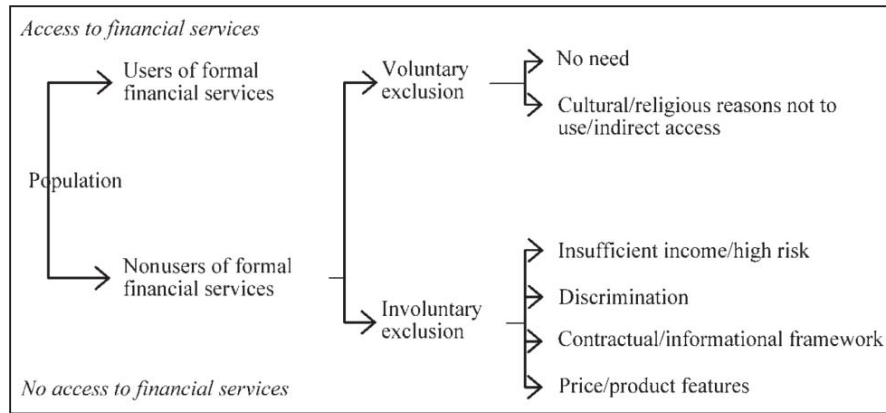
#### **4. Excess Demand for Microcredits**

For a holistic vision of the microfinance sector, we complement the supply-side analysis with a demand-side one by assessing the excess demand for microcredits in Uzbekistan. This is important for policy agendas as, according to global data, 2.5 billion adults, almost half of the world's population, do not use formal financial services (Chaia et al., 2009). Despite this number, the true margins of the untapped market are not yet clear.

There are numerous estimates of excess demand for microcredits in Uzbekistan as well, provided primarily by donor evaluation reports. The estimates are stated in monetary terms or by numbers of people. According to the World Bank (2007) estimates, in 2006 the microfinance market in Uzbekistan was deeply underserved: outstanding loans of non-bank MFIs were equivalent to 1 USD per capita. In comparison, bank loans to households and small enterprises averaged 7 USD per capita or 1.2% of GDP. Based on an international comparison of the microfinance segment and assuming an 8% penetration rate, the estimated demand for microcredits was 500 million USD, which represented one third of the broad money circulating outside the banking system in 2006 (World Bank, 2007). According to a UNDP (2011) forecast, the demand for microcredits is equal to 735 million USD in 2012 and is predicted to grow to 5772 million USD by 2020.

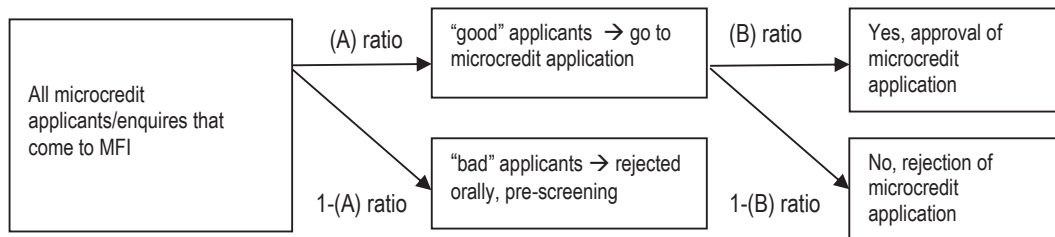
However, a huge untapped demand does not necessarily mean that all are eligible to receive microcredit. It is also important to distinguish between *use of* and *access to* microcredits which are two different concepts (Figure 6). People who are voluntarily self-excluded are not expected to demand microcredits. Involuntary exclusion from financial services and microcredits in Uzbekistan can be caused by lack of required collateral, insufficient income, high risk profile, lack of financial literacy, absence of profitable business enterprise and geographical difficulties in reaching non-bank MFIs.

**Figure 6. Distinguishing access to and use of financial services**



Source: Beck, Demirgüç-Kunt, Honohan (2009)

Therefore we focus on estimating the excess demand for the *use* of microcredits. The particular value added is based on the identification of eligible non-participants (ENP), as not all visitors to MFIs end up eventually getting a microcredit due to various reasons. This might be an important policy question, relevant for investment decisions and helpful in defining the actual boundaries of the markets. The latter is of particular concern for saturated and highly competitive markets as the pool of “good” clients shrinks. The methodology is based on ratio analysis of received and approved loan applications by non-bank MFIs. MFI managers and credit officers were asked to provide two ratios: (A) ratio of credit applications that are sent for application procedures, i.e., pre-screening, and (B) ratio of ultimately approved credit applications from the pre-screened pool. The total probability of microcredit approval by non-bank MFIs was found to be on average 0.5 (Table 4).



The average range for both (A) and (B) ratios is given in Table 5. While there are minor differences between types of MFIs, both MCOs and CUs pre-screen initial credit applications and inquires. Once the loan application passes initial pre-screening, there is a very high probability of final approval reflected in the value of (B) ratio.

**Table 5. Total probability of obtaining microcredit in non-bank MFIs**

Non-bank MFI:	(A) ratio, range	(B) ratio, range	(A)*(B), range
	probability of being successfully pre-screened and being sent to compile microcredit application folder	probability of final approval of microcredit application	total probability of microcredit approval, which also reflects the pool of eligible non-participants
Credit Unions	0.3 - 0.8	0.80 - 0.87	0.24 – 0.7
Microcredit Organizations	0.2 - 0.9	0.90 - 0.96	0.18 – 0.86
<i>Average for MFIs:</i>	<i>0.25 – 0.85</i>	<i>0.85 – 0.91</i>	<i>0.21 – 0.78</i>
<i>Average of the range:</i>	<i>~ 0.56</i>	<i>~ 0.88</i>	<i>~ 0.49</i>

The microcredit approval rate also slightly varies for CUs, depending on the seasonality of businesses and portfolio quality given the balance on the deposit side. Possible sources of variations in the above mentioned (A) and (B) ratios are potentially defined by urban/rural location of MFIs, and the pool of eligible and potential clients. For instance, urban clients are found to be more “capricious and demanding”<sup>42</sup> than rural ones, which is reflected in difficulties in loan repayment and enforcement. Non-bank MFIs also maintain a stable pool of loyal clients, which also guarantees a minimum level of demand. Some CUs and MCOs also apply marketing tools (i.e. chain marketing, promotion of credit products to targeted clients<sup>43</sup>) to boost demand, increase market share and diversify their credit portfolio.

Based on this ratio analysis, we therefore conclude that careful consideration is needed when advocating that there is huge demand for microcredits. The actual margins of the untapped market could shrink by as much as half when the narrower definition of eligible applicants is taken into consideration. The result conveys policy relevance, especially when tailoring recommendations on microfinance program expansion and forecasting demand for microcredits.

<sup>42</sup> In-depth interviews with MFI credit officers and management.

<sup>43</sup> For example promotion of educational loans covering tuition fee at local Universities.

## Conclusion

The chapter describes the microfinance environment in Uzbekistan with a special focus on two types of non-bank microfinance institutions - Credit Unions and Microcredit Organizations. The private commercial nature of these MFIs provides new evidence on the commercially oriented microcredit model and SME lending, which is an emerging trend in mainstream microfinance.

The chapter provides two important contributions.

On the supply side of microcredits, the determinants of initial placement of MFIs are analysed. Using district level data, we find that the determinants of MCO growth are closely associated with the household/family nature of business to which the microcredits are disbursed. In contrast, CUs serve middle class enterprises on a higher business and economic scale, for which the economic development of the region and industrial composition is an important factor. The results suggest that non-bank microfinance institutions in Uzbekistan follow general economic principles. Given that MFIs represent the financial segment functioning based on competitive market principles, historical changes in the legal framework and other exogenous changes did not impede their free market functioning.

On the demand side, the excess demand for microcredits is analysed. The specific contribution is based on identification of eligible non-participants, as not all visitors to MFIs end up eventually getting the microcredit. Analysing the ratios from MFI managers and credit officers, we find that the total probability of microcredit approval is on average 0.5. This data is potentially important for policy makers, as actual margins of the untapped market could shrink by as much as half when the narrow definition of eligible applicants is taken into consideration.

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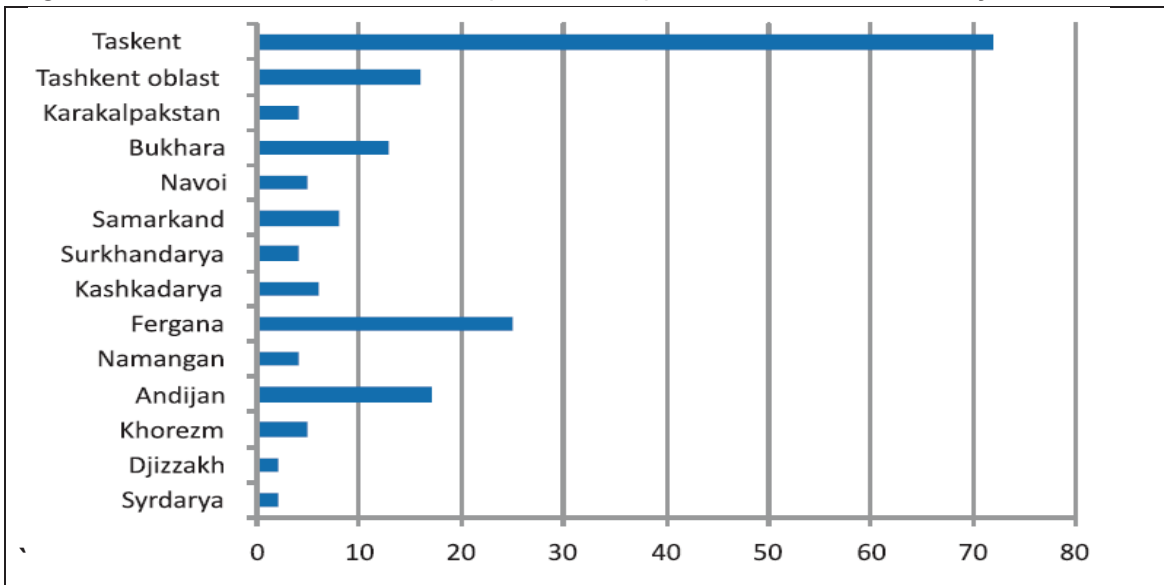
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## APPENDIX

Figure 7. Distribution of non-bank MFIs (MCO and CU) in Uzbekistan, as of January 2011



Source: author's computation based on the data from the Central Bank of Uzbekistan

**Table 6. Selected economic, human development and business environment indicators for Uzbekistan**

[A] Macroeconomic Indicators:	Uzbekistan [2010]	Europe and Central Asia [2010]	OECD [2010]	World [2010]
Population, total, million	28.2	890.2	1236.1	6840.5
Population growth (annual %)	1.4	0.4	0.6	1.1
GDP (current USD) billion	39	20053	42809	63124
GDP growth (annual %)	8.5	2.4	3.1	4.2
GDP per capita (current USD)	1384	22527	34631	9228
GDP per capita growth (annual %)	7.0	2.1	2.4	3.0
Inflation, GDP deflator (annual %)	18.5	2.0	1.3	4.4

[B] Business Environment Indicators:	Uzbekistan rank out of 183 [2012]	Europe and Central Asia [2012]	OECD [2012]	World [2012]
Starting a business:	96			
Procedures, number	6	6	5	7.1
Time, days	14	16	12	28
Cost, % of income per capita	6.4	8.3	4.7	30.1
Getting credit:	159			
Strength of legal rights index (0-10)	2	7	7	6
Depth of credit information index (0-6)	3	5	5	3.4
Public registry coverage (% of adults)	5	16.2	9.5	8.4
Private bureau coverage (% of adults)	3.6	29.4	63.9	23.7
Paying taxes:	157			
Payments (number per year)	41	37	13	28
Profit tax (%)	1.1	9.3	15.4	15.6
Total tax rate (% profit)	97.5	40.4	42.7	42.7
Registering property	136			
Enforcing contracts	43			
Protecting investors	133			
Ease of doing business index (1=most business-friendly regulations, out of 183 countries)	166			

[C] Human Development Indicators:	Uzbekistan [2011]	Low human development [2011]	Medium human development [2011]	High human development [2011]
GNI per capita (constant 2005 USD, PPP terms) <sup>44</sup>	2'967	1'585	5'276	11'579
GNI per capita [Living standards index]	0.486	0.396	0.568	0.681
Life expectancy at birth [Health index]	0.752	0.611	0.784	0.838
Expected and mean years of schooling [Education index]	0.711	0.392	0.561	0.715
Human Development Index [HDI] value	0.641	0.456	0.630	0.741

Notes: the table provides a set of indicators for Uzbekistan compared with Europe and the Central Asia region, OECD countries and the world average. Data on [A] Macroeconomic indicators are based on World Bank World Development Indicators and the Global Development Finance on-line database. Data on [B] Business environment indicators are based on the "Doing Business Report 2012" report and on-line database. [B] Human development indicators are based on the UNDP on-line database. The HDI index is a composite index measuring average achievement in three basic dimensions of human development—a long and healthy life, knowledge and a decent standard of living.

<sup>44</sup> GNI per capita in Atlas method of the World Bank (current USD) was 1280 USD as of year 2010. Source: World Bank, World Development Indicators 2011 database.

**Table 7. Summary statistics district level determinants of non-bank MFIs**

	Variables:	Definition:	Mean	Std. dev.	Min	Max
(i) Socio-demographic	Economically active population, '000	economically active population, thousand people	66.03	41.16	7.6	252.40
	Unemployed, % of econ. active ppl	number of registered unemployed people	0.34	0.38	0.01	2.93
	Density, total ppl over territory	total population over territory of the district	626	1391	1	10805
	Urban population	district urban population, '000 people	46.37	74.83	0	393
(ii) Infrastructure	Housing stock, sq. meters per capita	housing stock, sq. meters per person in districts	14.13	4.06	7.10	32.70
	Medical points, number per 10'000 ppl	number of medical points (i.e. medical points, doctors, beds, medical receptions, doctors and other health infrastructure) per 10.000 people in districts	152.07	59.03	27.30	380.50
	Water pipes, % provision	provision with centralized water pipes, %	77.97	19.75	19.70	139.90
	Gas, % provision	provision with natural gas, %	77.26	22.25	0.00	100.00
	Road densities	density of roads in district, km of road per 100 sq. km of land area	1.33	1.13	0.07	4.46
(iii) Economy structure	SME share in GRP	share of SME in gross regional product	2.98	2.76	0.00	15.65
	Gross Regional Product, billion UZS	gross regional product, billion UZS	2914.8	1767.7	795.4	8502.8
	Industrial production, % of GRP	industrial output, percent of GRP	0.57	0.33	0.26	1.21
	Trade saldo, million USD	export volume – import volume, million USD	7.53	2.25	3.22	12.58
	Manufacturing sales, '000 UZS per capita	manufacturing volume, '000 UZS per capita	2915	1768	795	8503
	Retail sales, '000 UZS per capita	retail sales volume, '000 UZS per capita	0.57	0.33	0.26	1.22

Notes: The table reports summary statistics of district level variables that determine the appearance of non-bank MFIs in Uzbekistan. There are 14 regions in Uzbekistan with a total 184 districts. There are 184 numbers of observations per each variable. Local currency is the Uzbek soum [UZS]. The official exchange rate is 2100 UZS/UZD, as of September 2013.

**Table 7a. Comparison of district level determinants across district with and without MFIs**

	Variables:	Mean District with MFIs	Mean District without MFIs	Difference	95% CI Lower	95% CI Upper	t	df	p-value
(i) Socio-demographic	Economically active population, '000	56	129	-43.01	60.06	72.00	-7.42	183	0.000
	Unemployed, % of econ. active ppl	0.24	0.39	0.15	0.034	0.27	2.53	183	0.994
	Density, total ppl over territory	1613	194	-1419	-1808	-1030	-7.19	182	0.000
(ii) Infrastructure	Housing stock, sq. meters per capita	15.21	13.65	-1.55	-2.82	-0.29	-2.42	183	0.008
	Medical points, number per 10'000 ppl	178	140	-37.89	-55.75	-20.04	-4.18	183	0.000
	Water pipes, % provision	89.6	72.9	-16.69	-22.45	-10.93	-5.71	183	0.000
	Gas, % provision	85.83	73.53	-12.30	19.11	-5.49	-3.56	183	0.000
	Road densities	1.19	1.38	0.18	-0.16	0.54	1.04	184	0.851
(iii) Economy structure	SME share in GRP	8.54	7.08	-1.46	-2.13	-0.78	-4.24	184	0.000
	Gross Regional Product, billion UZS	3979	2456	-1523	-2037	-1010	-5.85	184	0.000
	Industrial production, % of GRP	0.66	0.53	-0.13	-0.23	-0.028	-2.50	184	0.006
	Trade saldo, million USD	-281	92.5	374	150	598	3.29	184	0.999
	Manufacturing sales, '000 UZS per capita	1.46	6502	-8144	-2.03	4004	-1.32	183	0.093
	Retail sales, '000 UZS per capita	8892557	8051581	-840975	-890476	7222807	-0.205	183	0.418

Notes: The table reports the results of a t-test for the main determinants of the placement of non-bank MFIs across districts with MFIs and without MFIs.

**Table 8. Test for multicollinearity**

	Variables:	Variance Inflation Factor	1/Variance Inflation Factor
(i) Socio-demogr.	Economically active population, '000	2.27	0.440
	Unemployed, % of econ. active ppl	1.35	0.738
	Density, total ppl over territory	2.25	0.443
	Urban population	3.35	0.298
(ii) Infrastructure	Housing stock, sq. meters per capita	1.28	0.781
	Medical points, number per 10'000 ppl	1.61	0.620
	Water pipes, % provision	1.50	0.665
	Gas, % provision	1.46	0.684
	Road densities	3.54	0.282
(iii) Economy structure	SME share in GRP	5.76	0.173
	Gross Regional Product, billion UZS	2.69	0.371
	Industrial production, % of GRP	2.13	0.468
	Trade saldo, million USD	4.76	0.210
	Manufacturing sales, '000 UZS per capita	1.25	0.802
	Retail sales, '000 UZS per capita	1.55	0.644
	Mean VIF:	2.45	

Notes: The table reports the test results of multicollinearity measured by Variance Inflation Factor [VIF] as a post-estimation of linear probability model. A variable whose VIF values are greater than 10 indicate multicollinearity (Chatterjee & Hadi, 2006). Tolerance, measured by 1/VIF, is used to check for degree of multicollinearity. A tolerance value of is chosen of 0.1 compared to a VIF of 10. Based on VIF and 1/VIF neither any individual variable nor the mean VIF indicates a multicollinearity issue.

**Table 9. Correlation matrix district level determinants of non-bank MFIs**

	Econ. active population, '000	Unemplod, % of econ. active ppl	Density, total ppl over territory	Urban dummy	Housing stock, sq. meters pc	Medical points, number per 10'000 ppl	Water pipes, % provision	Gas, % provision	Road densities	SME share in GRP	Gross Regional Product, billion UZS	Industrial production, % of GRP	Trade saldo, million USD	Manufacturing sales, '000 UZS p. c.	Retail sales, '000 UZS per capita
Econ. active population, '000	1														
Unemployed, % of econ. active ppl	-0.23	1													
Density, total ppl over territory	0.48*	-0.13	1												
Urban population	0.65*	-0.08	0.66*	1											
Housing stock, sq. meters pc	0.03	0.20	0.10	0.10	1										
Medical points, number per 10'000 ppl	0.18	0.00	0.34*	0.49*	0.06	1									
Water pipes, % provision	0.30*	-0.26*	0.35*	0.36*	-0.09	0.18	1								
Gas, % provision	0.21	-0.01	0.29*	0.32*	0.2*	0.27*	0.28*	1							
Road densities	0.00	-0.07	0.05	0.03	0.00	-0.03	-0.13	-0.01	1						
SME share in GRP	0.30*	-0.03	0.36*	0.30*	0.05	0.22	0.35*	0.26*	-0.42*	1					
Gross Regional Product, billion UZS	0.48*	-0.23	0.52*	0.41*	0.11	0.23	0.35*	0.15	-0.11	0.51*	1				
Industrial production, % of GRP	0.03	-0.14	-0.02	0.00	-0.10	0.06	0.11	-0.17	-0.53*	0.14	0.37*	1			
Trade saldo, million USD	-0.32*	-0.00	-0.44*	-0.36*	-0.06	-0.29*	-0.22	-0.23	-0.15	-0.71*	-0.46*	0.15	1		
Manufacturing sales, '000 UZS per capita	0.08	-0.07	-0.06	0.09	-0.09	-0.06	0.07	-0.02	0.06	-0.26*	-0.03	0.09	0.30*	1	
Retail sales, '000 UZS per capita	-0.09	0.17	0.01	-0.00	-0.15	-0.22	0.04	-0.11	0.39*	-0.25	-0.25*	-0.30*	0.06	0.12	1

Notes: \* denotes statistical significance at 1% level

**Table 10. Factor Analysis**

Factor:	Eigenvalue:	Difference:	Proportion:	Cumulative:
Factor 1	1.92	0.75	0.32	0.32
Factor 2	1.16	0.15	0.19	0.51
Factor 3	1.01	0.22	0.16	0.68
Factor 4	0.78	0.16	0.13	0.81
Factor 5	0.62	0.144	0.10	0.92
Factor 6	0.48	.	0.08	1.00

Notes: The table reports the results of factor analysis of infrastructure related determinants: population density, housing, medical points, water pipes, road density. Based on eigenvalues the first three factors are chosen for further analysis.

**Table 11. Rotated factor loadings**

Variable:	Factor 1 [Urbanization]	Factor 2 [Housing]	Factor 3 [Roads]	Uniqueness:
Density	0.76	0.10	0.17	0.37
Housing	-0.05	0.91	0.00	0.15
Medical points	0.63	0.15	0.04	0.57
Water pipes	0.72	-0.19	-0.28	0.35
Gas	0.51	0.60	-0.07	0.36
Road densities	-0.00	-0.01	0.96	0.06

Notes: The table reports the results of rotated factor loadings based on the factor analysis of the following infrastructure related determinants: population density, housing, medical points, water pipes, road density.

**Table 12. Predicting the number of non-bank MFIs in districts of Uzbekistan, factor analysis  
[Factor 1 and Factor 2]**

	Variables:	[1] Number of MCO and CU	[2] Number of MCO	[3] Number of CU
(i) Socio-	Econ. active population, '000	0.015*** (0.00)	0.015*** (0.00)	0.014*** (0.00)
	Unemployed, % of econ. active ppl	-0.415 (0.62)	0.629 (0.80)	-0.882 (0.76)
(ii) Infrastruct	Factor 1[Urbanization]	0.655*** (0.07)	0.913*** (0.18)	0.590*** (0.08)
	Factor 2 [Housing]	0.538*** (0.12)	0.661* (0.28)	0.536*** (0.14)
(iii) Economy structure	SME share in GRP	0.272* (0.11)	-0.015 (0.20)	0.349** (0.11)
	Gross Regional Product, billion UZS	-0.000* (0.00)	0.000 (0.00)	-0.000* (0.00)
	Industrial production, % of GRP	1.500*** (0.35)	0.455 (1.03)	1.667*** (0.39)
	Trade saldo, million USD	0.000* (0.00)	0.000 (0.00)	0.000* (0.00)
	Manufacturing sales, 0'000 UZS p. c.	-5.663e-10 (0.00)	3.833e-10 (0.00)	-1.174e-09 (0.00)
	Retail sales, 0'000 UZS p. c.	1.442e-08*** (0.00)	9.080e-09 (0.00)	1.594e-08*** (0.00)
	Constant	-4.6295*** (1.29)	-4.5884* (1.83)	-5.3140*** (1.39)
	Number of obs.	184	184	184
	Pseudo R <sup>2</sup>	0.48	0.41	0.44
	DoF	10	10	10
	LR chi2	225	83	187

Note: The table reports estimation results from a *truncated Poisson regression model for count data*, with robust standard errors. The dependent variable is a *MFI number* (number of MCOs and CUs), *MCO number* and *CU number* in districts. Non-bank MFIs include Microcredit Organizations (MCO) and Credit Unions (CU). All models passed the goodness-of-fit specification test. Equality of means and variances of dependent variables have been tested and confirmed. Infrastructure variables have been replaced by Factor 1 and Factor 2 based on factor analysis. Local currency is the Uzbek soum (UZS). The official exchange rate is 2100 UZS/USD, as of September 2013. Summary statistics of supply-side determinants are presented in Table 6. Standard errors in parenthesis. \*, \*\*, \*\*\* denote 10%, 5% and 0% significance levels.

**Table 13. Predicting number of non-bank MFIs in districts of Uzbekistan, factor analysis [Factor 1]**

	Variables:	[1] Number of MCO and CU	[2] Number of MCO	[3] Number of CU
(i) Socio-	Econ. active population, '000	0.013*** (0.00)	0.012** (0.00)	0.013*** (0.00)
	Unemployed, % of econ. active ppl	-0.287 (0.63)	0.705 (0.70)	-0.777 (0.82)
(ii) Inf	Factor 1[Urbanization]	0.656*** (0.08)	0.879*** (0.20)	0.599*** (0.09)
(iii) Economy structure	SME share in GRP	0.254* (0.12)	0.004 (0.19)	0.329** (0.13)
	Gross Regional Product, billion UZS	-0.000 (0.00)	0.000 (0.00)	-0.000 (0.00)
	Industrial production, % of GRP	1.117*** (0.33)	0.063 (1.05)	1.286*** (0.37)
	Trade saldo, million USD	0.000* (0.00)	0.000 (0.00)	0.000* (0.00)
	Manufacturing sales, '000 UZS p. c.	-1.428e-09 (0.00)	1.698e-11 (0.00)	-2.304e-09 (0.00)
	Retail sales, '000 UZS p. c.	1.235e-08*** (0.00)	5.896e-09 (0.00)	1.410e-08*** (0.00)
	Constant	-4.3138** (1.33)	-4.2121* (1.66)	-5.0358*** (1.47)
	Number of obs.	184	184	184
	Pseudo R <sup>2</sup>	0.45	0.38	0.41
	DoF	9	9	9
	LR chi2	190	102	157

Note: The table reports estimation results from a truncated Poisson regression model for count data, with robust standard errors. The dependent variable is an MFI number (number of MCOs and CUs), MCO number and CU number in districts. Non-bank MFIs include Microcredit Organizations (MCO) and Credit Unions (CU). All models passed the goodness-of-fit specification test. Equality of means and variances of dependent variables have been tested and confirmed. Infrastructure variables have been replaced by Factor 1 based on factor analysis. Local currency is the Uzbek soum (UZS). The official exchange rate is 2100 UZS/USD, as of September 2013. Summary statistics of supply-side determinants are presented in Table 6. Standard errors in parenthesis. \*, \*\*, \*\*\* denote 10%, 5% and 0% significance levels.

## Chapter 3

# Better Access to Microcredits: Does Geographical Proximity Matter?

### **Abstract**

Despite substantial improvements in access to finance, the geographical distance of a household to financial institutions still constitutes a significant obstacle in many developing countries. This chapter aims to measure the causal impact of improved access to microcredits as it relates to the distance to the nearest microfinance institution in the case of Uzbekistan. Geographical proximity to microfinance institutions is also considered as a proxy for knowledge spillover effects of microcredits that have not been investigated before, given the challenges of measurement. The methodology is based on propensity score matching using initial covariates that are re-created retrospectively in a cross-sectional survey which is considered as a novel and robust approach for impact assessment. The findings suggest that households located closer to microfinance institutions are more likely to start a new business, and to generate higher revenue, but to reduce the number of employees of their enterprises. On the consumption side, households are found to invest more in human capital such as education and health and to reduce expenditures on non-durable items such as weddings and other social events.

**JEL Codes:** O16, C34

**Keywords:** microcredit, microfinance institutions, retrospective panel

## 1. Introduction and Motivation

According to Global Findex Data (2012), around 2.5 billion adults, roughly half of the world's adult population, do not have a formal bank account (Demirguc-Kunt & Klapper, 2012). This indicates the existence of various obstacles, including information asymmetries between borrower and lender, cost of transactions, legal, and geographical barriers. Market structure and interaction between formal and informal financial institutions account for these market failures (Karlan & Morduch, 2010).

Over recent decades, the microfinance movement has gained worldwide recognition as an important tool for economic development and improved access to finance. While numerous attempts<sup>45</sup> have been made to measure the direct impact of microcredit on microenterprises and consumer wellbeing, the evidence on learning and spillover effects is quite thin. Households with access to microcredits not only benefit directly from funds but more importantly learn to run microenterprise, perform financial transactions, and improve their financial literacy (Bauchet et al. 2011). The spillover effects occur when these information and learning effects spread to nearby non-recipients of microfinance programs. Therefore inferences on such spillover effects of microcredits are important as they may bring even more valuable and sustainable effects just those of the short-term effects. Group lending and peer monitoring are important tools specific to microfinance models that enhance knowledge spillover effects different from conventional banking (Barboza & Barreto, 2006). Microfinance institutions (MFIs) hold a particular niche among formal financial intermediaries such as banks, insurance companies and informal moneylenders. The niche is particularly important as consumers interact more and thus have greater opportunities to peer monitor each other than do formal financial institutions. This is one of the important reasons for the efficiency of nonmarket institutions where formal institutions fail (Besley 1995).

This chapter is aimed at measuring the causal impact of improved access to microcredits in terms of the distance to the nearest MFI. Geographical distance affects spillover and learning effects of microfinance programs that are hard to capture directly. Proximity matters because of travel, time and other pecuniary costs, and, more importantly in terms of knowledge diffusion and (dis)connection from the microfinance network causing "signal dissipation". Within current empirical literature this is the first evidence quantifying the impact of geographical obstacles on a full set of household indicators, capturing their business enterprise and consumption patterns.

The evidence is based on the specific microfinance environment in Uzbekistan, Central Asia region. The particular market evolution in the country provoked the emergence of two types of non-bank

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<sup>45</sup> See Bauchet et al. (2011) for summary of recent empirical findings on measuring the impact of microfinance.

MFIs: microcredit organizations (MCOs) that operate similarly to a traditional form microfinance model under group lending though without external donor support, and credit unions (CUs) that function similarly to commercial SME finance models. The analysis therefore provides additional insights into microcredit impact assessment literature and specifically on the SME lending model, which is an emerging trend in the literature (Bauchet & Morduch, 2011; Bateman, 2010).

The primary objective is to estimate the causal effect of better geographical proximity. Therefore propensity score (p-score) matching is employed as a second best solution for program evaluation in the absence of experimental intervention. 25% of households residing the closest to MFIs are matched with the 25% residing the farthest, which defines the “treatment” as having easy geographical access to microcredits. To ensure proper implementation of matching technique, initial level covariates are re-created using a set of retrospective questions embodied in a single cross-sectional design. The accuracy and memory recall of retrospective data is ensured by the use of “fundamental events” that are discrete and significant in the life of households and therefore are easy to recall by survey respondents. The supply-side selection stemming from non-random placement of MFIs is addressed by using district level socio-economic determinants.

The findings indicate that in households with better access to microcredits, clients run more profitable enterprises in terms of significant increase in income and profits. On the other hand, they reduce the number of employees of their businesses. On the consumption side, households are found to make more rational resource allocation by investing more in human capital, captured by larger expenditures on health and education and reduction of non-durable items such as weddings and other social events. Overall results indicate a positive and significant effect of improved access to microcredits. The dataset, however, is limited to clearly distinguishing the extent of the underlying mechanism - whether the effect is due to geographical proximity or knowledge diffusion, which calls for further research.

## **2. Literature Review**

### **2.1. Theory of Market Structure and Spillover Effects**

Buera et al. (2012) develop a General Equilibrium model to assess the potential impact of economy-wide microfinance availability and credit expansion. According to theoretical predictions, typical microfinance programs can have significant aggregate and pro-poor redistributive impacts: benefiting the poor (defined as marginal entrepreneurs) directly, and workers indirectly through higher wages—and

potentially hurting the most able and richest entrepreneurs through higher factor prices. Theoretical predictions are confirmed in recent experimental evaluations of microfinance programs in India (Banerjee et al., 2010), Thailand (Kaboski & Townsend, 2011, 2012), Mongolia (Attanasio et al., 2011), Morocco (Créponet et al., 2011), and the Philippines (Karlan & Zinman, 2010). Experimental expansion of microcredit programs in these countries is found to cause an increase in investment, entrepreneurship and consumption of households. The findings potentially indicate that microcredit beneficiaries are indeed able to learn to run business enterprises more efficiently and to change their consumption behaviour towards more rational resource allocation.

Other dimensions of learning and spillover effects come from the specific nature of microfinance networks that are different from conventional banking. In particular, microfinance programs offer strong solutions for asymmetric information and moral hazard in credit markets. The underlying mechanism is related to social networks, the role of joint liability group lending which facilitates screening, monitoring and enforcement of contracts, thus reducing agency costs for MFIs (Karlan & Morduch, 2009). Using data from Mexico, Barboza and Barreto (2006) find that learning by association is at the core of the success of microcredit programs. Microcredits work as a tool, teaching clients how to manage funds, develop entrepreneurial skills and succeed in a market-based society. Moreover, spillover learning effects occur both within and across microcredit borrowing groups. Successful small entrepreneurs can educate members of the group who perform poorly by sharing their managerial skills and work habits. Wydick (1999) provides evidence from Guatemala on the role of social networks, where higher loan repayment is observed when borrowers are more connected to each other. Karlan (2007) shows that microcredit groups with greater levels of social connections such as ethnic ties and geographical proximity have lower default and higher savings rates. Wydick, Karp & Hilliker (2011) analyze the role of social networks as a determinant of MFI outreach in Guatemala. The authors find that households that belong to the same church also have a higher probability of obtaining the microcredit.

All of this evidence suggests the important role of microfinance programs and learning through social networks, which is lacking in conventional credit institutions. Therefore, it might be valid to assume that geographical proximity to MFIs serves as a “radar signal,” dissipating with distance from the network. The strength of learning and spillover effects, which is challenging to measure directly, could be captured by using geographical distance as a proxy.

## 2.2. The Role and Impact of Distance in Microcredit

In most developing countries, geographical or physical access is among the barriers that prevent small businesses and poor households from accessing financial services. While some financial institutions allow clients to access financial services over the phone or via the Internet, most financial institutions including MFIs require clients to visit a branch, ensuring repayment and collection of hard and soft information (World Bank, 2008; Presbitero, 2012).

The role of geographical distance has been widely investigated in commercial banking as a proxy for transportation costs and informational asymmetries between lenders and borrowers (Allesandrini, Fratianni, Zazzaro, 2009; Allesandrini, Fratianni, Zazzaro, 2010). Decentralized banking systems and geographical proximity is considered a key factor for access to credit, given that local bank branches guarantee personal contacts with borrowers through which hard and soft information is collected. This allows financial institutions to reduce the costs of monitoring of borrowers (Presbitero & Ravellotti, 2012).

Compared to conventional banks, the geographical outreach of microfinance institutions has been less studied, mainly due to a general assumption that MFIs are close to beneficiaries and locally embedded in the communities they operate in (Bateman & Chang, 2009). Gulli & Berger (1999) find that poor infrastructure, unfavorable geographic conditions and low population density hinders the outreach of MFIs in remote and rural areas.

As noted previously, there are few studies measuring the direct effect of geographical distance on access to microcredit and on loan outcomes. Few studies evaluate the impact of the distance on loan repayment rates but find contrasting results: while distance is negatively correlated with microcredit repayment in Nigeria (Oke, Adeyemo & Agbonlahor, 2007), the same effect has not been found in Malaysia (Roslan & Karim, 2009). Providing evidence from Niger, Pedrosa and Do (2011) consider the physical distance between borrowers and MFI as a proxy for transportation costs and information asymmetries. To counter with the effects of geographical distance, MFIs adapt their policies through more restrictive loan conditions, higher interest rates and more intensive screening. Providing evidence from Mexico, Barboza and Trejos (2009) find that urban versus rural location of MFIs, and thus geographical barriers, have a significant influence on group lending and peer monitoring in microcredit repayment. Presbitero and Rabellotti (2012) estimate the effect of distance on a borrower's self-assessed outcome of a microcredit project in Colombia and confirm the presence of moral hazard where agency cost is found to increase with the distance.

There are two recent non-experimental studies which examine the impact of geographical distance to an MFI on financial inclusion. Allen et al. (2013) employ household survey and bank penetration data from Equity Bank in Kenya. The findings suggest that the presence of Equity Bank has a positive and significant impact on households' use of bank accounts and bank credit, especially for those who are ignored by traditional commercial banks. Brown et al. (2013) study the expansion of the branch network of ProCredit banks in South-East Europe between 2006 and 2010. In particular, the authors examine how geographical proximity to a microfinance bank affects the use of bank accounts by low-income households. The findings suggest that microfinance banks promote financial inclusion even in emerging markets where conventional banks perform their lending activities well. Compared to studies that measure the effect of distance, this chapter contributes to the literature in the following aspects. First, within current empirical findings this is the first evidence of the impact of geographical distance on business indicators and household consumption behavior. This might convey important policy perspectives given the vast donor interest in the microfinance sector and the choice of location for establishing a microfinance institution. More importantly, the causal impact is assessed by addressing both demand and supply side selection bias of microcredit participation, thus ensuring the robustness of results. Second, distance is used as a proxy for broader learning and spillover effects of microcredits that have not been investigated before given the challenges of the measurement. In contrast to other empirical studies, the sample includes not only borrowers, but also non-borrowers. The specific microfinance environment in Uzbekistan provides evidence of private commercial non-bank MFIs supporting both consumer and business loans. The country's heterogeneous geographical landscape is beneficial as it validates the use of distance to the nearest MFI as an informative proxy.

### **2.3. Why Distance is a Good Proxy**

There are several indicators that measure geographical access to finance, including average distance from household to branch (or ATM), the density of branches per square kilometer or per capita, and average time necessary for the borrower to reach an MFI branch (World Bank, 2008). In this paper, geographical access to microcredit is measured in kilometer distance to the nearest non-bank MFI. The following factors justify the use of this measure as an informative proxy to capture learning effects of households.

With an area of 447,400 km<sup>2</sup> Uzbekistan is the 56<sup>th</sup> largest country in the world. The country has a heterogeneous landscape, with mountains, regions with valleys, and deserts. Access to most regional and

district centers are based on established paved road connections. Therefore the minimum distance to the nearest non-bank MFI consists of at least a few kilometers, which makes the cost of travel significant<sup>46</sup>.

According to the World Bank (2011), Uzbekistan is a lower middle-income country. Being on the developing path the country's infrastructure provision (i.e. credit facilities, collateral appraisal offices and other registries required for loan application and enterprise development) are potentially unevenly distributed, being most likely concentrated in regional and district centers. Therefore, geographical barriers constitute significant obstacles not only to accessing MFIs, but also related infrastructure, which in turn determine the demand for microcredits. It may be valid to expect that there is no need for microcredits if there is no related credit registry infrastructure.

### **3. Country Context and Microfinance Institutions**

Uzbekistan is a lower middle-income country located in the heart of the Central Asia and a former member of the Soviet Union, having gained its independence in 1991. With 28.2 million inhabitants, the country accounts for almost 40% of the population of the Central Asia region. Microfinance programs in the country were first pioneered by United Nations Development Programs in 1998, with the conventional mission to alleviate poverty, smooth the transition period and boost employment, especially in remote areas. Over the 1998 - 2011 period, the microfinance landscape in Uzbekistan changed substantially, driven mainly by legal changes, and the microfinance sector became an important non-bank segment of the financial system.<sup>47</sup> These changes provoked the emergence of two types of private and for profit non-bank microfinance institutions. Credit Unions (CUs) issue individual microcredits for both business and consumption needs and attract deposits. Differing from international practice, in Uzbekistan CUs are open to the general public and are not limited to a close, "professional" membership. Microcredit Organizations (MCOs) operate similarly to Grameen type group lending under joint liability and a small collateral requirement with dynamic incentives and greater female participation. CUs and MCOs hold a particular microcredit niche between commercial banks and informal money lenders. The average loan size is USD 2200 in CUs and USD 530 in MCOs, compared to USD 3500 in bank microlending.

While conventional banks serve the higher-end segment and corporate clients, non-bank MFIs target economically active households and those above the official poverty line (UNDP, 2011). Canonical microfinance lending, supported by international donors and subsidies, has a basic mission to reduce

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<sup>46</sup>There might be, however, a potential measurement error and bias given that geographical distance is not necessarily equivalent to road connection.

<sup>47</sup> See Chapter 2 of this dissertation for a detailed description of the microfinance environment in the country.

poverty and therefore targets households of the lowest income group. In contrast, in this chapter, the impact of commercial, SME microlending is measured - the segment that serves the middle range of the population above the poverty line. Therefore, different effects on business and consumption outcomes might be expected than those of canonical microlending<sup>48</sup>.

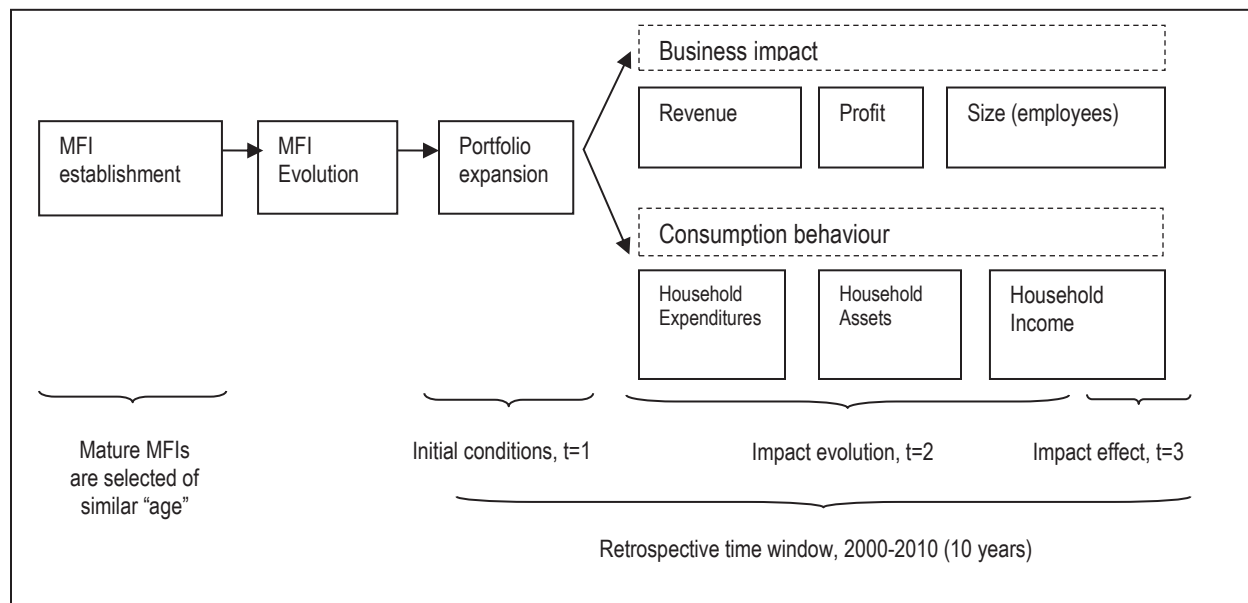
In addition to their private nature, both MCOs and CUs are subject to uniform licensing from a regulatory body – the Central Bank. The license requirement implies that MFIs have to meet the established minimum standards for microfinance operations. The uniform provision of microcredits in turn helps to address the heterogeneity on the supply side in impact assessment.

## 4. Methodology

### 4.1. Conceptual Framework and Outcome Indicators

The overall approach for impact assessment is based on retrospective design with the aim of re-creating the covariates for matching procedure (Figure 1).

**Figure 1. Conceptual framework of impact assessment and retrospective time window**



<sup>48</sup> Specifically critics of microcredits suggest that job creation that boosts economic growth and hence reduces poverty is better done by larger enterprises, defined as small and medium enterprises, rather than conventional microenterprises (Karnani 2007). M. Yunus' original model assumed that small, informal microenterprises supported by microloans can be unlimitedly absorbed by weak local economies of developing countries. However, being tiny, unskilled, informal start-ups, these microenterprises eventually did not have enough capacity to scale-up, diversify and innovate, leading to an unproductive underdeveloped economy and creating negative externalities to existing productive businesses (Bateman 2010).

The building blocks of impact evolution start with the supply side and MFI establishment. First, an MCO or CU is established institutionally and evolves steadily, expanding its loan portfolio. Acknowledging institutional growth cycles, MFIs of similar age are selected for this study, which ensures that they are in a similar development stage. Clients joining MFIs could be of two types - newcomers and those switching from other types of institutions. Once an MFI is opened, clients start taking credits for business or consumption purposes. The retrospective time window of 10 years is chosen to capture these changes and evolution of the impact of microcredits. The window could not be too large given the trade-off between accuracy of retrospective data and memory recall (Beckett et al. 2001).

The aggregate impact of access to microcredits is divided into business and consumption behavior. For both MCOs and CUs, portfolio expansion comes from issuing credits for individual entrepreneurship and small businesses. In particular, the retail nature of these businesses yields high turnover and profit (UNDP, 2005). Therefore, a significant impact of microcredits on business revenue, profit and employment is expected. For consumption behaviour, the portfolio of household expenditure is studied, with a detailed break-down of education, health, consumer durables and other items. The choice of business and consumption channels is made according to theoretical predictions claiming that credits are fungible within households and that once borrowed for self-employment purposes, they may be used instead to cover immediate household needs such as expenditures on basic needs, health and education, purchase of consumer durables, and social events (Karlan & Goldberg, 2011).

## **4.2. Parameters of Interest**

The objective is to estimate the causal impact of distance to microcredits. In this regard, there are two possible parameters to estimate: [1] the ATT (average treatment on the treated) effect. This would be the average effect of borrowing on consumption and entrepreneurial activity of those which borrow. In this case, to estimate ATT, the consumption and business activities of borrowers to that of non-borrowers has to be compared. Given the non-random assignment of borrowing, respondent distance to the next MFI could then be used as an instrument for borrowing in an IV framework or a conditioning variable in a matching framework of borrowers vs. non-borrowers. [2] An alternative approach would be to estimate the ITT (intention to treat) effect which is commonly used in experimental studies. In this case, the estimation strategy would imply a comparison of consumption and business activity of households which are close to an MFI to those which are not, independent of whether they borrow or not. In this case, the challenge is to

account for non-random location of MFI branches. A matching procedure based on region-level characteristics would be an appropriate estimation strategy.

Acknowledging the nature of the survey and the data collection, in this chapter the parameter to estimate is similar to ITT but of different intensity to treat which is proxied by geographical proximity. Thus we match 25% of respondents living closest to MFIs to 25% of respondents living farthest from MFIs.

There are two sources of the bias that plague consistent estimates of the causal impact of microfinance programs: (i) demand side selection, given that microfinance clients are not a random sample of the population and are self-selected into MFIs based on unobserved characteristics, and (ii) supply side selection, given that MFIs are non-randomly established in districts. Addressing the demand side selection, microfinance impact assessment literature and findings are broadly divided into experimental, so-called randomized control trials (RCT) and non-experimental methods. A detailed overview and the trade-off between consistencies of experimental versus non-experimental studies can be found in Smith and Todd (2005), Dehejia and Wahba (2002), and, specific methods applied in the microfinance context are thoroughly discussed in Armendáriz and Morduch (2010) and Armendáriz and Labie (2011).

Propensity score matching is employed as a second best solution for demand side selection bias in the absence of experimental intervention (Rosenbaum & Rubin, 1983)<sup>49</sup>. The notion of “treatment” in this case is related to the distance to the nearest non-bank MFI. Therefore, the 25% of households residing the closest to MFIs are matched with the 25% residing the farthest, using a set of pre-treatment covariates, household characteristics and supply-side determinants, thus ensuring the robustness of results for both demand and supply side selections. Given the variety of the matching technology (i.e., nearest-neighborhood, kernel, stratification, radius, caliper) a matching algorithm is chosen, considering the trade-offs between the bias and efficiency. In this chapter, kernel matching (equation below) is applied, as it has the major advantage of lower variance, given that the common support condition is fully satisfied (Caliendo & Kopeinig, 2008):

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<sup>49</sup>While matching is the second best solution for impact assessment in the absence of experimental design, alternative verification could be a regression analysis using instrumental variables to control for selection and endogeneity of microcredit participation decision. The regression approach, however, imposes strong functional form (linearity) over the common support area while matching is non-parametric. Regressions also use functional form to work off the common support, which can be highly misleading (Jurajda, 2012). Effectively, what matters the most is not the estimation method itself (regression or matching), but whether the data is balanced. The latter is ensured in p-score matching, which is verified in matching results as well. Despite this methodological expectation, we still use two stages least square [2SLS] regression analysis which is performed instrumenting an “easy-difficult access” treatment dummy in the first stage. Neither selected instrument passed the Sargan test for over identifying restrictions.

$$ATT = \frac{1}{N^T} \sum_{i \in T} \left\{ Y_i^T - \frac{\sum_{j \in C} Y_j^C G\left(\frac{P_j - P_i}{h_n}\right)}{\sum_{k \in C} G\left(\frac{P_k - P_i}{h_n}\right)} \right\}$$

Matching involves comparison of treated and control groups with respect to their observable characteristics, which are similar for both groups. When the treatment participation and outcome variables are independent, conditional on pre-treatment covariates, and the relevant differences are captured in the observable covariates, the matching method can result in an unbiased estimate of the treatment impact (Dehejia & Wahba, 2002). There are two important assumptions that validate the application of p-score matching: (1) Conditional Independence Assumption (CIA) – which implies that, given the probability of an individual participating in the treatment based on observed covariates, potential outcome variables are independent of assignment to treatment. In other words, conditioning on observable characteristics, assignment to treatment can be taken “as if” random; (2) sufficient common support condition implies that treatment and control groups should have sufficient overlap after matching. Matching on the propensity score is essentially a weighting scheme, which determines what weights are placed on comparison units when computing the estimated treatment effect (Rosenbaum & Rubin 1983; Dehejia & Wahba 2002). The complete algorithm for implementing p-score matching consists of at least six stages and is well described in Caliendo and Kopeinig (2008).

### 4.3. Supply Side Selection

In addition to the demand-side selection of microfinance clients, there is a potential bias stemming from a non-random placement of microfinance institutions (Hulme & Mosley, 1996; Armendáriz & Morduch, 2010). The direction of supply-side selection could go in either direction. Poverty oriented donor MFIs are established in poorer areas, thus causing a downward bias. In contrast, an upward supply-side bias stems from the fact that profit oriented MFIs evolve in economically advantageous areas or places with better credit infrastructure. Given the absence of donor participation and the commercial focus of non-bank MFIs in Uzbekistan, there is evidence of upward supply-side selection<sup>50</sup>. Using district level data, a truncated Poisson regression is estimated, given the uneven distribution of MFIs across regions. Non-bank MFIs are found to be placed in districts with higher population density and a greater share of economically active people, areas with better infrastructure and industrially developed regions. Therefore supply-side

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<sup>50</sup> See Chapter 2 of this Dissertation for the details of estimations.

determinants are included in matching algorithm and thus ensure the robustness of the impact.

On the methodology side, we try to ensure the robustness of control of the supply-side selection by inclusion of the determinants. In particular there are three equations: first, an MFI opens the branch. Second, given that a branch is opened in a district – clients apply for microcredits. Third, given the application - microcredits are awarded. In our case we estimate the reduced form equation treating the location of MFIs in districts as endogenous. According to our results, MFIs are to be opened in districts with favourable conditions of microlending. Therefore we have tried to capture the most significant determinants of MFIs' placement and believe that in this way we capture the supply-side selection. Meanwhile, to find a pure supply-side selection bias an experimental approach could have been applicable.

We believe that coefficients of the supply-side determinants found in our chapter are potentially higher than if there was a pure random placement of MFIs in districts or experimental assessment. This could be due to increased female participation, the effect of greater wealth and better infrastructure - MFI determinants found in this chapter. Moreover we do not have valid instruments to control for potential reverse causality between MFIs' placement and the determinants. Therefore, we believe that the determinants found correctly address the supply-side selection though the coefficients are potentially higher than if they had been estimated using experimental solutions.

#### **4.4. Retrospective Methodology**

The propensity score matching employed in this chapter is based on covariates measured by a set of retrospective questions embodied in a cross-section survey design. The retrospective covariates control for initial conditions that determine the decision of the borrowers for taking microcredits and distance to the nearest MFI.

In the context of microfinance there are only a few studies which use the retrospective approach. McIntosh et al. (2011) survey households in Guatemala to examine the access to microcredit on dwelling improvement. The authors include major diseases, deaths, school enrolments, and major asset purchases among memorable events, while considering changes in profits and revenues among those which are more difficult to remember with precision. The authors find that access to microfinance causes a small but positive increase in the probability of housing improvement. Becchetti & Castriota (2011) evaluated the effectiveness of microcredits as a post tsunami recovery tool in Sri Lanka. Applying a similar retrospective approach as McIntosh et al. (2011) the authors asked the respondents about percent change in income

and hours worked after microcredit financing. The authors define four retrospective periods in relation to the occurrence of the tsunami and obtained microcredit. The authors find microloans obtained from MFI after the tsunami has a positive and significant effect on real income and hours worked. Becchetti & Conzo (2010) ask retrospectively about the years of schooling and age of children of microfinance borrowers and comparison group of non-borrowers in Buenos Aires. The authors find a positive and significant effect of microcredit history on child schooling.

Hermes & Lensink (2011) acknowledge the importance of a retrospective approach as a cost effective way of microfinance impact assessment. In contrast to previous studies, the value added of this approach is that respondents from the non-borrower group are included. The retrospective methodology also goes beyond measuring 1-0 discrete data on fundamental events as in McIntosh et al. (2011) to measuring the magnitude of changes, which enables one to quantify the actual margins of the impact. Moreover, there is no exogenous identification of retrospective periods as in Becchetti & Castgriota (2011). Respondents were asked about the year and cost incurred of an associated fundamental event which minimizes the memory recall bias.

Proper retrospective data collection is one of the fundamental challenges, as measurement error and accuracy of recall should be minimized. This is directly linked to an understanding of the structure of autobiographical memory. In particular, there are hierarchical thematic and temporal structures that define human memory and mechanisms of recall<sup>51</sup>. Acknowledging such structures of autobiographical memory, there are two distinct ways to collect retrospective data. The first is “Event history calendar” method or simply calendar interviewing. This method is based on the hierarchical network of the memory that includes extended, summarized and specific events, and therefore permits retrieval of past events through multiple pathways that work top-down in the hierarchy, sequentially within life themes that unify extended events, and in parallel across life themes that involve contemporaneous and sequential events (Belli 1998; Belli 2007). The second is a standardized interviewing method, which is based on traditional survey questions that tend to segment related aspects of autobiographical events from one another and do not reflect the interrelatedness of events as indicated within the structure of autobiographical memory.

Given the objectives of impact assessment and the aim of retrieving general events, the standardized interview method was applied, where retrospective questions are embodied in a survey

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<sup>51</sup>There are three fundamental levels that define the structure of autobiographical memory: (i) *lifetime periods* - reflect long-term extended events, thematic divisions of one's autobiography (ii) *general events* - short-term extended events and summarized events which are lifetime periods that nest general events (iii) *episodic memories* - consists of a pool of detailed sensations and perceptions (Conway and Pleydell-Pearce, 2000).

questionnaire. Specifically, the retrospective questions were designed to ask respondents about the *year of* and *cost* incurred for particular events which are psychologically significant, discrete, and therefore easily memorable in the lives of respondents<sup>52</sup>. The accuracy of recall was additionally ensured through application of timelines, public landmarks<sup>53</sup> and specific training of interviewers. Acknowledging country-specific traditions, historical changes in the following fundamental events are assumed to capture the immediate effect of microcredits: (i) weddings and other family ceremonies (ii) housing renovation and construction; (iii) purchase of major consumer durables<sup>54</sup>; (iv) business income, profit and size in terms of number of employees. In addition, a retrospective borrowing history (i.e. loan amount, interest paid, maturity, collateral pledged) from formal (bank, MCO, CU) and informal financial sources (friends, relatives, moneylenders) was collected.

Retrospective covariates are re-created using a set of retrospective questions embodied in a cross-sectional survey. Based on the record of weddings and tracking the births of children, the year-by-year dynamics of family structure and household size are re-created. For household wealth<sup>55</sup> covariates, the year, magnitude of change (i.e. cost of acquisition, expenditure) and current market values are used. Therefore, households with similar demographics and initial wealth conditions are matched. The dynamic retrospective panel is re-created in several steps based on the following segments:

(a) Household demographics: a family grid, which records all family members, is combined with their gender and age, and the weddings track to generate the dynamics of household size and composition<sup>56</sup>. The leading adjustment in family demographics is based on births and weddings<sup>57</sup>.

(b) Wealth: reconstruction of wealth is based on the record of household and business assets. For each of 12 types of consumer durables and housing premises, current market value, a retrospective record of their year and cost of purchase are used to re-create year-by-year values. The assets are then re-

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<sup>52</sup> As a matter of pride and self-esteem respondents were keen to share and therefore recalled easily weddings of their children, possession and acquisition of consumer durables. Therefore inaccuracy of recall is assumed to be minimal.

<sup>53</sup> It is a tradition in Uzbekistan to proclaim each calendar year with a particular social agenda, which is promoted heavily throughout the whole year and is uniform across regions. Therefore, for each retrospective question, respondents were reminded by the corresponding “public landmark”.

<sup>54</sup> The list of consumer durables comprised 12 items including furniture, major household appliances, vehicles, livestock and poultry. The list is also in line with national poverty indicators.

<sup>55</sup> Household wealth is a sum of major consumer durables, livestock, vehicles, residential premises.

<sup>56</sup> One member is dropped for a particular year if there is a female in the family between the age of 17 and 30, and a wedding is recorded in the same year; one member is added for particular year if there is a male in the family between the age of 20 and 35, the wedding is recorded and a childbirth is recorded shortly after the marriage. Additional coordinates for precise identification of the male wedding come from cost-free record of furniture sets which according to local traditions brides bring into their husbands' household as part of their dowry. All newborn children are dropped when re-creating initial values retrospectively.

<sup>57</sup> There are other sources of changes in family demographics such as death, migration and divorce. However, in light of the strong family institutions and the local culture, weddings and child birth remain the primary identification assumptions.

grouped into major categories such as durables, vehicles, livestock and housing. All assets are then collapsed to generate overall wealth dynamics. A similar methodology was used for home renovations and constructions.

(c) Timing: the timing of receiving microcredits is not imposed exogenously but is rather allowed to be endogenously identified based on a complete borrowing history both from formal and informal lending sources. This enables implicit estimation of the level of substitution on the market between the sources. Retrospective covariates represent the lagged values where the timing is tied to the year when microcredit is received from non-bank MFI. The timing is defined as a year when a first credit from CU was taken and second if borrowed from MCO<sup>58</sup>. Given that group lending and dynamic incentives applied in MCOs it is assumed that only after the second borrowing the impact will be internalized and therefore captured.

#### 4.5. Full List of Covariates

Validity of the conditional independence (CIA) assumption and overall matching quality is directly linked to appropriate inclusion and exclusion of covariates. The matching strategy is built on CIA, requiring that outcome variables must be independent of treatment conditional on the propensity score. Therefore, implementing matching requires the choice of a set of variables that credibly satisfy this condition (Caliendo & Kopeinig, 2005). Neither too many covariates, nor a too “trimmed” model is recommended. Therefore, covariates are chosen based on economic theory, features of microfinancing and lending policy of MFIs in Uzbekistan. To estimate the impact, the following covariates are employed, and are grouped into three major blocks. A detailed list of all covariates, definitions and the methodology of construction of the score (index) based variables can be found in the appendix, Table 8.

(i) Observable characteristics: this group of covariates includes the standard, observed variables that determine the probability of obtaining the credit from any type of lender [*age, age square, occupation dummies, household size*]. To capture the economic power of families of similar size [*household size, considering household members in economic age*] is included. [*Household assets per capita*] is a proxy for borrowing capacity, wealth and collateral requirements for microcredit contract. To account for business entrepreneurship activity [*business possession*] over the previous 5 years and the total number of businesses in the family for the past 10 years [*business number*] is included to capture any substitution

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<sup>58</sup> This is primarily justified by the lending methodology of these institutions. CUs focus on higher value transaction, and the average credit size is USD 2200. Given the focus on group lending and dynamic incentives, average credit size in MCOs constitutes USD 530. Therefore it is expected that the first credit in CU and the second credit from MCO capture the effect of microcredits.

effects and overall repayment capacity of the respondents. The registration status of the business makes a fundamental difference not only at the credit application stage, which is defined by law for tax reporting purposes, but also for any potential legal liabilities and the possibility of screening by the lender. To capture this effect, the dummy for household possession of any registered business [*registered business*] and their quantity [*registered business number*] is employed.

(ii) Qualifications, skills characteristics: Education is an important determinant of the success of business enterprises and the probability of obtaining credit. This set of covariates (dummies) aims to capture the level of education and to account for the transition period from the former Soviet system in the early 1990s. It is assumed that the quality of provision of public services such as health, education, and social safety net deteriorated in the early transition period, given the change from a planned to a competitive market economy. Therefore the following interaction dummies are introduced: interaction of major education types with male/female dummies [*education • gender*] and pre- and post-transition age of the respondents [*education • age in transition*].

(iii) Behavioural characteristics: Any entrepreneurship activity is tightly related to risk tolerance and business savvy. Therefore, these aspects are captured in the methodology based on the recent findings on behavioural aspects of microfinance and consumer lending (Bauer et al 2011; Ashraf et al. 2006; Lusardi 2008). In particular [*financial literacy*], [*trust to MFIs*], [*locus of control*] and [*risk aversion*] aim to capture important cognitive abilities of the respondents and thus address the demand side selection bias, which is mostly based on unobserved features. Most of these covariates represent the score (index) earned by survey respondents on related questions.

## 5. Data and Descriptive Statistics

The data was collected during January-March 2011 in three regions of Uzbekistan. Given the absence of donor-funded microfinance programs, all CUs and MCOs emerged for commercial purposes and their geographical distribution is quite uneven. The survey regions have been identified based on the density and maturity of MFIs: the capital Tashkent (72 non-bank MFIs), Tashkent region (16 non-bank MFIs), and Fergana region (25 non-bank MFIs). The survey included two groups of respondents and the following sampling procedures were applied for each group respectively:

Sampling of borrower's group: In each survey region, one CU and one MCO was selected based on maturity, size measured by total assets portfolio, and total number of clients. Selection of MFIs based on maturity ensures comparability across institutions and the validity of a retrospective time window of 10

years. The borrower's group constituted only active clients with sufficient credit history and outstanding loans. The borrowers' group is comprised of borrowers from MCOs and borrowers from CUs sub-samples.

Sampling of non-borrowers' group: Both CUs and MCOs issue loans for entrepreneurship activity and consumption purposes. A comparison group of non-borrowers is comprised of two sub-groups: (a) non-borrower entrepreneurs - identified as individuals who have entrepreneurship activities that generate profit and assumes self-employment; (b) non-borrower households without entrepreneurship activities - the respondent was identified as a household head, the most knowledgeable person in the family of economically active age<sup>59</sup>. For the non-borrower's group a multi-stage random quota sampling was used. The total sample size of the survey constituted 1086 observations. The distribution of the sample across four types of respondents is as provided in Table 1.

**Table 1. Respondents' group and sample size**

Respondents:	Definition:	Sampling:	Sample size:
Borrowers' Group	Borrower of Microcredit Organization [MCO]	microcredit borrowers who have been active over the past few years	224 [21%]
	Borrower of Credit Union [CU]	microcredit borrowers who have been active for the past few years	262 [24%]
Non-Borrowers' Group	Non-borrower entrepreneur	respondent was identified as an individual engaged in entrepreneurship activity that generates profit and assumes self-employment	312 [29%]
	Non-borrower household w/o entrepreneurship activity	respondent was identified as the household head - the most knowledgeable person in the family of an economically active age [for women 18-55 years old, for men 18-60 years old]	288 [27%]
		Total:	1086 [100%]

Table 2 further summarizes the location of the respondents across four distance quantiles, where comparison of those living the nearest (first quantile) and the farthest (fourth quantile) to non-bank MFI is important for impact assessment. Therefore, the respondents of the first quantile are defined as having easy access to microcredits and those in the fourth quantile as having difficult access. The difference in the sample size across the 3<sup>rd</sup> [279 respondents] and 4<sup>th</sup> [259 respondents] distance quantiles reflect sampling procedures and, specifically, of the group of non-borrowers that reside in districts where no non-bank MFI is located.

<sup>59</sup>Defined as 18-55 years old for women and 18-60 years old for men.

**Table 2. Four quantiles of distance to nearest MFI**

Distance quantiles:	Distance		Borrowers' group:		Non-borrowers' group:		Total:
	Mean [km]	Std. dev.	MCO borrowers	CU borrowers	Non-borrowers, with entrepreneurship	Non-borrowers, w/o entrepreneurship	
1 [nearest]	3.9	1.4	55 [20%]	101 [37%]	59 [22%]	59 [22%]	274 [100%]
2	15.5	8.0	100 [37%]	89 [32%]	42 [15%]	43 [16%]	274 [100%]
3	50.5	12.8	24 [9%]	35 [12%]	125 [45%]	95 [34%]	279 [100%]
4 [farthest]	87.5	22.6	45 [17%]	37 [14%]	86 [33%]	91 [35%]	259 [100%]
			224 [21%]	262 [24%]	312 [29%]	288 [26%]	1086 [100%]

Further household characteristics and outcome variables across distance quantiles are compared (Table 3). An interesting observation is that more female clients [60%] reside in the first distance quantile. This could be due to sampling procedures and MCO clients, 80% of which are woman. Overall, it is visible that those households with better access to microcredits are more female, of younger age, have higher skills, are better educated and make up a significant share of entrepreneurship activity. This has a potential indication on learning and spillover effect of the presence of MFIs in nearby area, in line with the initial hypothesis. While the effect of defiers is not expected, proximity to microfinance institutions therefore could be a proxy for information and learning spillover.

**Table 3. Business and household consumption indicators across distance quantiles**

	Variables:	Var. mean across four quantiles of distance to nearest MFI				Total:
		1 nearest	2	3	4 farthest	
Demographics	Respondent age [years]	<b>39</b>	41	43	<b>40</b>	41
	Female dummy	<b>0.62</b>	0.41	0.35	<b>0.40</b>	0.45
	Household size	<b>4.23</b>	4.75	5.33	<b>5.00</b>	4.82
Education	Basic secondary education	<b>0.05</b>	0.05	0.05	<b>0.03</b>	0.04
	Complete secondary education	<b>0.25</b>	0.23	0.27	<b>0.30</b>	0.26
	Secondary vocation education	<b>0.38</b>	0.38	0.46	<b>0.48</b>	0.42
	Higher education	<b>0.32</b>	0.34	0.23	<b>0.17</b>	0.27
Occupation	Has own business	<b>0.54</b>	0.56	0.58	<b>0.45</b>	0.55
	Has hired job	<b>0.33</b>	0.22	0.20	<b>0.32</b>	0.26
	Self-employed	<b>0.02</b>	0.03	0.10	<b>0.15</b>	0.08
	Unoccupied	<b>0.12</b>	0.10	0.12	<b>0.09</b>	0.11
Behavioural	Financial literacy	<b>12.02</b>	12.02	11.75	<b>10.65</b>	11.62
	Trust to MFIs	<b>0.61</b>	0.66	0.33	<b>0.50</b>	0.53
	Locus of control	<b>0.23</b>	0.13	0.17	<b>0.15</b>	0.17
	Risk aversion	<b>0.45</b>	0.51	0.47	<b>0.47</b>	0.47
Initial covariates	Household wealth, -1 lag ['000 UZS]	<b>992</b>	1645	695	<b>1903</b>	1299
	Household wealth, -2 lag ['000 UZS]	<b>801</b>	1244	603	<b>1820</b>	1110
	Wedding expenditures, -1 lag ['000 UZS]	<b>1110</b>	436	691	<b>551</b>	517
	Wedding expenditures, -2 lag ['000 UZS]	<b>354</b>	390	662	<b>511</b>	480
	Construction expenditures, -1 lag ['000 UZS]	<b>346</b>	373	451	<b>312</b>	371

	Construction expenditures, -2 lag ['000 UZS]	<b>296</b>	346	394	<b>269</b>	326
Business outcome var.	Business revenue ['000 UZS]	<b>33229</b>	37469	17231	<b>49507</b>	33893
	Business profit ['000 UZS]	<b>12886</b>	14875	5800	<b>25948</b>	14519
	Business size [no. of employees]	<b>2.23</b>	2.70	3.84	<b>4.48</b>	3.28
	Number of businesses per household	<b>0.74</b>	0.84	0.79	<b>0.71</b>	0.77
	Number of registered businesses per household	<b>1.16</b>	1.08	1.01	<b>1.09</b>	1.08
Consumption outcome var.	Total household expenses ['000 UZS]	<b>22601</b>	24398	39741	<b>31964</b>	29651
	Education expenses ['000 UZS]	<b>1616</b>	2665	1805	<b>1095</b>	1792
	Health expenses ['000 UZS]	<b>320</b>	317	255	<b>224</b>	279
	Social expenses ['000 UZS]	<b>4771</b>	5952	10357	<b>6764</b>	6955
	Expenses on housing ['000 UZS]	<b>6500</b>	5806	13936	<b>8055</b>	8587
	Expenses on basic needs ['000 UZS]	<b>5960</b>	5971	6802	<b>7212</b>	6481
	Total income ['000 UZS]	<b>1321</b>	1656	897	<b>932</b>	1201
	Total assets [business and household assets, '000 UZS]	<b>91319</b>	90699	73544	<b>73954</b>	82441

Notes: The official exchange rate is 2100 Uzbek soums to US dollar, in September 2013.

## 6. Results

### 6.1. Substitutions on the Market

First, the market structure is analysed in order to make inferences regarding spillover effects of non-bank MFIs. Following the theoretical predictions of Tirole (2006) and Holmstrom and Tirole (1997), once a new formal and competitive lender appears, a substitution effect between formal and informal lending sources is expected. At first glance a noticeable substitution effect is observed in the sample.

Given that the microlending market in Uzbekistan is segmented across formal and informal sources, the microcredit take-up effect (i.e., amount borrowed, interest paid, maturity) is therefore contrasted across these sources, as well as across the respondents' group (Table 9). A noticeable substitution effect is observed. In districts where a non-bank MFI is located, the probability of borrowing from an informal lender constitutes 3%. In contrast, the same probability is 17% in districts where there is any non-bank MFI. The pattern is consistent across all survey regions. The maximum effect is observed in region 2 where this probability is 1.4% in districts where non-bank MFI is located versus 35% probability in districts where non-bank MFI is not located. The result indicates that households having access to microfinance institutions tend to reduce borrowing from informal sources, which are found to be the most expensive<sup>60</sup> and less secure<sup>61</sup>. This suggests, first, a significant take-up effect and second, a large

<sup>60</sup>According to the qualitative survey of the author, the interest rate per month for credit from informal sources varies from 80% - 90% in contrast to 1.8% in banks, 4% - 5% in MCOs and 3% - 4% in CUs.

<sup>61</sup>Qualitative research reveals a high level of abuse of collateral and property rights of the clients when borrowed from informal moneylenders.

untapped demand for credit. More importantly, the evidence indicates learning behavior of the households and potential spillover effects of microfinance programs. The next step is actually measuring this impact.

## 6.2. Business Impact

First, the business channel of the impact is explored. Table 4 reports estimation results from p-score matching for the set of business enterprise outcomes such as revenue, profit and size captured by the number of employees. Dependent (outcome) variables represent average values for the year 2010.

**Table 4. Impact of better access to microcredit on business outcomes**

Outcome variables:	No. of respondents living in 1 <sup>st</sup> distance quantile	No. of respondents living in 4 <sup>th</sup> distance quantile	ATT	SE bootstrapped	ATT p> z
[1] Business revenue ['000 UZS]	274	259	17065.3***	2021.6	0.000
[2] Business profit ['000 UZS]	274	259	5309.2***	1103.6	0.000
[3] Business size [no. of employees]	274	259	-0.05	0.081	0.538

*Notes:* The table represents estimates of propensity score matching implemented by kernel matching using covariates listed in Tables 8. Respondents in the 1<sup>st</sup> [top 25% living nearest to MFI] and 4<sup>th</sup> distance quantiles [bottom 25% living farthest from MFI] are matched, respondents from the 2<sup>nd</sup> and 3<sup>rd</sup> distance quantiles are excluded. Business income and profits are measured in local currency, thousands of Uzbek soums. The official exchange rate is 2100 Uzbek soums to a US dollar, in September 2013. \*, \*\*, \*\*\* denotes 10%, 5% and 0% significance levels. The number of observations is based on re-created retrospective panel structure. Estimated pseudo R<sup>2</sup> is 0.19. Quality of matching and balancing test results is reported in Table 10.

The primary observation is that better access to microcredits has a positive and significant impact on business revenue and profits. No significant impact is observed on the size of micro-enterprises captured by the number of persons employed. This could be interpreted as a cost reduction following the expansion of the business after obtaining the microcredit. Another plausible explanation is related to the micro, family scale of business. Typical entrepreneurship activity supported by microcredits relies first on the help of family members and then externally hired employees, who are more costly for the business.

The obtained results are in line with the findings of Banerjee et al. (2010), which confirm that existing business owners benefit from access to credit and are able to expand their enterprises. An observed positive impact on profits and insignificant impact on business employment confirms the previous findings of Karlan and Zinman (2010), claiming that successful business entities which have successfully obtained credit shrink by shedding unproductive workers. Significant business effects also confirm the

concept of the business start-up model of microfinance intervention and specifically the country context of commercially oriented MFIs that serve middle-income class clients.

### 6.3. Consumption Behaviour

The second channel is based on the analysis of consumption patterns at household level. The impact is estimated both on aggregate measures such as total household expenses, total income and total assets and by disentangling them into individual expenditures items (Table 5). Dependent (outcome) variables represent average values for year 2010.

**Table 5. Impact of better access to microcredit on consumption behaviour**

Outcome variables:	No. of respondents living in 1 <sup>st</sup> distance quantile	No. of respondents living in 4 <sup>th</sup> distance quantile	ATT	SE bootstrapped	ATT p> z
[1] Total HH expenses <sup>62</sup> ['000 UZS]	274	259	-4331.9***	1109.1	0.000
[2] Education expenses ['000 UZS]	274	259	346.1***	81.3	0.000
[3] Health expenses ['000 UZS]	274	259	114.1***	12.4	0.000
[4] Social expenses ['000 UZS]	274	259	-683.3**	313.3	0.029
[5] Expenses on housing ['000 UZS]	274	259	-1153.7	775.7	0.137
[6] Expenses on basic needs ['000 UZS]	274	259	503.3***	96.5	0.000
[7] Total income ['000 UZS]	274	259	496.5***	23.3	0.000
[8] Total assets ['000 UZS]	274	259	40772.8***	1895.9	0.000

Notes: The table represents estimates of propensity score matching implemented by kernel matching using covariates listed in Tables 8. Respondents in the 1<sup>st</sup> [top 25% living nearest to MFI] and 4<sup>th</sup> distance quantiles [bottom 25% living farthest from MFI] are matched, respondents from the 2<sup>nd</sup> and 3<sup>rd</sup> distance quantiles are excluded. Business income and profits are measured in local currency, thousands of Uzbek soums. The official exchange rate is 2100 Uzbek soums to a US dollar, in September 2013. \*, \*\*, \*\*\* denotes 10%, 5% and 0% significance levels. The number of observations is based on re-created retrospective panel structure. Estimated pseudo R<sup>2</sup> is 0.21. Quality of matching and balancing test results is reported in Table 10.

Matching statistically close households on observable characteristics, better access to MFIs is found to produce positive and significant impacts on household consumption behavior and assets. The result is consistent with the theoretical predictions of Kaboski and Townsend (2012) of an overall increase in consumption.

The impact on total household expenditures is found to be negative and significant, which might be a potential indication of re-allocation of the resources within households toward a reduction of expenditures on non-durables and an increase on durable expenses. This is confirmed by a positive increase in

<sup>62</sup>Total household expenditure is the sum of durable and non-durable expenditures, and does not include the credit repayment.

expenses on education and health, indicating greater investment in human capital. On the contrary, households with better access to microcredits reduce expenses on social events such as weddings, family ceremonies and other social events. Expenses on basic needs such as food, purchase of detergents and hygiene products, and daily transportation has increased, which indicates that microcredits are fungible and clients sometimes use them to satisfy basic household needs.

Impact on household income and assets is found to be positive and significant, which indicates an overall effect of improved access on household consumption and welfare. In comparison to conventional microfinance programs, whose welfare effect is found to be marginal or zero<sup>63</sup>, positive results are expected, given that MFIs in Uzbekistan operate on a commercial basis, serving many households which are far above the poverty line.

While the findings indicate an overall change in the consumption behavior of households after having better access to microcredits, the dataset does not fully allow identification of the dynamics and prior state. The results possibly capture already adapted behavior of households, given their location in district centers where MFIs are localized. Consumption patterns and household expenditures in fact are different in urban and rural locations.

Summarizing the impact of improved access to microcredits, the overall effect is found to be positive. The dataset, however, does not allow one to distinguish the intra-household allocation of resources for business and consumption purposes. The important conclusion to be drawn is that better access to microcredits measured, in terms of the distance to the nearest MFI, has a positive effect on household welfare and business enterprise. Given that geographical distance is considered as a proxy for learning and spillover effects, the results also indicate important aspects of microcredits for knowledge diffusion.

#### **6.4. Diffusion Effect**

To conclude the empirical analysis, the diffusion effect of the distance to the nearest MFI is analysed. This is done by comparing the set of outcome variables between two sets of distance quantiles: 1<sup>st</sup>-3<sup>rd</sup> and 1<sup>st</sup>-4<sup>th</sup> (Table 6). The indicative distance between two quantiles equals roughly 40 km, which allows for tracing the learning behaviour and spillover effects.

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<sup>63</sup>Armendáriz & Morduch (2010), Bauchet et al. (2011).

The primary observation is that there are similar patterns of business and consumption behaviour across two distance quantiles, which indicates uniformity of effect, i.e. the “signal” goes in the same direction. There are, however, noticeable changes in selected outcome variables, which is also a potential indication of learning behaviour of microcredit recipients.

**Table 6. Diffusion effect of the distance**

Mean distance to nearest MFI:		50.5 km		87.5 km	
Comparison group of respondents in matching →		1 <sup>st</sup> and 3 <sup>rd</sup> distance quantiles		1 <sup>st</sup> and 4 <sup>th</sup> distance quantiles	
Outcome variables:		ATT [p-value]	SE bootstrapped	ATT [p-value]	SE bootstrapped
Business Impact	[1] Business revenue ['000 UZS]	15266.03*** [0.000]	1524.2	17065.3*** [0.000]	2021.6
	[2] Business profit ['000 UZS]	6181.9*** [0.000]	706.4	5309.2*** [0.000]	1103.6
	[3] Business size [no. of employees]	-1.32*** [0.000]	0.18	-0.05 [0.538]	0.081
Consumption Behavior	[4] Total HH expenses <sup>64</sup> ['000 UZS]	-21383.5*** [0.000]	3050.4	-4331.9*** [0.000]	1109.1
	[5] Education expenses ['000 UZS]	-102 [0.228]	84.6	346.1*** [0.000]	81.3
	[6] Health expenses ['000 UZS]	85.6*** [0.000]	17.7	114.1*** [0.000]	12.4
	[7] Social expenses ['000 UZS]	-8417.4*** [0.000]	1875.8	-683.3** [0.029]	313.3
	[8] Expenses on housing ['000 UZS]	-8235.9*** [0.000]	1630.2	-1153.7 [0.137]	775.7
	[9] Expenses on basic needs ['000 UZS]	-983.9** [0.003]	331.3	503.3*** [0.000]	96.5
	[10] Total income ['000 UZS]	443.6*** [0.000]	21.5	496.5*** [0.000]	23.3
	[11] Total assets ['000 UZS]	-6385.2 [0.187]	4840.8	40772.8*** [0.000]	1895.9
R <sup>2</sup>		0.13		0.19	

Notes: The table represents estimates of propensity score matching implemented by kernel matching using covariates listed in Tables 8. Respondents in the 1<sup>st</sup> [top 25% living nearest to MFI] and 4<sup>th</sup> distance quantiles [bottom 25% living farthest from MFI] are matched, respondents from 2<sup>nd</sup> and 3<sup>rd</sup> distance quantiles are excluded. Business income and profits are measured in local currency, thousands of Uzbek soums. The official exchange rate is 2100 Uzbek soums to a US dollar, in September 2013. \*, \*\*, \*\*\* denotes 10%, 5% and 0% significance levels. The number of observations is based on re-created retrospective panel structure. The quality of matching and balancing test results is reported in Table 10 and 11.

On the business side, significant impact is observed on the size of businesses in 1<sup>st</sup>-3<sup>rd</sup> distance quantile, which dissipates when it reaches 1<sup>st</sup> – 4<sup>th</sup> quintile. The result is in line with the previous findings of Karlan and Zinman (2010) on enterprise efficiency and the reduction of the number of employees. Another

<sup>64</sup>Total household expenditure is the sum of durable and non-durable expenditures, and does not include credit repayment.

explanation could be framed in terms of geographical location. Enterprises with closer proximity to MFIs, have greater exposure and interaction with other, more mature businesses and therefore benefit from greater efficiency by learning and knowledge spillover. The efficiency is potentially lost the farther one goes away from an MFI, i.e. by reaching the 1<sup>st</sup> – 4<sup>th</sup> distance quantile. A further plausible explanation could be a wage effect. Wages and salaries are usually higher in cities, and district centers where most MFIs are localized. Therefore, businesses with better access to microcredits might reduce number of employees aiming to increase the efficiency of their enterprises.

On the household consumption side, the differences between the 1<sup>st</sup> – 3<sup>rd</sup> and 1<sup>st</sup> – 4<sup>th</sup> distance quantiles are observed on expenditures on health, weddings, and basic needs. The differences reflect different consumption patterns, which is likely an indication of the learning and the effect of proximity to the network.

In contrast, no significant effect is observed on education expenses and household assets. A plausible explanation could be that households in the 1<sup>st</sup> – 3<sup>rd</sup> distance quantile live in urban areas or district centers where MFIs are localized and with better access to education<sup>65</sup>. The different effect on assets level could be explained similarly. Households living closer to MFIs reside in areas with different valuation of assets and income levels. Therefore this might explain why no impact is observed in the 1<sup>st</sup> – 3<sup>rd</sup> quantile, but impact becomes positive and significant in the 1<sup>st</sup> – 4<sup>th</sup> quantile.

Overall results suggest the presence of a diffusion effect and the concept that geographical proximity matters. While the findings in this chapter provide potential evidence of the boundaries of the distance, the dataset and survey was not designed specifically to capture the spillover effect. Nevertheless, the research agenda conveys important policy relevance, thus motivating further research.

## Conclusion

Despite substantial improvement of access to finance, physical barriers reaching financial institutions continue to constitute significant impediments. Over recent decades, microfinance institutions have gained worldwide recognition, reaching billions of poor who are ineligible for traditional banking services. Despite greater flexibility, geographical barriers to access to MFIs constitute an important obstacle. Greater distance increases the direct cost of traveling for potential microcredit beneficiaries and increases the cost of monitoring for MFIs.

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<sup>65</sup>Another reason could be derived from the side of microfinance institutions given that MFIs advertise their education loans at local Universities, with coverage limited to closer geographical circle, i.e. 1-3 distance quantile.

This chapter is aimed at measuring the causal impact of better access to microcredits in terms of distance to the nearest MFI on business indicators and household consumption behavior. Additionally, the direct effect distance is considered as a proxy for broader learning and spillover effects of microcredits, as beneficiaries share their knowledge and experience with others. Close or distant location from the nearest MFI thus indicates the strength of the knowledge diffusion operating as a “dissipating signal”.

The data is based on a survey of 1086 microcredit borrowers and non-borrowers in Uzbekistan. The microfinance environment in Uzbekistan provides evidence of private commercial non-bank MFIs supporting both consumer and business loans. The country’s geographical landscape validates the use of distance to nearest MFI as an informative proxy.

The results indicate positive and significant effects of better geographical access to microcredits. In particular, households with easier access to MFIs reveal more likelihood of starting a new business. A positive effect is found on business revenue and profit but not enterprise size, as entities reduce the number of employees. The findings are in line with the conventional microcredit model that centers entrepreneurship activity as a primary channel for the impact. This is also justified by the private and commercial nature of MFIs in the study, which operate mostly with higher profile clients with income levels above the poverty line.

On the consumption side, households with better access to microcredits are found to engage in more rational decision making. They invest more in human capital such as education and health and reduce spending on non-durable items such as weddings and other social events. The findings are in accord with experimental studies in the field that, having access to microcredits, households shift consumption patterns, reducing expenditures on temptation goods and re-investing more into business and other durable items.

Finally, the diffusion effect of the distance to nearest MFI is analysed by comparing business and consumption outcome variables between the 1<sup>st</sup>- 3<sup>rd</sup> and 1<sup>st</sup>- 4<sup>th</sup> distance quantiles. The indicative distance between two quantiles equals roughly 40 km, which allows the tracing of the learning effects. Similar patterns of business and consumption behaviour across two distance quantiles is found, revealing the uniformity of the “radar signal” going in the same direction. This is a potential indication of a diffusion effect and the concept that geographical proximity matters.

The overall results in the study are in line with theoretical predictions of credit expansion and access to finance. Better access to microcredits cause changes in household behaviour. However, the

dataset does not provide a clear division of the mechanism, i.e. whether it is entirely due to geographical proximity or knowledge diffusion. This calls for further research and empirical work.

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## Appendix

**Table 7. List and definition of covariates used for p-score matching**

Covariate name:	Definition, construction:
<i>(i) Observable characteristics:</i>	
Age	is an important determinant both for obtaining the credit and running the entrepreneurship activity. We also include $age^2$ to control for concavity
Female	gender dummy equals “1” if respondent is female and “0” is male
Occupation	following from summary statistics as well as labor economic policies occupational choice and possession of formal job is a fundamental. 13 classifications used in original survey instrument are regrouped into the four major ones and respective dummies (occup1_own business, occup2_hired, occup3_self-employed, occup4_unemployed, occup5_students)
Household size	is an important determinant of family demographics which determines the need for microcredits. We distinguish total household size when all members of the family are considered including children, pensioners, students
Household size, in economic age	captures economic power of the families with the same size. It also captures any changes in demographics ex post the transition. We consider only family members in economically active age of 18 to 60 years old
Household assets per capita	measures wealth conditions and is also a good proxy for collateral requirements for getting the credit. Household assets per capita is the sum of current market value of household assets (i.e. consumer durables, vehicle, livestock) and housing divided by the number of members in households
Density	measured as total population over the territory of the district where the respondent resides. As such density is a proxy for rural vs. urban types of location characteristics. In this case the districts are identified in line with the sampling framework
Business possession	current or past possession of any entrepreneurship activity critically determines the need for the credits. From descriptive statistics it follows that most of the credits are used for business start-ups and therefore prior business experience is an important determinant of probability of getting the credit. Dummy equals “1” if the respondent has done any entrepreneurship activity for the 5 years and “0” if none
Business number	is an average number of all and any type of business/entrepreneurship activities done in the family. Sufficient experience and duration of business activity is an important factor in probability of getting the credit
Registered business	dummy equals “1” if there is at least one registered business in the family and “0” if none. The registration status of the business is an important determinant of success in credit markets as it reflects the level of transparency, tax status and legal accountability. Loan terms and lending attitude of MFIs is indeed different depending on whether a business is registered. Business registration includes patent (i.e. self-employed individual entrepreneurship) or legal entity (i.e. micro enterprise)
Registered business number	is the number of registered businesses in the family
<i>(ii) Qualifications, skills characteristics:</i>	
Education	is an important determinant of the success of business enterprise and the probability of getting the credit. Education is captured through the following dummies representing classification by type of education: educ1_not finished basic education, educ2_basic (7-9 grades), educ3_secondary (10-11 grades), educ4_vocational (lyceum, college), educ5_higher (university, post doc)
Education • gender	represent a set of interaction dummies of male/female gender and education categories. This is to account for potential heterogeneity and gender biased selection
Education • age in transition	represent set of interaction dummies of respondents' age born before or after transition and education categories: educ2_basic_tran (<16 years), educ3_secondary_tran (<20), educ4_vocational_tran (<20 years), educ5_higher_tran (<35)
<i>(iii) Behavioural characteristics:</i>	
Financial literacy	is a composite score obtained from 3 questions in the questionnaire measuring different level and competence in financial matters. Financial literacy and basic calculus (accounting) knowledge is an important factor of not only getting the credit but in its further management and successful repayment. We distinguish three levels of financial literacy based on the composite score: “1” fully literate, composite score equals to 5-11, “2” literate, composite score equals to 12-17, “3” illiterate, composite score equals to 18-21

Trust to MFIs	access and use of non-bank credits is importantly determine whether households have trust these institutions which are relatively new on the market in comparison to conventional banks or other forms of informal lending sources. The variable is a dummy based on a composite score measuring the trust of MFIs. Beyond measuring the trust this indicator also captures the knowledge of respondents about these institutions
Locus of control	represents a simplified version of a general Rotter's test of locus of control (Rotterr,1966). An important assumption is that people who better control their lives are self-selected and therefore it is an important determinant of the probability of getting the credit. Three levels of locus of control are defined: "1" strong, score equals to 3-6, "2" moderate, score equals to 7-9, "3" weak, score equals to 10-12
Risk aversion	is based on the decision whether to participate in the game with an uncertain and risky outcome or choose a safe option, in terms of money

**Table 8. Summary statistics of covariates used for business and welfare impact estimation**

	Total Sample:		Borrowers' Group:		Non-borrowers' Group:	
<i>(i) Observable characteristics:</i>						
Age	40.51	10.51	39.75	10.49	41.13	10.50
Age <sup>2</sup>	1751	906	1690	878	1801	926
Male/female dummy	0.47	0.50	0.51	0.50	0.43	0.50
Business owner occup. dummy	0.54	0.50	0.64	0.48	0.46	0.50
Hired employee occup. dummy	0.27	0.45	0.26	0.44	0.28	0.45
Self-employed occup. dummy	0.08	0.26	0.03	0.18	0.11	0.31
Unemployed occup. dummy	0.10	0.31	0.06	0.23	0.14	0.35
Students	0.00	0.06	0.00	0.06	0.00	0.06
HH size	4.76	1.76	4.73	1.65	4.79	1.85
HH size, in economic age	2.99	1.35	3.06	1.31	2.93	1.38
HH assets per capita ['000 UZS]	15478	17832	17236	17258	14055	18173
Density of district of residence	0.00	0.01	0.00	0.00	0.00	0.01
Business possession	0.69	0.46	0.83	0.38	0.58	0.49
Business number per HH	0.76	0.53	0.89	0.45	0.65	0.57
Registered business	0.23	0.42	0.27	0.45	0.21	0.40
Registered business number per HH	1.08	0.34	1.08	0.35	1.08	0.33
<i>(ii) Qualifications, skills characteristics:</i>						
Basic education dummy	0.04	0.19	0.03	0.16	0.05	0.21
Basic education, males	0.01	0.11	0.01	0.09	0.02	0.12
Basic education, females	0.03	0.16	0.02	0.13	0.03	0.18
Basic education, transition period	0.00	0.00	0.00	0.00	0.00	0.00
Secondary education dummy	0.28	0.45	0.28	0.45	0.29	0.45
Secondary education, males	0.15	0.36	0.13	0.34	0.17	0.37
Secondary education, females	0.13	0.34	0.14	0.35	0.12	0.32
Secondary education, transition period	0.00	0.00	0.00	0.00	0.00	0.00
Vocational education dummy	0.43	0.50	0.39	0.49	0.46	0.50
Vocational education, males	0.24	0.43	0.19	0.39	0.28	0.45
Vocational education, females	0.19	0.39	0.20	0.40	0.19	0.39
Vocational education, transition period	0.00	0.04	0.00	0.00	0.00	0.06
Higher education dummy	0.25	0.43	0.31	0.46	0.21	0.40
Higher education, males	0.12	0.32	0.15	0.36	0.09	0.29
Higher education, females	0.13	0.34	0.16	0.37	0.11	0.32
Higher education, transition	0.08	0.26	0.11	0.32	0.05	0.21

period						
<i>(iii) Behavioral characteristics:</i>						
Financial literacy	11.77	3.44	11.22	3.04	12.21	3.67
Trust to MFI	0.54	0.50	0.73	0.44	0.39	0.49
Locus of control	0.18	0.39	0.16	0.37	0.20	0.40
Risk aversion	0.48	0.50	0.47	0.50	0.49	0.50
<i>No. obs.</i>	1086		486		600	

Notes: Business income and profits are measured in local currency, thousands of Uzbek soums. The official exchange rate is 2100 Uzbek soums to US dollar, in September 2013.

**Table 9. Comparison of microcredit (borrowing) characteristics across formal and informal sources**

Variable:	Description:	WHOLE SAMPLE				SURVEY REGION 1				SURVEY REGION 2				SURVEY REGION 3			
		Mean	Mean	Mean	Mean Diff.	Mean	Mean	Mean	Mean Diff.	Mean	Mean	Mean	Mean Diff.	Mean	Mean	Mean	Mean Diff.
		B group	NB group	NB group	NB-B	B group	NB group	NB group	NB-B	B group	NB group	NB group	NB-B	B group	NB group	NB group	NB-B
Average loan size, '000UZS	from bank	25517 [4166] obs: 130	34442 [3275] obs: 128	8925 [5309] obs: 258	-10400 [10670] obs: 84	15013 [3434] obs: 76	4612 [2420] obs: 8	-10400 [10670] obs: 84	49610 [10131] obs: 43	7852 [1082] obs: 19	7852 [1082] obs: 19	-41757** [15328] obs: 62	3909 [563] obs: 11	41807 [3823] obs: 101	37896** [11633] obs: 112	37896** [11633] obs: 112	
	from MCO	1752 [173] obs: 203	2166 [1424.00] obs: 3	414 [1435] obs: 206	NA	2313 [2910] obs: 94	NA	NA	2412 [366.63] obs: 44	5000 [...] obs: 1	5000 [...] obs: 1	2587 [...] obs: 45	494 [94.47] obs: 65	750 [250] obs: 2	255 [543.52] obs: 67	255 [543.52] obs: 67	
	from CU	5893 [348] obs: 255	2457.62 [502] obs: 7	-3436 [2111] obs: 262	-6045 [5933] obs: 64	7405 [1057] obs: 62	1360 [640] obs: 2	NA	-6045 [5933] obs: 64	8078 [316.01] obs: 105	1000 [...] obs: 1	1000 [...] obs: 1	-7078 [...] obs: 106	2222 [310.92] obs: 88	3370 [399.67] obs: 4	1148 [1467.98] obs: 92	1148 [1467.98] obs: 92
Average maturity, months	from informal sources (moneylenders, friends, relatives)	882 [314] obs: 15	1865 [467] obs: 103	982 [1234] obs: 118	4449 [5209] obs: 28	600 [305] obs: 3	5049 [1774] obs: 25	4449 [5209] obs: 28	866 [409.60] obs: 3	924 [138.78] obs: 54	924 [138.78] obs: 54	57 [599.24] obs: 57	981 [512.84] obs: 9	663 [153.32] obs: 24	-317 [396.58] obs: 33	-317 [396.58] obs: 33	
	from bank	16 [3.25] obs: 13	34.97 [6.95] obs: 37	18.98 [11.97] obs: 50	31.00 [18.39] obs: 12	12.5 [3.56] obs: 8	43.5 [26.31] obs: 4	31.00 [18.39] obs: 12	24 [6.92] obs: 4	26.4 [5.87] obs: 5	26.4 [5.87] obs: 5	2.40 [9.03] obs: 9	12 [...] obs: 1	35.29 [8.51] obs: 28	23.29 [...] obs: 29	23.29 [...] obs: 29	
	from MCO	9.06 [0.21] obs: 203	12 [0.00] obs: 3	2.93 [1.78] obs: 206	NA	8.92 [3.25] obs: 94	NA	NA	10.43 [0.51] obs: 44	12 [...] obs: 1	12 [...] obs: 1	1.56 [...] obs: 45	8.34 [0.27] obs: 65	12 [0.00] obs: 2	3.65* [1.57] obs: 67	3.65* [1.57] obs: 67	
Average interest rate, per month	from CU	14.93 [0.366] obs: 255	12 [0.00] obs: 7	-2.93 [2.22] obs: 262	-0.82 [3.66] obs: 64	12.82 [0.65] obs: 62	12 [0.00] obs: 2	-0.82 [3.66] obs: 64	18.77 [0.60] obs: 105	12 [...] obs: 1	12 [...] obs: 1	-6.78 [...] obs: 106	11.82 [0.21] obs: 88	12 [0.00] obs: 4	0.17 [1.01] obs: 92	0.17 [1.01] obs: 92	
	from informal sources (moneylenders, friends, relatives)	42.84 [12.28] obs: 15	15.61 [2.58] obs: 103	-27.23** [8.19] obs: 118	10.36 [12.16] obs: 28	4 [1.15] obs: 3	14.36 [4.14] obs: 25	10.36 [12.16] obs: 28	3.33 [1.85] obs: 3	18.66 [4.15] obs: 54	18.66 [4.15] obs: 54	15.33 [17.79] obs: 57	68.96 [15.04] obs: 9	10.06 [4.07] obs: 24	-58.90*** [11.20] obs: 33	-58.90*** [11.20] obs: 33	
	from bank	1.80 [0.28] obs: 13	1.24 [0.12] obs: 37	-0.56* [0.26] obs: 50	-1.28 [0.58] obs: 12	2.04 [0.38] obs: 8	0.76 [0.25] obs: 4	-1.28 [0.58] obs: 12	1.02 [0.19] obs: 4	1.54 [0.23] obs: 5	1.54 [0.23] obs: 5	0.52 [0.31] obs: 9	3 [...] obs: 1	1.26 [0.14] obs: 28	-1.74 [...] obs: 29	-1.74 [...] obs: 29	
Probability of the borrowing from informal sources:	from MCO	5.24 [0.09] obs: 203	4.16 [1.16] obs: 3	-1.08 [0.81] obs: 206	NA	4.92 [0.72] obs: 94	NA	NA	6.73 [0.28] obs: 44	2 [...] obs: 1	2 [...] obs: 1	-4.73 [...] obs: 45	4.70 [0.12] obs: 35	5.25 [0.75] obs: 2	0.55 [0.70] obs: 67	0.55 [0.70] obs: 67	
	from CU	4.56 [0.06] obs: 255	3.42 [0.72] obs: 7	-1.14** [0.42] obs: 262	0.06 [0.64] obs: 64	4.69 [0.11] obs: 62	4.75 [0.25] obs: 2	0.06 [0.64] obs: 64	4.54 [0.13] obs: 105	4 [...] obs: 1	4 [...] obs: 1	-0.54 [...] obs: 106	4.50 [0.07] obs: 88	2.62 [1.12] obs: 4	-1.88*** [0.42] obs: 92	-1.88*** [0.42] obs: 92	
	from informal sources (moneylenders, friends, relatives)	78.84 [9.37] obs: 15	86.95 [3.13] obs: 103	8.11 [8.96] obs: 118	9.57 [26.22] obs: 28	66.53 32.46 obs: 3	76.1 [8.32] obs: 25	9.57 [26.22] obs: 28	51.33 [27.14] obs: 3	88.37 [4.12] obs: 54	88.37 [4.12] obs: 54	37.04* [18.45] obs: 57	92.11 [6.88] obs: 9	95.05 [3.95] obs: 24	2.94 [7.70] obs: 33	2.94 [7.70] obs: 33	
Probability of the borrowing from informal sources:		0.025	0.211			0.015	0.145		0.015	0.346			0.045	0.147			

Notes: B stands for the borrowers' group from MCOs and CUs. NB stands for the comparison group of non-borrowers. \*, \*\*, \*\*\* denotes 10%, 5% and 0% significance levels. Standard errors in parenthesis. Official exchange rate is 2100 Uzbek soums to US dollar, in September 2013.

**Table 10. Balancing test results [matching respondent in 1<sup>st</sup> and 4<sup>th</sup> distance quantiles]**

Variable	Sample	Mean		% reduct		t-test	
		Treated	Control	% bias	bias	t	p-value
Household wealth <sub>-1</sub>	Unmatched	1287.8	2990.6	-12.4		-4.13	0.000
	Matched	1297.3	1025.1	2.0	84.0	1.12	<b>0.263</b>
Household wealth <sub>-2</sub>	Unmatched	914.71	2644.5	-13.4		-4.45	0.000
	Matched	921.8	571.26	2.7	79.7	1.90	<b>0.057</b>
Wedding expenditures <sub>-2</sub>	Unmatched	399.9	411.59	-0.6		-0.18	0.855
	Matched	396.13	482.53	-4.1	-639.5	-1.29	<b>0.196</b>
Industrial production [district]	Unmatched	1355.2	2735.5	-90.9		-29.99	0.000
	Matched	1370.5	1327.8	2.8	96.9	1.02	<b>0.309</b>
Financial literacy	Unmatched	11.22	9.60	55.0		17.97	0.000
	Matched	11.22	10.84	9.3	83.0	3.23	<b>0.001</b>

Notes: The table reports the balancing test result for propensity score matching. The last column shows the comparisons of treated and control groups: bold-type p-value clearly indicates that we cannot reject the null hypothesis of the equality of treated and control groups for all the compared variables.

**Table 11. Balancing test results [matching respondent in 1<sup>st</sup> and 3<sup>rd</sup> distance quantiles]**

Variable	Sample	Mean		% reduct		t-test	
		Treated	Control	% bias	bias	t	p-value
Wedding expenditures <sub>-1</sub>	Unmatched	481.87	833.25	-10.0		-3.36	0.001
	Matched	483.82	579.1	-2.7	72.9	-1.21	<b>0.228</b>
Wedding expenditures <sub>-2</sub>	Unmatched	399.9	749.65	-10.4		-3.49	0.000
	Matched	401.52	449.27	-1.4	86.3	-0.69	<b>0.492</b>
Gas [district]	Unmatched	82.6	80.5	11.6		3.91	0.000
	Matched	82.6	81.5	5.9	49.3	2.10	<b>0.036</b>
Industrial production [district]	Unmatched	1355.2	2286.3	-67.7		-22.8	0.000
	Matched	1359.3	1412.3	-3.9	94.3	-1.45	<b>0.148</b>
Number of businesses	Unmatched	1.09	1.10	-1.4		-0.46	0.646
	Matched	1.09	1.09	1.3	1.4	0.46	<b>0.647</b>
Female dummy	Unmatched	0.60	0.32	58.0		19.56	0.000
	Matched	0.60	0.60	-1.3	97.7	-0.44	<b>0.659</b>
Financial literacy	Unmatched	11.2	10.6	18.6		6.27	0.000
	Matched	11.2	11.5	-9.6	48.6	-3.04	<b>0.002</b>
Risk aversion	Unmatched	0.40	0.42	-3.5		-1.17	0.240
	Matched	0.40	0.43	-5.5	-58.0	-1.83	<b>0.067</b>

Notes: The table reports the balancing test result for propensity score matching. The last column shows the comparisons of treated and control groups: bold-type p-value clearly indicates that we cannot reject the null hypothesis of the equality of treated and control groups for all the compared variables.

## Survey Implementation, Field works and Logistics

- **Motivation:**

The survey on microfinance was initiated by the author as being an integral part of the Dissertation and providing additional empirical evidence on microfinance impact from new country setting, i.e. Uzbekistan. The original phase of developing the conceptual framework of the survey, research question and objectives was commenced in 2009.

- **Funding Agencies:**

There were several agencies that supported the data collection and survey implementation. In particular, GDN grant implemented jointly by CERGE-EI (Prague, Czech Republic) and EERC (Kiev, Ukraine) covered the direct cost of data collection, payment for interviewers and other field logistics. The University Meets Microfinance (UMM) project of the European Microfinance Network co-financed by European Union grant covered travel expenses from Prague to the field.

- **Fieldwork:**

During 2010 part of the survey implementation, including background work and acquaintances with the microfinance sector, microfinance institutions, regulators and other sector infrastructure was conducted together with the United Nations Development Program's "Support to Microfinance Sector Development" project. Actual data collection and interviews were conducted during January - March 2011.

- **Survey Team:**

It should be acknowledged that the proclamation of year 2011 as the "Year of small business and private entrepreneurship" as well as institutional support from Westminster International University in Tashkent greatly facilitated of the data collection process and communication with relevant parties. The survey was implemented in sequential order from Region 1, 2 and 3 during January-March 2011. This allowed for efficiency of field supervision and better control of the data collection process including arrangements with local microfinance institutions (MFIs). The researcher was the principle field supervisor. In each survey region both treatment and control groups were surveyed simultaneously. The majority of treatment group respondents were surveyed on the premises of MFIs which facilitated the pre-contact and information disclosure. Each interviewer was allocated a quota of respondents meeting the survey objectives. Engagement of local interviewers in the regions (i) facilitated pre-contact with respondents in the regions; (ii) helped to overcome interviewer fatigue by allocating a reasonable amount of questionnaires; (iii) helped to minimize the expenses without paying for lodging by having only travel and per diem expenses; and (iv) this cost saving allowed an increase in sample size.

In each survey region the local survey team was screened and recruited from the pool of professional interviewers. All together there were 15 professional interviewers employed. The Center for Social Research "TAHLIL" was outsourced for all other services except for actual data collection given the constraints on permission letters from national authorities.

- **Qualitative Research:**

Complementary to a structured survey, qualitative research by means of in-depth interviews as well as additional statistics were collected. The main objective of the qualitative research is to unveil qualitative aspects of microfinance which are not well captured in quantitative analysis as well as to complement the impact assessment. The quantitative analysis shall also serve as a reference for unique features of micro-lending in Uzbekistan which has not been well documented before and therefore can serve as a reference in forthcoming academic papers.

In-depth interviews: Qualitative research was done by the researcher based on face-to-face in-depth interviews from the following group of respondents:

1. Experience with "money-lenders"
2. Microfinance "clients" of credit unions, microfinance institutions, track of microfinance impact
3. Reasons and profile of "drop-outs" of credit unions and microfinance institutions
4. Reasons and profile of those "rejected" by credit unions and microfinance institutions
5. Experience with conventional "bank" type of microfinance lending
6. Reasons for "delinquency and (in)formal procedures for loan enforcement", particularly in non-bank MFIs
7. Regional variations in microfinance supply

▪ **Survey Questionnaire:**

The primary survey instrument is a structured questionnaire, a single version adapted for all 4 types of respondents with appropriate filter questions. Meeting the research objectives all questions distinguish between the microfinance impact dynamics at the household and business levels. Conceptually the questionnaire is designed to collect data for "observed" impact assessment variables as well as behavioral aspects related to access/use of financial services such as time preference, risk aversion, trust in MFIs, financial literacy, locus of control, i.e., so-called "unobserved" variables. These questions also intend to measure the degree of self-selection and heterogeneity of comparison groups based on unobservables. Other details of the survey questionnaire are as follows:

- The questionnaire consists of 5 thematic blocks fitted into 12 pages.
- The duration of the interviews varied given that certain blocks were not covered for the control group. The average duration for the treatment group constituted 40-80 minutes and 30-60 minutes for the control group.
- 90% of the questionnaire was printed in the Uzbek language, the remaining 10% in Russian. All interviewers were bilingual and 95% of all interviews were done in the Uzbek language.
- All monetary questions (income, expenses, cost of purchase) were asked in local currency. Items stored or costs incurred in US dollars were calculated by interviewers into local currency using the official exchange rate for that period. It was prohibited to do any calculations during the interview. A full version of the questionnaire is provided below.

## QUESTIONNAIRE

Hello! My name is \_\_\_\_\_. In the framework of state program "2011 year of small business and private entrepreneurship" we would like to invite you to participate in this academic survey. The objective is to identify the demand for microcredits and the ways they support small business and family welfare. There are no correct or incorrect answers; all we are interested in is your own experience. We guarantee that no personal information will be disclosed and the responses will be used in aggregated form only. We hope you will participate in the survey since your opinion is very important and will be rewarded.

### Section Q. Questionnaire passport

<p><b>Q2. Quota 1. Region:</b></p> <p>Region 1 ..... 1</p> <p>Region 2 ..... 2</p> <p>Region 3 ..... 3</p>	<p><b>Q4. Quota 2. Respondent type:</b></p> <p>MCO client ..... 1</p> <p>CU client ..... 2</p> <p>Non-client, entrepreneur ..... 3</p> <p>Non-client, household (w/o entrepreneurship) ..... 4</p>
<p><b>Q3. Name of district, town in regions:</b></p> <p>_____  _ _ </p>	<p><b>Q5. MFI name</b></p> <p>MCO _____  _ _ </p> <p>CU _____  _ _ </p>

**Q6. Respondent address (city, town, village, district, mahalla (community), street, house):** \_\_\_\_\_

**Q7. Telephone:** \_\_\_\_\_

**Q8. Interview date:** day |\_|\_| month |\_|\_| year|\_|\_|\_|

Start time: |\_|\_|:|\_|\_| End time: |\_|\_|:|\_|\_|

**Q9. Interviewer name:** \_\_\_\_\_ |\_|\_|\_|

**Q10. Operator code:** |\_|\_|

INTERVIEWER! ASK D8 AT THE END OF INTERVIEW!

**D8. You have a choice: you can receive 10,000 soums or participate in the game. In case you choose the game you may win the present or nothing. Terms of the game: there are two balls in the bag – red and green. One ball is randomly drawn. If it is red ball - you get nothing, if it green ball – you get the present. What do you choose?**

to receive 10,000 soums	1
to play the game with balls	2

→ record outcome of the game: 1 - win or 2 – loss

**Section A. Family**

**Let's start with your household. Please start with yourself and name all household members including the children as well as those members who share income and expenses related at least to food and consumption.**

**INTERVIEWER! FILL IN THE TABLE STARTING WITH THE RESPONDENT! SEE INSTRUCTION FOR RESPONDENT SELECTION!**

Number	Name	Sex 1 - F 2 - M	Age (complete years old), children below 12 months = 0	Highest educational attainment: (18 years and above) 1-did not finish school (none of certificate) 2-basic secondary education (7-9 classes) 3-complete secondary education (10-11 classes) 4-secondary vocational education (PTU, SPTU, lyceum, college) 5-higher education (bachelors, masters, postgraduate etc.)  99- below 18 years old	Main occupation: (18 years old and above)  <b>Has own business:</b> 1-patent (business in nonagri. sector) 2-legal entity (business in nonagri. sector) 3-unregistered business in nonagri. sector including cattle resale w/o fattening 4-owner of the farm <b>Has hired job (including maternity leave) at:</b> 5-state financed (budgetary) organizations (health, education, governance, military forces etc.) 6-private and state organizations (transport, construction, manufacturing, communications etc.) <b>Self-employed:</b> 7-works on family farm, tomorqa/peasant including livestock fattening for resale 8-works in tomorqa but perceived as unemployed 9-mardikor (temporary, single time, seasonal work) <b>Unoccupied:</b> 10-unemployed (not working, searching for a job and ready to start immediately) 11-not working and not searching for a job for any reasons 12-pensioner, person with disabilities registered at social welfare department (18 years old and above – do not include children with disabilities below 18 years old) 13-student 18 years old and above  99 – below 18 years old	Sphere of main occupation:  1-state authorities and administration, including military authorities 2-agriculture 3-industry 4-construction 5-transport 6-communications 7-finance and insurance 8-trade 9-public catering 10-services including tourism, hotels, housing and communal services 11-health care 12-education 13-culture, science, media 14-not working (18 years old and above) 15-students 18 years old and above  99 – below 18 years old	Additional job/occupation: (codes from A5)
A1.		A2.	A3.	A4.	A5.	A6.	A7.
1							
2							
3							
4							
5							
6							
7							

A8. Who is the head of your household?

HOUSEHOLD HEAD № FROM COLUMN A1 OF FAMILY GRID

A9. Respondent's marital status?

married	1
single	2
divorced	3
widow(er)	4

A10. Type of the dwelling you live in (where interview takes place)?

house	1
flat / apartment	2

A11. How long have you lived in this house/flat? \_\_\_\_\_ number of years

A12. Who is the official owner of this house/flat?

this house/flat is a property of a household member living with us	1
this house/flat is a property of a relative/ household member living separate from us	2
this house/flat is a property of the state	3
this house/flat is rented from an individual	4

A13. If you would like to purchase in your neighborhood the same house/flat you live in what minimal price would you pay? Do you or any household members living with you possess other residential and non-residential premises? If yes, than how many and what is their minimal market price? How do you use them?

(EXCHANGE RATE IS 1600 SOUMS/DOLLAR)

		Quantity:  0 = none → next row	Current market value:  (for total quantity)  thousand sums	Use: SINGLE ANSWER!  1-not used 2-used for family needs only 3-used to generate income only 4-used both for family needs and income generation	When did you buy them? MULTIPLE ANSWERS POSSIBLE!  SEPARATE BY COMMA!  97-if bought before year 2000	How much did you pay for them? thousand soums  SEPARATE BY COMMA!  97-if bought before year 2000
1	House/flat you live in including all additional premises	1		1.....2.....3.....4		
2	Other home/flat			1.....2.....3.....4		
3	Cottage (dacha)			1.....2.....3.....4		
4	Garage (separate and outside of the house)			1.....2.....3.....4		

A14. For the past 10 years (2000-2010) please recall which family events you conducted and what was the cost incurred? Also, have you done any major repair and home reconstruction? If yes, when you have done them and what was the cost incurred?

INTERVIEWER! IF THERE WERE SEVERAL EVENTS IN ONE YEAR, THEN SUM UP THE COSTS FOR ONE YEAR!

		Year of event  SEPARATE BY COMMA!  97-if was before year 2000	Total cost incurred thousand sums SEPARATE BY COMMA!  97-if was before year 2000
1	Wedding		
2	Other significant family events		
3	Repair of residential premises, public utilities		
4	Construction		

**A15. Do the members of your family own the following (functional) items as well livestock and poultry? If yes, than how many items are there? What is their current market value? How do you use them? When did you buy them and for how much?**

		<b>Quantity:</b> 0=none → next row	<b>Current market value:</b> (for total quantity)  thousand sums	<b>Use:</b> SINGLE ANSWER! 1-not used 2-used for family needs only 3-used to generate income only 4-used both for family needs and income generation	<b>When did you buy them?</b> MULTIPLE ANSWERS POSSIBLE!  SEPARATE BY COMMA!  97-if bought before 2000	<b>How much did you pay for them?</b> thousand sums  SEPARATE BY COMMA!  97-if bought before 2000
1	Furniture set			1.....2.....3.....4		
2	Refrigerator, freezer			1.....2.....3.....4		
3	TV, home TV theater			1.....2.....3.....4		
4	Audio-video appliances (music centre, DVD-player, video camera)			1.....2.....3.....4		
5	Washing machine			1.....2.....3.....4		
6	Sewing machine			1.....2.....3.....4		
7	Microwave oven, kitchen set, grill			1.....2.....3.....4		
8	Satellite antenna			1.....2.....3.....4		
9	PC, lap-top			1.....2.....3.....4		
10	Car			1.....2.....3.....4		
11	Lorry, truck			1.....2.....3.....4		
12	Livestock and poultry (cattle, sheep, goats, horses, chicken etc.)			1.....2.....3.....4		

**A16. Now I would like to ask about your family expenses. Besides monthly expenses there are significant and irregular expenses incurred only several times during the year. Now I will read you the list of such expenses. Could you please recall how much money your family spent on them in 2010?**

	<b>I. Type of yearly expenses:</b>	<b>Expenses</b> (thousand sums)
1	Purchase of clothes and footwear	
2	Tuition payment for higher education (including payment for those members of the household living apart from family)	
3	Expenditures on public education and purchase of school stationery, uniform, books, required payments to school/college/lyceum, private tutoring fees, courses etc.	
4	Payments for utilities, property and land taxes	
5	Medical treatment, drugs, diagnostics, service of doctors and nurses	
6	Home repair, construction, purchase of construction materials	
7	Expenditures on maintaining peasant farm/tomorqa, including livestock and poultry DO NOT INCLUDE EXPENDITURES ON FARM!	
8	Expenses on significant family events (wedding, anniversary celebration etc.)	
9	Gratuitous help to relatives, neighbors, charity	
10	Lending to relatives, friends, acquaintances etc.	
11	Other expenses (record)	

**A17. Now I will read the list of expenses incurred every month. Please try to recall how much money your family spend on them in regular month?**

	<b>Type of monthly expenses:</b>	<b>Expenses</b> (thousand soums)
1	Expenses on food including the meals outside the home	
2	Purchase of detergents, sanitation and hygiene products	
3	Payment for communication services (telephone, mobile phones, Internet)	
4	Expenses on public transport, taxi and fixed-route-taxi, gasoline	
5	Leisure and entertainment (parties, "gap", choyhona, going out to parks, cinema, etc.)	
6	Other expenses (record)	

**A18. Could you please tell what is the regular monthly income (both cash and transfer to plastic card) of all family members including salaries, pensions, allowances, stipends and all other sources?**

	Type of income per <u>month</u> :	Income (thousand soums)
1	Employment in agriculture sector (in shirkat, peasant /dehqon farm, farm not belonging to the family members, including earnings from seasonal agriculture work/mardikor)	
2	Employment in non-agriculture sector (enterprises, organizations, firms, including earnings from seasonal non-agricultural work/mardikor)	
3	Remittances abroad	
4	Sales of own agricultural products, including livestock products	
5	Non-agricultural entrepreneurship activity (including resale of agricultural products of others)	
6	Property income (rent of dwelling, household premises, automobile, other property, land lease)	
7	Deposit income (bank, credit union, money lending)	
8	Pension and allowances (for retirement, seniority, disability, loss of survivor/breadwinner, community (mahalla) benefits, unemployment benefits, stipends etc. )	
9	Gratuitous help from relatives, friends	
10	Borrowing from relatives, friends	
11	Other income (record)	

**A19. How do you rate the wellbeing of your family/households in .....? SINGLE ANSWER IN EACH COLUMN!**

	in 2010 (Year of harmoniously developed generation)	in 2008 (Year of social protection)	in 2006 (Year of charity and medical workers)
Income is sufficient for everything/fully sufficient	5	5	5
Income is sufficient for foodstuffs, clothing and other basic needs	4	4	4
Income is sufficient only for very basic needs- foodstuffs, clothing and utility payments	3	3	3
Income is sufficient only for foodstuffs	2	2	2
Income is not sufficient even for foodstuffs	1	1	1

**Now I would like to ask you about entrepreneurship activity. Under “business” or “private entrepreneurship” it is understood the activity that generates income and envisages self-employment.**

INTERVIEWER! BESIDES LEGAL ENTITIES AND PATENT HOLDERS SELF-EMPLOYED AND OWNERS OF UNREGISTERED BUSINESS ALSO REFER TO ENTREPRENEURS!

**B1. For the past 5 years have you done any entrepreneurial activity?**

Yes, I have and am doing now	1
Yes, I have but not doing nowadays	2
No, I haven't	3

→ B18

## Section B. Entrepreneurship activity

INTERVIEWER: IN THE TABLE BELOW RECORD ALL BUSINESSES (TERMINATED AND CURRENT) THE RESPONDENT HAD OVER THE PAST 5 YEARS REGARDLESS OF THE DATE OF ITS CREATION!

No	B2. What is this business? 1 – Trade (besides livestock trade) 2 – Public catering 3 – Services 4 – Non-agricultural production (including processing of agri. products) 5 – Agricultural production (crops) 6 – Livestock and poultry fattening for sale 7 – Livestock trade	B3. Was the business registered? 1 – without registration 2 – patent 3 – legal entity	B4. Year when started (for example 2006)	B5. Year when terminated If business currently exists = 2011 → B7	B6. Reasons for terminating the business? MULTIPLE ANSWERS POSSIBLE! 1-did not sustain competition 2-turnover was not sufficient 3-lack of experience, skills 4-unreliable partners 5-increase in taxes 6-end of tax concessions 7-change in legislation 8-increase of admin. pressure 9-business was unprofitable 10-personal decision to terminate entrepreneurship activity 11-other (record)	B7. Did you take credit or borrowed for this business? 1-yes 2- no → next row	B8. Where did you take credit or borrowed? MULTIPLE ANSWERS POSSIBLE! 1-from bank 2-from Credit Union 3-from MCO 4-from moneylender 5-from relatives, friends, acquaintances 6-other
First	1.....2.....3.....4.....5.....6.....7	1.....2.....3				1.....2	1.....2.....3.....4.....5
Second	1.....2.....3.....4.....5.....6.....7	1.....2.....3				1.....2	1.....2.....3.....4.....5
Third	1.....2.....3.....4.....5.....6.....7	1.....2.....3				1.....2	1.....2.....3.....4.....5
Forth	1.....2.....3.....4.....5.....6.....7	1.....2.....3				1.....2	1.....2.....3.....4.....5
Fifth	1.....2.....3.....4.....5.....6.....7	1.....2.....3				1.....2	1.....2.....3.....4.....5

RULE FOR SELECTING THE BUSINESS FOR FURTHER SURVEY:

**IF THE RESPONDENT DOES NOT HAVE A CURRENT BUSINESS → B18**

**IF THE RESPONDENT TOOK CREDIT/BORROWED (SEE B7), THEN CONTINUE THE SURVEY WITH THE BUSINESS HE/SHE TOOK THE CREDIT FOR! IF THE RESPONDENT HAS MORE THAN ONE BUSINESS HE/SHE TOOK CREDIT FOR THAN CONTINUE THE SURVEY WITH THE MOST PROFITABLE BUSINESS FOR WHICH THE CREDIT WAS TAKEN!**

**IF THE RESPONDENT DID NOT TAKE CREDIT/BORROW (SEE B7), THEN CONTINUE THE SURVEY WITH THE MOST PROFITABLE CURRENT BUSINESS!**

No \_\_\_\_\_ RECORD THE NUMBER OF SELECTED BUSINESS

B9. What was the start-up amount of the business? \_\_\_\_\_ thousand sums

B10. What were the sources of this start-up? Indicate in percents:

		% in percent of total start-up amount
1	Own funds	
2	Gratuitous help from relatives, friends, acquaintances	
3	Borrowed money from relative, friends, acquaintances	
4	Borrowed goods/raw materials	
5	Credit from bank	
6	Credit from Credit Union	
7	Credit from Microcredit Organization	
8	Borrowed from moneylender	
9	"Gap" (rotating savings circle, emergency fund)	
	Other (record)	

B11. How many people are employed (regularly/usually) in this business?

- Total, including you \_\_\_\_\_ number of people
- Of which family members except you \_\_\_\_\_ number of people

B12. Now let's talk about assets of this business:

	Type of business assets:	Currently possessed? 1- yes 2 -no→ next row	Current market value: (for total quantity)  thousand sums	When did you buy them? MULTIPLE ANSWERS POSSIBLE!  SEPARATE BY COMMA!  97-if bought before year 2000	How much did you pay for them? thousand sums  SEPARATE BY COMMA!  97-if bought before year 2000
1	Building and premises (offices, shops, drug-stores, workshops, greenhouses etc.)	1.....2			
2	Vehicles (except for agricultural machinery)	1.....2			
3	Equipment, machinery for manufacturing and processing	1.....2			
4	Agricultural machinery (tractor, combine and other major machinery)	1.....2			
5	Stock, raw materials	1.....2			
6	Inventory (including the stock for resale)	1.....2			
7	Other (record)	1.....2			

B13. What were the total expenses for this business in 2010? \_\_\_\_\_ thousand sums

B14. What was the total income from this business in 2010? What was the total amount of sales of goods and services in year 2010? \_\_\_\_\_ thousand sums

B15. What share of profit of this business in 2010 did you spend on your family needs? \_\_\_\_\_ % percent of profit

B16. How do you rate profitability of your business ...?

For those who took credit/ borrowed:	Before the credit/borrowing:	After the credit/borrowing:
Business is (was) rather profitable	4	4
There is (was) income but not too high	3	3
Income barely cover(ed) business expenses	2	2
Business is (was) unprofitable	1	1
<i>Business did not exist</i>	99	
For those who did not take credit and did not borrow:	Start of entrepreneurship activity:	Currently:
Business is (was) rather profitable	4	4
There is (was) income but not too high	3	3
Income barely cover(ed) business expenses	2	2
Business is (was) unprofitable	1	1

**B17. For the next 12 months do you plan.....**

SINGLE RESPONSE ONLY!

To expand the business (increase the scale of production, services, sales)	1
Don't plan to change anything	2
To decrease the business (decrease the scale of production, services, sales)	3
To liquidate this business and start a new one	4
To terminate entrepreneurship activity at all	5

**B18. What business type is the most profitable in your location/district of the city?**

MULTIPLE ANSWERS POSSIBLE!

Trade (except for livestock and poultry resale)	1
Public catering	2
Transportation of people and goods	3
Construction and repair works	4
Production of non-foodstuffs	5
Production of foodstuffs (including processing of agricultural and livestock products)	6
Crops	7
Livestock and poultry fattening for resale	8
Livestock and poultry resale	9
Craftsmanship	10
Public services (hairdressing, dry cleaning, laundry, repair of clothing and footwear, etc.)	11
Repair of household appliances	12
Other (record)	13
None of the businesses is profitable	14
Every business is profitable	15

**B19. Do you have barrier-free access to the following quality services in your location?**

INTERVIEWER! THIS IS AN EVALUATION OF ACCESS TO SERVICES, AND NOT THEIR CURRENT USE OR NEED FOR!

	Type of services:	There is access	There is noaccess
1	Centralized gas supply	1	2
2	Centralized water supply	1	2
3	Electricity	1	2
4	Asphalt roads in proper conditions	1	2
5	Sales markets (demand, resellers, markets)	1	2
6	Transportation services	1	2
7	Services of appraiser, insurance company, cadastre	1	2
8	Repair and maintenance of machinery/equipment	1	2
9	Warehouse services	1	2
10	Legal services, notary	1	2

**C1. Nowadays many people often borrow money. For the past 5 years have you borrowed or taken the credit for any purposes to the amount of a minimum 50.000 soums from friends, relatives, banks, microcredit organizations (MCO), Credit Unions, moneylenders etc.?**

Borrowed or took credit	1
Did not borrow or take credit	2

→ C12



**C11. What changes happened with you and your family after your borrowed/took credit(s)?**

MULTIPLE ANSWERS POSSIBLE!

1. POSITIVE CHANGES	
1	family wellbeing has improved
2	repaired house/flat
3	purchased dwelling, built the house
4	purchased vehicle
5	paid for education/tuition fee
6	conducted wedding, other family events
7	purchased consumer durables
8	covered expenses for medical treatment, drugs
9	business turnover has increased
10	business profit has increased
11	started new business
	other (record)
<b>99 – No positive changes have occurred</b>	

2. NEGATIVE CHANGES	
1	family wellbeing has deteriorated
2	relationship in the family have worsened
3	business expenses have increased
4	business profits have decreased
5	business scale have decreased
6	business went bankrupt
7	ended-up with burden of debt
8	credit group has been dissolved
	other (record)
<b>99 – No positive changes have occurred</b>	

**C12. Now let's talk about financial organizations and individuals lending the money.**

		Is there ...in your location?	In 2010 how many times did you refer to/consulted for any reasons?	Are you satisfied with their work?	II. Why not satisfied? MULTIPLE ANSWERS POSSIBLE!
		1-yes, there is  2-don't know 3-no, there is no 4-never heard about → next row	quantity per year  0 =if did not refer/consult → next row	1-yes → next row 2-no	1- too much bureucracy 2- incompetent personnel 3-unacceptable products/services 4-insufficient collateral 5-no trust 6- distant location 7-required unofficial payments 8-low quality services 9-other
1	Bank	1.....2.....3.....4		1.....2	1...2...3...4...5...6...7...8...9
2	Credit Union	1.....2.....3.....4		1.....2	1...2...3...4...5...6...7...8...9
3	Microcredit Organization	1.....2.....3.....4		1.....2	1...2...3...4...5...6...7...8...9
4	Pawnshop	1.....2.....3.....4		1.....2	1...2...3...4...5...6...7...8...9
5	Moneylender	1.....2.....3.....4		1.....2	1...2...3...4...5...6...7...8...9

**C13. Do you need credit?**

no, do not need	1
do not need now, but need sometimes	2
yes, need very much	3

→C17

**C14. For what purposes do you need the credit?**

MULTIPLE ANSWERS POSSIBLE!

FOR BUSINESS PURPOSES	
1	To start new business
2	To expand existing business
3	To purchase machinery, equipment, spare parts
4	To purchase livestock
5	To purchase raw materials, stock
6	To repair, expand business premises
7	To pay the rent for business premises
8	To repay other debts
<b>9</b>	<b>Does not need credit for business</b>
10	other (record)

FOR HOUSEHOLD PURPOSES	
1	To purchase vehicle
2	To purchase, build dwelling
3	To repair dwelling
4	To purchase livestock
5	To purchase consumer durables
6	To pay tuition fees
7	To cover medical treatment expenses
8	To conduct family events, leisure
<b>9</b>	<b>Do not need credit for household</b>
10	other (record)

**C15. Where do you prefer to get the credit?**

	FOR BUSINESS PURPOSE
Bank	1
Credit Union	2
Microcredit Organization	3
Pawn-shop	4
Moneylender	5
Friends, neighbors, acquaintances	6
Relatives	7
<b>Does not matter</b>	<b>99</b>
<b>Does not need credits</b>	<b>9</b>

	FOR HOUSEHOLD PURPOSE
	1
	2
	3
	4
	5
	6
	7
	<b>99</b>
	<b>9</b>

**C16. Under which terms do you prefer to take the credit?**

1	What is the minimum amount of credit you need? <b>thousand soums</b>	
2	What is the minimum term (period) you prefer? <b>months</b>	
3	What is the maximum interest rate you can pay? <b>% per month</b>	
4	Which time of the year you need credit the most? <b>1-winter, 2-spring, 3-summer, 4-autumn, 5-does not matter</b>	1.....2.....3.....4.....5

**C17. Imagine that a financial organization (bank, CU, MCO, pawn-shop) offers credit to the amount of 3 million soums. Which of the following options would you choose?**

INTERVIEWER! SHOW CARD! SINGLE RESPONSE ONLY! DO NOT READ/SHOW OPTIONS 10 AND 11!

Options:	% rate p.a.	Maturity	Total amount to repay including interest payment, soums	Required collateral value:
1	7%	6 months	3,105,000	170% of credit amount
2	10%	18 months	3,360,000	
3	12%	36 months	3,720,000	
4	18%	6 months	3,270,000	150% of credit amount
5	21%	18 months	3,756,000	
6	23%	36 months	4,380,000	
7	30%	6 months	3,540,000	120% of credit amount
8	33%	18 months	4,188,000	
9	35%	36 months	5,100,000	
10	I would rather borrow from relatives or friends as I do not trust financial organizations			
11	I would not borrow the money under any circumstances			

**C18. Would you like to deposit money in a bank, credit union or give to an individual to earn profit?**

	1=yes	2=no
Bank	1.....	2
Credit Union	1.....	2
Individual	1.....	2

IF ALL ARE «NO» → C20

**C19. Under which terms would you prefer to deposit money in bank or credit union or give to an individual to earn profit?**

1	Amount, <b>thousand soums</b>	
2	Maturity, <b>months</b>	
3	Interest per month, <b>%</b>	

**C20. Imagine you decided to deposit 1 million soums to earn profit. A financial organization offers you the following options. Which one would you choose?**

INTERVIEWER! SHOW CARD! SINGLE RESPONSE ONLY! DO NOT READ/SHOW OPTIONS 10 AND 11!

Options	% rate p.a.	Maturity	Total amount to receive including interest payment, soums	Safety of deposit:
1	5%	3 months	1,012,500	100% guarantee; you receive profit in cash and on time
2	10%	12 months	1,100,000	
3	20%	18 months	1,300,000	

4	18%	3 months	1,045,000	100% guarantee; you receive part of the profit on (local) plastic card
5	36%	12 months	1,360,000	
6	46%	18 months	1,690,000	
7	30%	3 months	1,075,000	there is a 5% probability that the financial organization could not repay you; in this case you will receive only 100,000 sums instead of the required amount
8	60%	12 months	1,600,000	
9	70%	18 months	2,050,000	
10	I would like to deposit, but there are no suitable options			
11	I do not want to deposit at all			

**C21. Which of the following savings services do you currently use?**

INTERVIEWER! PLASTIC CARD, FIRM ACCOUNT ARE NOT SAVINGS! MULTIPLE ANSWERS POSSIBLE!

I have a deposit account in bank	1
I have a deposit account in a credit union	2
I participate in "gap" (rotating circle, emergency fund)	3
I do not use savings services of organizations because I prefer to invest in property, livestock etc.	4
I do not use savings services of organizations because I do not trust them	5
I do not use savings services of organizations because there is no access to them	6
I do not use savings services of organizations because terms for savings are unsatisfactory (% rate, maturity etc.)	7
I do not use savings services because do not have extra money to save	8
other (record	

**Section D. Respondent's life experience**

**D1. Now I would like you to make a simple choice. Would you prefer to receive 100.000 soums today or ....**

INTERVIEWER! ASK EACH PAIR SEPARATELY! SINGLE RESPONSE FOR EACH PAIR!

Receive 100.000 soums today	1	or	2	115.000 soums in 3 months (March 2011)?
Receive 100.000 soums today	1	or	2	130.000 soums in 3 months (March 2011)?
Receive 100.000 soums today	1	or	2	150.000 soums in 3 months (March 2011)?
Receive 100.000 soums today	1	or	2	180.000 soums in 3 months (March 2011)?
Receive 100.000 soums today	1	or	2	225.000 soums in 3 months (March 2011)?

**D2. Now please make a similar choice. Would you prefer to receive 100.000 soums in one year or ....**

INTERVIEWER! ASK EACH PAIR SEPARATELY! SINGLE RESPONSE FOR EACH PAIR!

Receive 100.000 soums in one year (January 2012)	1	or	2	115.000 soums in one year and 3 months (March 2012)?
Receive 100.000 soums in one year (January 2012)	1	or	2	130.000 soums in one year and 3 months (March 2012)?
Receive 100.000 soums in one year (January 2012)	1	or	2	150.000 soums in one year and 3 months (March 2012)?
Receive 100.000 soums in one year (January 2012)	1	or	2	180.000 soums in one year and 3 months (March 2012)?
Receive 100.000 soums in one year (January 2012)	1	or	2	225.000 soums in one year and 3 months (March 2012)?

**D3. Please rate your trust to the following institutions and people in general based on the scale from 1 to 5 where "1" means "I don't trust at all", "5" means "I trust completely"**

		I don't trust at all			I trust completely			DO NOT KNOW
1	Banks	1	2	3	4	5	0	
2	Credit Unions	1	2	3	4	5	0	
3	Microcredit Organizations	1	2	3	4	5	0	
4	People in general	1	2	3	4	5	0	

**D4. How well do you know (understand and able to perform) the following matters?**

		very good	good	bad	DON'T KNOW
1	Planning the family budget	1	2	3	4
2	Accounting and bookkeeping	1	2	3	4
3	Developing the business plan	1	2	3	4
4	Managing the business	1	2	3	4
5	Marketing, sales	1	2	3	4

**D5. How much is 30% of 3.000 soums?**

300 sums	3
600 sums	2
900 sums	1
DO NOT KNOW	0

**D6. Imagine you have 100.000 soums in a bank account. Annual interest rate is 5%. How much money will be in your account after 2 years? (it is assumed that you will not withdraw the interest in between)**

more than 110.000 sums	1
exactly 110.000 sums	2
less than 110.000 sums	3
DO NOT KNOW	0

**D7. How much do you agree with the following statements?**

		strongly agree	agree	disagree	strongly disagree
1	"I have little control over what will happen to me in my life"	1	2	3	4
2	"I have a hard time saving money, even though I know I want to save money"	1	2	3	4
3	"Good things tend to happen to other people, not to me or my family"	1	2	3	4

**Thank you very much for the interview!**

**INTERVIEWER! GO TO D8!**