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## **Microfinance Environment in Uzbekistan: Analysis of Supply and Demand**

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## **Contents**

Abstract .....	v
1 Introduction and Motivation .....	1
2 Microfinance Environment .....	3
2.1 Historical Evolution .....	3
2.2 Microfinance sector analysis as of 2011 .....	6
3 Determinants of Non-bank MFIs' Placement .....	14
4 Excess Demand for Microcredits .....	23
5 Conclusion .....	27
References .....	28
Appendix .....	31

## **List of Figures**

Figure 1 Cumulative growth non-bank MFIs in Uzbekistan, 1998–2011 .....	6
Figure 2 Trends in outreach and scale for a median MFI (2009) .....	11
Figure 3 Depth of outreach: average loan balance, in USD and as percentage of GNI per capita (2009) .....	11
Figure 4 Efficiency of MFIs (2009) .....	13
Figure 5 Assets productivity and returns (2009) .....	13
Figure 6 Distinguishing access to and use of financial services .....	23
Figure 7 Distribution of non-bank MFIs (MCO and CU) in Uzbekistan, as of January 2011 .....	31

## **List of Tables**

Table 1 Microcredit and microdeposit services in Uzbekistan .....	7
Table 2 Predicting probability of appearance of non-bank MFIs [Probit] .....	18
Table 3 Frequency distribution of non-bank MFI in districts .....	19

Table 4	Predicting number of non-bank MFIs [Truncated Poisson] .....	21
Table 5	Total probability of obtaining microcredit in non-bank MFIs .....	25
Table 6	Selected economic, human development and business environment indicators for Uzbekistan .....	32
Table 7	Summary statistics district level determinants of non-bank MFIs .....	33
Table 7a	Comparison of district level determinants across district with and without MFIs .....	34
Table 8	Test for multicollinearity .....	35
Table 9	Correlation matrix district level determinants of non-bank MFIs .....	36
Table 10	Factor Analysis .....	37
Table 11	Rotated factor loadings .....	37
Table 12	Predicting the number of non-bank MFIs in districts of Uzbekistan, factor analysis [Factor 1 and Factor 2] .....	38
Table 13	Predicting number of non-bank MFIs in districts of Uzbekistan, factor analysis [Factor 1] .....	39

## **Abstract**

The paper 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 paper 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-Classification:* O16, C34

*Keywords:* microcredit, microfinance institutions, credit unions

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## 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>1</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 the 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 paper thus contributes to the general microfinance literature providing the first evidence from Uzbekistan. The particular development path of the microfinance sector

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<sup>1</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.

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 Micro-credit Organizations (MCOs), which practice a canonical microfinance model, albeit with for profit status.

The paper 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.

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 paper 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.

## 2 Microfinance Environment

### 2.1 Historical Evolution

Uzbekistan is a lower middle-income country located in the heart of 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>2</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,

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<sup>2</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).

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>3</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 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

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<sup>3</sup> The Law on “Credit Unions” was adopted in 2002, the laws “On Microfinance” and “On Microcredit Organizations” were adopted in 2006.

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 Micro-finance 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>4</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>5</sup>. Figure 1 summarizes the entire evolution of microfinance sector in the country, visualizing the three periods in market evolution.

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

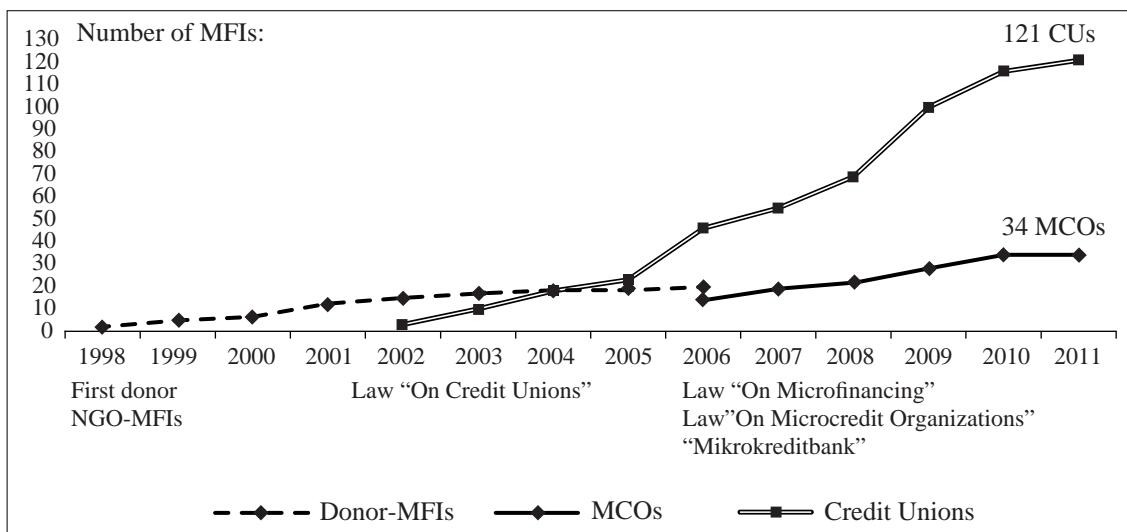
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<sup>4</sup> “Mikrokreditbank” is an open joint-stock company and its largest shareholder remains the Ministry of Finance. Following the required re-registration procedures of NGO-MFIs in 2006, any foreign donor funding in support of microfinance activities 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>5</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.

unique law in the Central Asia region, which explicitly defines the term “microfinance”<sup>6</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, Demirguc-Kunt & Morduch, 2011).

**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)

## 2.2 Microfinance sector analysis as of 2011<sup>7</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).

<sup>6</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.

<sup>7</sup> The analysis is as of January 2011 given the data availability. The activities of all non-bank MFIs has been officially terminated in October 2011.

**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>8</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>9</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>10</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>11</sup>. Based on this methodology commercial banks in Uzbekistan offer primarily SME loans with an average loan balance above 3 200 USD. This loan amount is 1.4 times

<sup>8</sup> Existing financial institutions enter the microfinance segment by offering loans of a lower amount, i.e., direct lending to end-users.

<sup>9</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>10</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>11</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.

(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>12</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>13</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>14</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

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<sup>12</sup> As of December 2012 MMS constituted 79 590 Uzbek soums (38 USD).

<sup>13</sup> This is related to overall the macroeconomic and monetary system with elements of cash control.

<sup>14</sup> The remaining share is MCOs (3%) and pawnshops (2%) (Tadjibaeva, 2011).

loans (16.5%)<sup>15</sup> and credits for other non-commercial purposes (3.9%). On the micro-finance 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 faster<sup>16</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>17</sup>. Group lend-

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<sup>15</sup> Popular ones include the purchase of cars, consumer durables, household appliances, livestock, payment of college tuition fees, housing repair.

<sup>16</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>17</sup> Compared to international practice and similar lending in Grameen Bank, this balance is still higher than USD 15–USD 50 size.

ing envisages dynamic incentives and very limited collateral pledges<sup>18</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 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>19</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>20</sup> and upper bounds for loans (Figure 3). However, the depth of outreach<sup>21</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).

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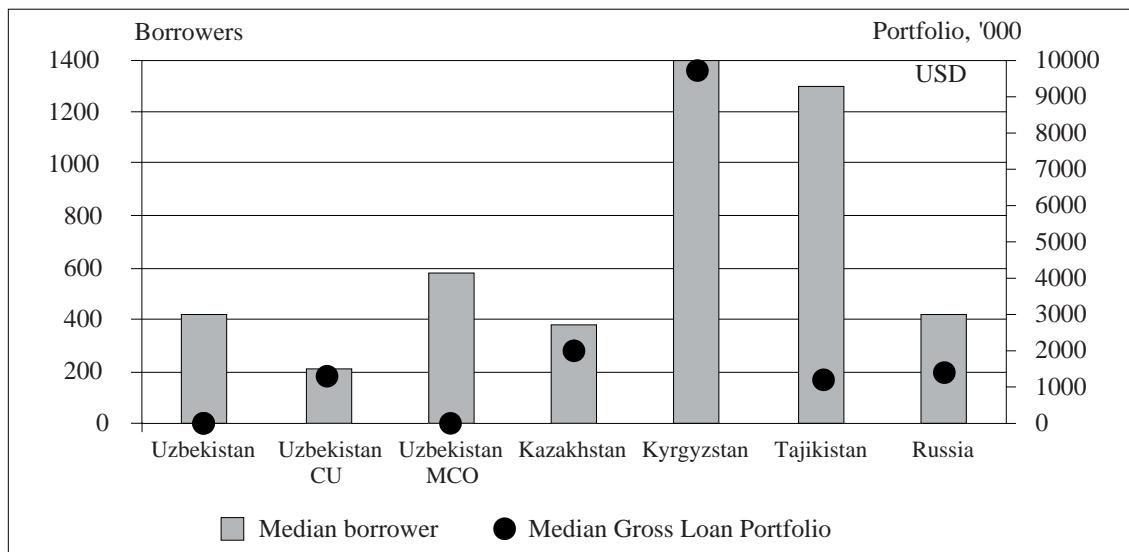
<sup>18</sup> Not more than 5% of the credit amount. Typical collateral includes gold jewelry, a vehicle or a third party guarantee.

<sup>19</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>20</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.

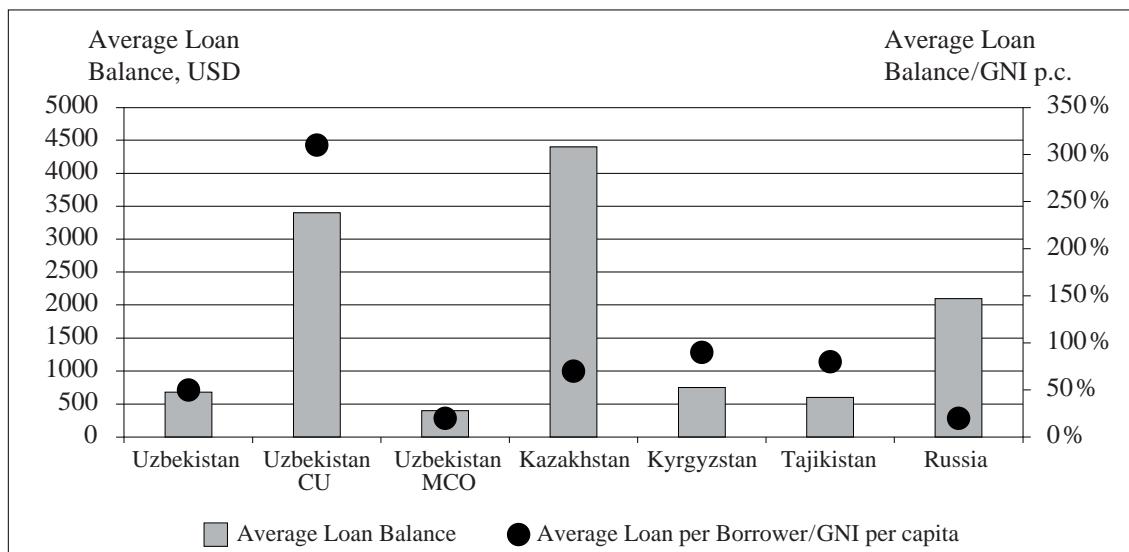
<sup>21</sup> Measured as average loan balance as a percentage of GNI per capita.

**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.

**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>22</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.

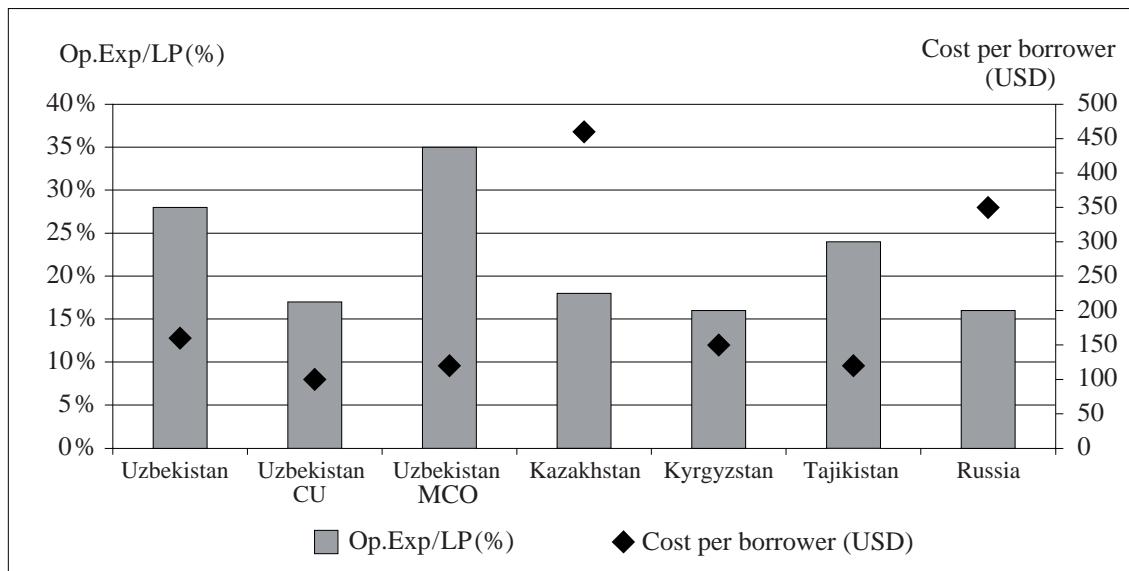
**Efficiency and productivity:** The efficiency of MFIs is illustrated by operating expenses and cost per borrower. High operating costs can be explained by the relatively young microfinance sector in Uzbekistan, where the mean operating costs in relation to loan portfolio add up to 39% (Kneading & Rosenberg, 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 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.

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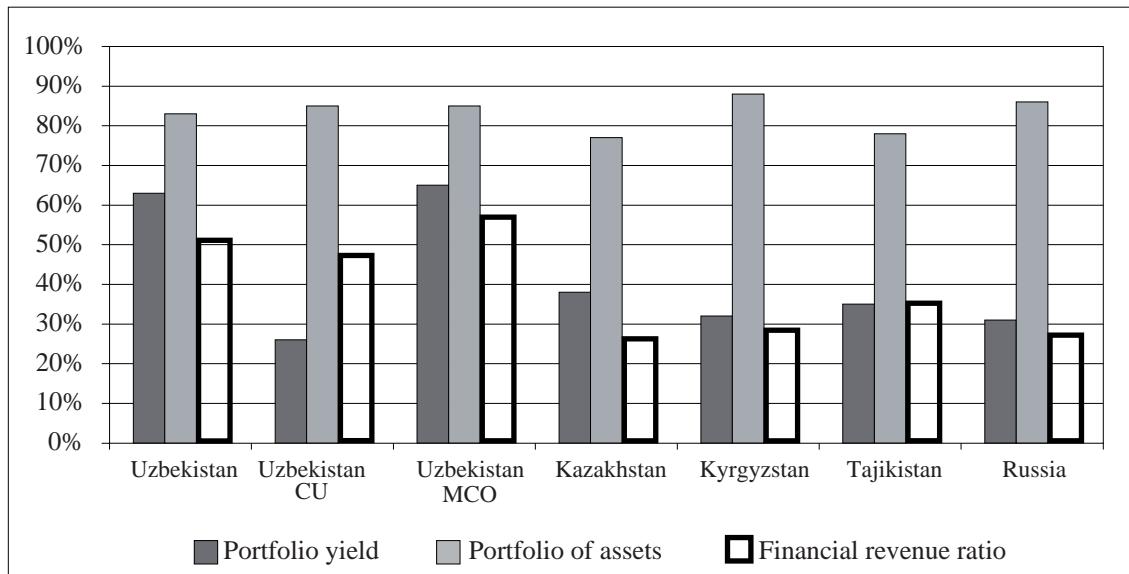
<sup>22</sup> While the global average is about 35% p.a., in Uzbekistan the average is above 80% p.a. and in Sri Lanka – around 17% p.a. (Kneading & Rosenberg, 2008).

**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.

Non-bank MFIs thus represent an important, competitive market based segment of the financial sector of the economy in Uzbekistan. The paper 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>23</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

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<sup>23</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/>

product (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 pro-

vide 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>24</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 & Colombe (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 im-

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<sup>24</sup> In Uzbekistan the economically active age constitutes 18–55 years old for women and 18–60 for men.

portant 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 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.

**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>25</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.

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<sup>25</sup> Available from the author upon request.

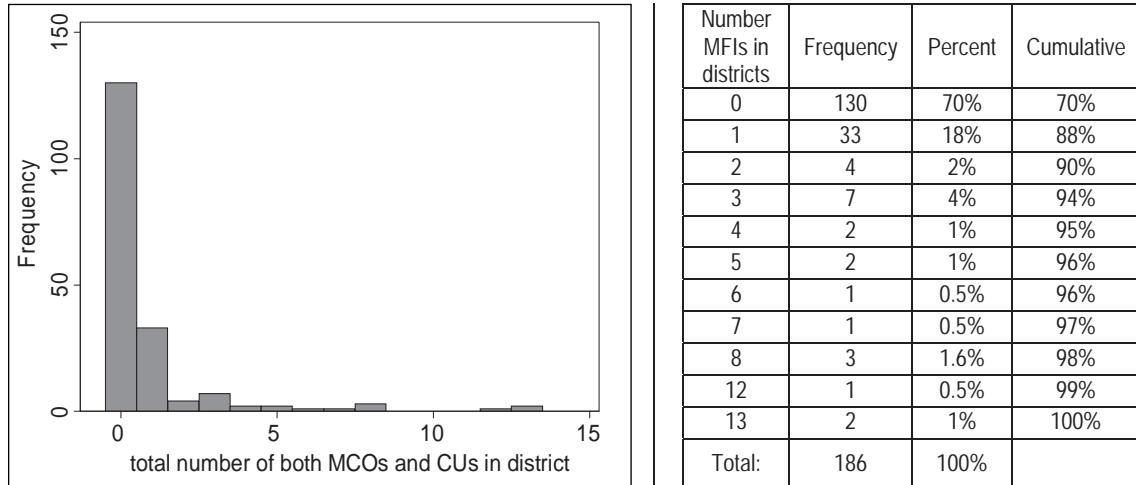
**Table 2: Predicting probability of appearance of non-bank MFIs [Probit]**

	Variables:	Var. mean:	(1) Probability of MCO and CU		(2) Probability of MCO		(3) Probability of CU	
			Co- efficients	Marginal effects	Co- efficients	Marginal effects	Co- efficients	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 soum (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.

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 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 retail 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 retail 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.

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.

**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)
	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.

**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>26</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 (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).

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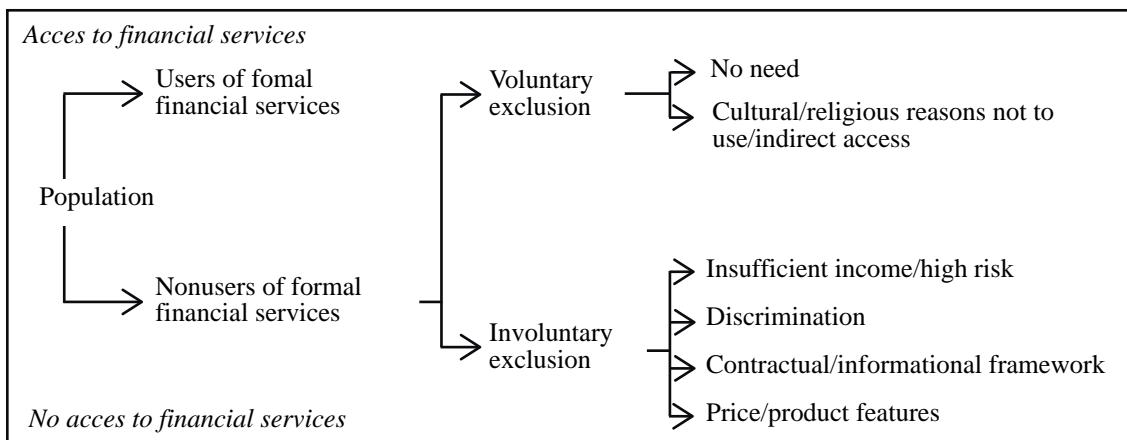
<sup>26</sup> Results of the sensitivity analysis are available from the author upon request.

## 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 Word 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 (Word 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.

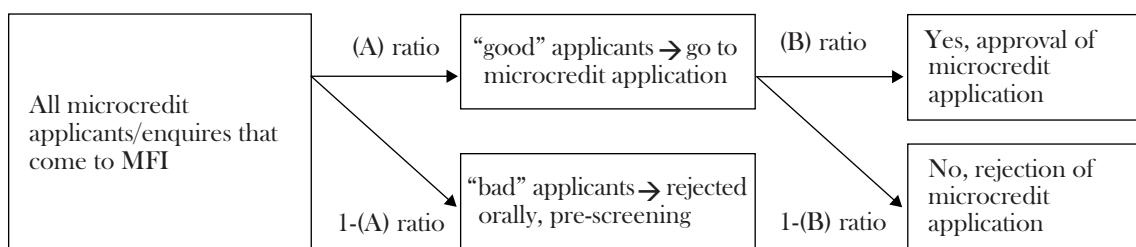
**Figure 6: Distinguishing access to and use of financial services**



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

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.

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 inquiries. Once the loan application passes initial pre-screening, there is a very high probability of final approval reflected in the value of (B) ratio. Loan ap-

plication procedures of non-bank MFIs is mainly based on a required set of documents and confirmations.<sup>27</sup> Before the legal changes in 2006, the first Credit Unions established in 2002 applied credit scoring methodology which was originally brought by donor projects such as FINCA and others.<sup>28</sup>

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

Non-bank MFI:	(A) ratio, range	(B) ratio, range	(A) <sup>*</sup> (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>29</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>30</sup>) to boost demand, increase market share and diversify their credit portfolio.

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<sup>27</sup> According to in-depth interviews with credit officers of MFIs, the following documents were required for microcredit application: (1) credit application form (2) business plan including cash flow projections (3) independent valuation of collateral pledge (4) confirmation from the residence place (5) patent/license if registered entrepreneur (6)agreement from other spouse on use of collateral pledge (7) credit contract/agreement between borrower and client (8) credit repayment schedule (9) decision of the credit committee (10) results from home inspection conducted by the credit officer for evaluation of repayment capacity of the applicant.

<sup>28</sup> Source: In-depth interviews with the managers of Credit Unions.

<sup>29</sup> In-depth interviews with MFI credit officers and management.

<sup>30</sup> For example promotion of educational loans covering tuition fee at local Universities.

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.

## 5 Conclusion

The paper 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 paper 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 micro-credits 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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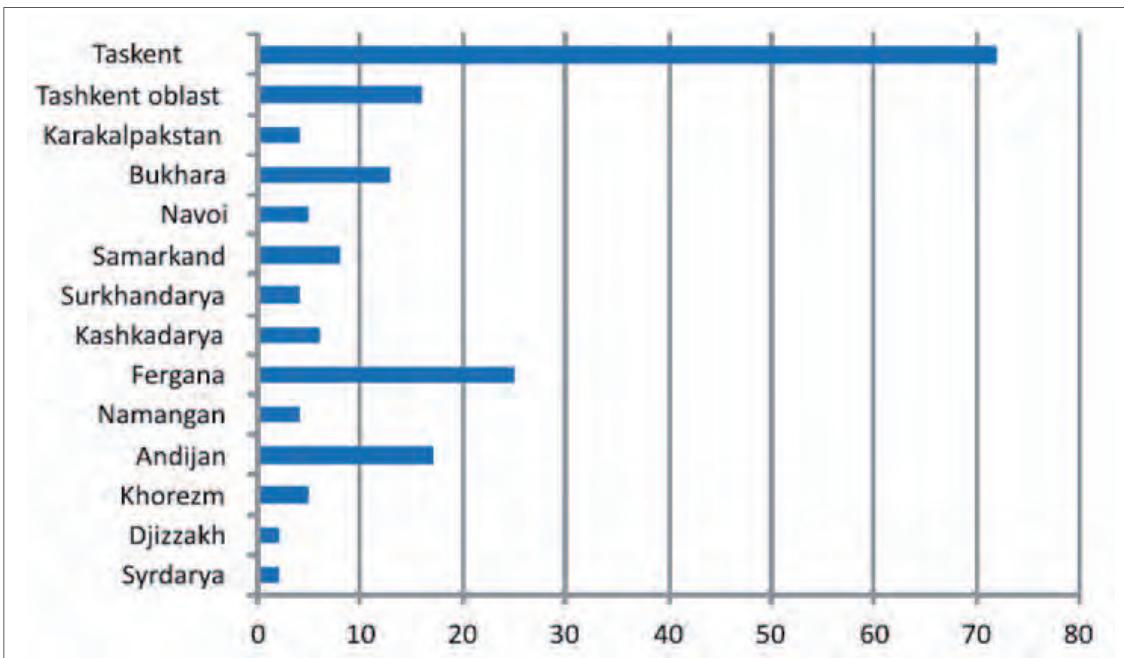
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## Appendix

**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>31</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>31</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 selected district level variables that determine the appearance of non-bank MFIs in Uzbekistan. The variables represent an official statistics as of year 2001. Given that this period represents an early transition period, the methodology of these variables is based on original Soviet model. (i) Socio-demographic variables represent set of indicators that determine population demographics, density, labor force participation which is important for determining potential clientele for non-bank MFIs (ii) Infrastructure variables represent set of indicators that determine the quality of provision of basic utilities such as water, access to medical services, public services. These variables are important to capture favorable environment for opening and running business (iii) Economy structure variables represent set of indicators that define economic development of districts in terms of regional output, manufacture production, trade, sales, and the level of entrepreneurship. They are important to grasp favorable environment for operation of MFIs.

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**

	Retail sales, '000 UZS per capita	Manufacturing sales, '000 UZS p. c.	Trade saldo, million USD	Industrial production, % of GRP	Gross Regional Product, billion UZS	SME share in GRP	Road densities	Gas, % provision	Water pipes, % provision	Medical points, number per 10'000 ppl	Housing stock, sq. meters pc	Urban dummy	Density, total ppl over territory	Unemployed, % of econ. active ppl	Econ. active population, '000
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	0.38*	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-demogr.	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) Infrastructure	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)
<hr/>				
	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-demogr.	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) Infra-structure	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.