**Household Allocation of Microfinance Loans in Kyrgyzstan**

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**Abstract**

In the last decade, the presence of microfinance has substantially increased in Kyrgyzstan. This study focuses on the demand for microcredit and identifies the determinants of household microfinance loan allocation. A multivariate probit model was developed and populated with borrowers’ loan allocations from 2006 to 2010. Results indicate that mobile phone and livestock ownership were identified as two key factors which decrease borrowers’ probability of using loans to purchase food and increase the probability of agricultural investment or to start a business. Borrowers in the rural Naryn region, one of the poorest areas in Kyrgyzstan, have a higher probability to allocate their loans toward food purchases and the smallest (negative) probability to allocate credit toward starting of business.

**1. Introduction**

Microfinance programs are based on the concept that low-income households are affected by the lack of credit access (Petrick, 2005). In general, asymmetric information reduces the lender’s ability to recognize reliable borrowers and this generates credit rationing (Stiglitz, 1990). Due to the lack of borrowing history and collateral as required by banks, low-income households are particularly credit constrained (Barnett et al., 2008). The relaxation of credit constraints is realized by microfinance through the introduction of group lending (Armendáriz and Labie, 2011). All members in a group are jointly responsible for a loan, which reduces a lender’s risk and increases access to financial services for households (Stiglitz, 1990). Thus, microfinance has the potential to lift low-income households out of poverty (Khandker, 2005; Katsushi et al., 2010).

In Central Asia and specifically in the Kyrgyz Republic, the collapse of state directed economies produced a dramatic rise in small business and self-employment (World Bank, 2004). However, the rate of formal credit penetration in Kyrgyzstan is one of the lowest in Central Asia and Eastern Europe (Microfinance Center, 2011). In 2009, this penetration rate from any source among the economically active population (15-65 years old) was only 11% in Kyrgyzstan. However, microfinance accounts for 70% of households with access to formal credit.

The objective of this study is to examine households’ allocation of microfinance loans in Kyrgyzstan. In particular, it is of interest to estimate which factors affect the probability of borrowers to use their loan(s) for different purposes such as consumption or investment which may or may not foster economic development.

The analysis employs data from the Kyrgyzstan Integrated Household Survey (KIHS, 2010). The KIHS is the most comprehensive dataset which covers the entire country. The dataset provides information on the socio-economic status at the household level. The survey also identifies microfinance borrowers and the purpose of their loans from 2006 to 2010. Thus, the KIHS is not restricted to specific microfinance programs, but it analyzes a sample of the entire microfinance sector in Kyrgyzstan.

The paper is organized as follows: Section two provides the background on the economic transition and the microfinance sector in Kyrgyzstan; section three describes the dataset and the variables employed; section four introduces the microeconomic model and the econometric approach for estimation; section five presents the results, while the conclusions and implications are provided in final section six.

**2. Economic Transition and Microfinance in Kyrgyzstan**

2.1 Economic Transition in Kyrgyzstan

The Kyrgyz Republic, located in Central Asia, received its independence in 1991 after the collapse of the Soviet Union (USSR). As with many of the former Soviet Republics, its economy was dependent on trade within the USSR, and after the collapse, it witnessed a large drop in Gross National Income (GNI) and living standards (Figure 2). It took 19 years to restore GNI to the pre-independence level.

The World Bank (2014a) classifies the Kyrgyzstan Republic as a low-income country. Approximately 6% of the population lives at the lowest poverty threshold of $1.25 per day. Moreover, the poverty gap increased by 37.5% from 2006 to 2011 (World Bank, 2014b).

While the country does have substantial reserves of coal, gold, uranium, antimony, and rare earth minerals, its currently mining production is only 50% of the pre-independence period (World Bank, 2005). Agricultural production, accounting for a third of the workforce, declined by 40% from 1990 to 1995 and is only now gradually recovering. In contrast, trade and the service sectors have substantially increased their share of GDP from 29.6% in 2000 to 46.6% in 2010 (National Statistical Committee of the Kyrgyz Republic, NSCK 2014).

2.2 Microfinance in Kyrgyzstan

According to Kyrgyz legislation, “the goal of microfinance organization activities is to provide accessible microfinance services to alleviate poverty, increase employment, and assist in the development of entrepreneurship and social mobilization of the population in the Kyrgyz Republic” (Kyrgyz Republic, 2002). In other words, microfinance in Kyrgyzstan was introduced as a poverty reduction tool, given the country’s low living standards.

The first examples of microfinance organizations in Kyrgyzstan date back two decades. Since then, their presence has grown considerably. Trends in the country’s microfinance sector, both in terms of size, number of loans, and interest rate, are listed in Table 1. From 2006 to 2011, the average loan size ranged from $391 to $597, while the real interest rate increased from 34% to 44%. These figures are on the same scale with the rest of Central Asia and Eastern Europe microcredit loans (Weiss and Montgomery, 2004).

Microfinance also presents some peculiar characteristics in the Kyrgyz Republic. Despite a large number of microcredit institutions, the market is very concentrated: 84% of the loans are provided by only five organizations - Aiyl Bank, Bai Tushum, Finca, Kompanion, and Mol Bulak (Microfinance Center, 2011). Profitability and low risk characterize these institutions. Table 2 shows that the share of microfinance loans overdue 30 days or more ranged from zero to 5.45%.

In Kyrgyzstan, microfinance programs are generally organized through group lending and provide financial and technical assistance with respect to the purpose of the loan. For instance, Kompanion offered loans to families to complete unfinished houses and renovate flats (Kompanion, 2013). In contrast, Ayl Bank mainly provided loans to the agricultural sector based on the use of livestock as collateral (Ngo, 2008).

The largest share of small loans in Kyrgyzstan is observed in the Naryn region which accounts for 56% of the microfinance loans (KIHS, 2010). The Naryn district is characterized by high rates of rural poverty. In 2011, the United National Development Program (UNDP) estimated that Naryn had the highest poverty rate in the country, 52% of the national poverty line (Slay, 2011). In addition, 76% of microfinance clients in Kyrgyzstan are women (Microfinance Center, 2011). In other words, microfinance in Kyrgyzstan was able to reach low-income clients, especially women living rural areas (World Bank, 2004).

Although small microfinance agencies (MFA) cover only 16% of the total credit market volume, they are more aggressive in attracting new low-income clients than the major microfinance institutions (Raghunathan et al., 2011; Microfinance Center, 2011). In recent years, Kyrgyzstan has experienced a rapid growth of these small microfinance leaders. Due to favorable legislation, a microfinance agency can be established with only $2,175 in capital and no expertise in microfinance (Smith, 2013).

According to the Microfinance Center (2011), the average number of loans per client is 1.46 while the average duration of a microfinance loan is 11 months. The Kyrgyzstan Integrated Household Survey (2010) confirms this aspect. In the 2006-2010 period, 74% of households with access to microfinance were observed with only one loan (KIHS, 2010).

In contrast, usurious interest rates have raised public concern in Kyrgyzstan. In May 2012 the Kyrgyzstan National Bank closed 94 microfinance lenders for charging above the industry-average interest rates (Smith, 2013). In August 2013, the president signed a bill that sets an interest rate cap to limit usurious practices (Youatt, 2013).

In conclusion, although in Kyrgyzstan microfinance was able to provide credit access to low-income households, especially women and small farmers, inadequate evaluation of client risk and expensive loan requirements seem to have weakened its effectiveness to foster economic development.

**3. Data**

The data set is based on the Kyrgyzstan Integrated Household Survey (KIHS, 2010) collected by the NSCK, covering the years from 2006 to 2010. The KIHS broadly consists of seven sections: general socio-economic information (age, gender, and marital status), family status (education, internal migration, and health status), consumption and expenditure composition, and employment status. Other data include purchase of non-food commodities, household income and expenditures, and housing conditions. An exhaustive description of the KIHS survey data is available in Esenaliev et al. (2011).

The survey is a rotating panel with only a maximum of one-quarter of the sample being replaced annually. The sample of households with access to microfinance credit consists of all the households with at least one microfinance loan. In the 2006-2010 period, this corresponds to 608 loans and 6% of households, basically the same data as reported by Microfinance Center (2011) and Mix Market Microfinance Information Exchange (2014) for the entire microfinance sector in Kyrgyzstan.

Socio-economic variables including age, family size, education, and off-farm income are employed along with binary variables for gender and rural or urban residence. The socio-demographic variables were defined with respect to the household head. The exact definition of each variable is listed in Table 3 with summary statistics in Table 4. Due to some skewness of the distribution, the off-farm income variable was log transformed.

The dataset also provides information on the region of residence. Apart from the capital city Bishkek, there are seven districts (Oblasts): Issykul, Jalal-Abad, Naryn, Batken, Osh, Talas, and Chui. Table 5 indicates that the share of sampled households in the Naryn district is on the same scale with the other districts (13.4%). In contrast, the access to microfinance and share of total loans in this district is larger, 51% and 56%, respectively.

Finally, the KIHS classified the loan purposes into seven categories: Food purchase for household nutrition, starting a private business, agricultural needs, housing, education, healthcare, and other expenses. Each dependent variable was defined equal to one if the household used the loan for that purpose and zero otherwise.

**4. Analytical Strategy and Model Specification**

4.1 Analytical Strategy

In general, credit constrained households allocate scarce funds among different choices subject to their opportunity cost (Karlan and Goldberg, 2011). Some of these choices, including capital investment or financing an emergency, can have high initial costs, which precludes the use of the loan for other choices. It is then reasonable to assume that the choices are interdependent. If the choices are interdependent, the error terms will be correlated among choices. Defining univariate models for each choice provides consistent estimates of the coefficients, but incorrect standard errors (Greene, 2012). Consequently, a multivariate model yielding efficient errors is preferred.

 In particular, it is assumed that a household with access to microfinance faces $M$ choices. Each choice consists of allocating part or the entire amount of the loan to a specific purpose. It is assumed that a household is a utility maximizer in its use of credit. A household’s utility is unobservable, but household’s attributes are observable. The utility function is then decomposed in the summation of a household’s attributes and the error term:

 $U\_{j}^{\*}=X\_{j}β\_{j}+ε\_{j} ,$ *j =* 1 *. . M* , (1)

where $U\_{j}^{\* } $is a vector of random utilities of *N* households, $X\_{j}$ is a matrix of household’s attributes, $β\_{j}$ is a vector of parameters, and $ε\_{j} $is vector of error terms. The system given in (1) identifies *M* equations, one for each choice.

System (1) is assumed to have a threshold value such that if the utility of the borrower *i* from the choice *j*, $U\_{ij}^{\* } $,is larger than the threshold, household *i* allocates part or the entire amount of the loan to choice *j*. Without loss of generality, the threshold value is assumed to be equal to zero. Utility $U\_{ij}^{\* }$ is not observed, so (1) is empirically estimated by considering a binary variable $y\_{ij}$ equal to one if household *i* allocates the loan to choice *j* and zero otherwise:

 $y\_{ij}=\left\{\begin{array}{c}1 if U\_{ij}^{\* }>0\\0 otherwise\end{array}\right. $ (2)

In particular, the choice among different uses of the microfinance loan is not exclusive where more than one choice is possible. Seventy-two percent of the loans were used for one purpose, 21% for two, 6% for three, and 1% for four or five purposes. Consequently, $ε$ is assumed to follow a multivariate standard normal distribution $N\left[0,Σ\right]$ where $Σ$ is the covariance matrix. This identifies the model as a multivariate Probit model. Given the normality assumption, the model is estimated with maximum likelihood estimation. The likelihood function is estimated with the Geweke-Hajivassiliou-Keane (GHK) smooth recursive simulator (Train, 2009). The integrals are evaluated by averaging over *R* draws from truncated normal distributions. With a large sample size, *R* should not be smaller than the square root of the number of observations (445 observations, 22 draws) (Cappellari and Jenkins, 2006). With a small sample size, *R* should be at least as large as the sample size. Consequently, the estimation of the marginal effects will be based on 1000 draws.

 The multivariate Probit model allows for a wide variety of partial effects and probabilities. Greene (2012) derives analytically the partial effects, the conditional probabilities, and the unconditional probability for a bivariate Probit while Mullahy (2011) derives them for the multivariate case. Specifically, give unconditional mean functions are univariate probabilities, their partial effects are estimated likewise to the univariate case (Greene, 2012). Controlling for heteroskedasticity, the significance of the average partial effects will be estimated by the delta method from the cluster-robust standard errors with clusters defined at the household level.

4.2 Model Specification

Limited observations resulted in aggregating loan categories. Specifically, housing, educational, healthcare expenses, and other expenses are aggregated into a category called Other Purchases. This defines a system of four equations:

$\left\{\begin{array}{c}U\_{food}^{\*}=X\_{0}β\_{food}^{0}+X\_{food}β\_{food}+ε\_{food} \\U\_{start}^{\*}=X\_{0}β\_{start}^{0}+X\_{start}β\_{start}+ε\_{start} \\U\_{farm}^{\*}=X\_{0}β\_{farm}^{0}+X\_{farm}β\_{farm}+ε\_{farm} \\U\_{other}^{\*}=X\_{0}β\_{other}^{0}+X\_{other}β\_{other}+ε\_{other} , \end{array}\right.$ (3)

where the subscript $food, start, farm,and other $identifies the loan use for Food Products, Start a Business, Agricultural Needs, and Other Purchases, respectively.

Each equation in (3) has a fixed group of independent variables ($X\_{0}$). These socio-economic variables are gender, age, family size, education, residence, and the off-farm income. In addition, dummy variables for the Naryn district and the year were defined.

The ownership of mobile phones is also included in each equation as a measure of household’s willingness to adopt new innovations. Mobile communication technology plays a strategic role in improving access to labor markets and reducing vulnerability to unpredictable shocks (World Bank, 2007). In 2006, the share of households with access to microfinance and a mobile phone was 12%. In 2010, the share was 91% (KIHS, 2010).

Explanatory variables specific to each equation represent the household’s resource endowment. From system (3), this corresponds to

$$\left\{\begin{array}{c}X\_{food}=\left(livestock, land,food storage\right) \\X\_{start}=\left(textile,food storage, transportation\right) \\X\_{farm}=\left(livestock, land, food storage, transportation\right) (4) \\X\_{other4}=\left(transportation, sanitation, hot water\right) . \end{array} \right.$$

 Binary variables for the ownership of textile machineries and food storage equipment were included in the Start a Business equation, given the leading retail sectors in Kyrgyzstan are still food products and clothing (Huang, 2014; EurasiaNet, 2014). Similarly, the ownership of sanitation and the hot water supply were considered as a proxy of the housing conditions and they were included in the Other Purchases equation (Parkinson and Talipova, 2005; and United Nations Economic Commission for Europe, UNECE, 2009).

 In order to avoid reverse causation, all the variables in (4), as well as the off-farm income and the ownership of mobile phone in $X\_{0}$**,** were lagged by one year. In this way, it is possible to test if the ownership of durable goods in the previous period (year) affects the household’s probability to allocate the loan for a specific purpose in the current period.

**5. Results**

The results of the multivariate Probit model for (3) are listed in Tables 6 and 7. Preliminarily, the diagnostics are shown at the bottom of Table 6. The likelihood ratio rejects the null hypothesis of no correlation among equations at the 1% level. This indicates that loan choices are interdependent. The estimated correlation matrix is given in the lower half of Table 6. All the correlation coefficients are negative and significant at the 1% level, apart from the Food Products and the Start a Business allocation of the loan. This supports the hypothesis that different loan choices are considered substitutes by households. This also suggests that households are substantially credit constrained given the loan allocation for one choice reduces the financial resources for other choices (Karlan and Goldberg, 2011). It is interesting to notice the absence of statistically significant correlation between buying food and starting a new business. The Wald test does not reject the hypothesis of zero correlation between the Food Products choice and the Start Business choice with a p-value equal to 0.39 (Jenkins et al., 2005). A possible explanation is that the first alternative is related to the autonomous consumption, the fixed spending necessary to satisfy basic needs, which is independent from the disposable income originating from the second alternative.

 The analysis of marginal effects allows identifying key factors in the loan allocation is shown in Table 7. For instance, in the Agricultural Needs equation, the ownership of livestock has a positive effect (0.23) while it has a negative effect in the Food Products equation (−0.17). This suggests livestock is a strategic asset for agricultural investment and it represents a substantial food source for small farmers (Lerman and Sedik, 2009). The Kyrgyz territory is mainly mountainous and the arable land has low productivity. Gazing cattle does not require ownership of land while the employment of fertilizer and the irrigation system are still quite limited for small farmers (Lerman and Sedik, 2009). This can explain the lack of significant effect of the ownership of arable land in the Food Products equation and the Agricultural Needs Equation.

The ownership of mobile phones also indicates an interesting pattern. If the household has a mobile phone in the previous period, the probability to use the loan to Start a Business in the current period increases by 0.12. In contrast, the ownership of mobile phone decreases the probability to allocate the credit for Food Products by 0.11. The strategic role played by mobile technology to foster the economic development in Kyrgyzstan suggests that if households improve their communication capabilities, this may reduce their vulnerability to unpredictable shocks and stimulate their access to market and job opportunities (World Bank, 2007).

The probability of using the loan to Start a Business is also positively affected by the ownership of textile and food storage equipment. If the household owns textile and food storage equipment, the probability to allocate the loan for starting a business increases by 0.07 and 0.08, respectively (10% significance). Note that the magnitude of the average partial effects of the two independent variables is basically the same. This is supported by the F-test on equal coefficients, which does not reject the null with a p-value equal to 0.82.

The off-farm income increases the probability to use the loan for Other Purchases by 0.07 and it decreases the probability to allocate credit for Agricultural Needs by 0.09. The effect of the off-farm income on loan allocation purposes is basically opposite that of the residence variable. Dwelling in a rural area increases the probability to use the loan for Agricultural Needs by 0.23 as expected and it decreases the probability to use the loan for Other Purchases by 0.10. Labor migratory trends in Kyrgyzstan in the last two decades are in line with these results. The Kyrgyz population, especially the young, is migrating from the countryside in order to find better economic opportunities in urban areas and abroad (Thieme, 2008). Off-farm income is mainly characterized by labor income, in particular more skilled jobs present in urban areas. In addition, remittances are another substantial source of the off-farm income that may further stimulate the abandonment of the countryside.

The Naryn region is positively associated with the probability to use the loan for Food Products (0.38) and negatively with the probability to use the loan to Start a Business (−0.08). The high poverty rate and the rural characteristics of Naryn suggest that although microfinance in this region targeted low-income households with substantial credit constraints, the extra liquidity was mainly used for short-run purposes rather than for investment uses.

Other factors have an isolated effect only on specific choices. The gender variable confirms the use of microfinance for nutritional purposes in households headed by women, especially for the care of children (Khandker, 2005). If the head of the household is female, the probability of purchasing food increases by 11% at the 5% significance level. Similarly, the educational level of the head of the family positively affects the probability to use the loan for Agricultural Needs at the 1% significance level. Finally, the Other Purchases are positively associated with family size. The average partial effect is 0.06 and 1% significant.

**6. Conclusions and Implications**

An economic assessment is presented for microfinance loan allocations in Kyrgyzstan from 2006 to 2010. This study identifies two key drivers of loan allocation: mobile phone and livestock ownership. Mobile phone ownership reduces the probability to allocate the loan for food needs and increases the probability to use the loan for starting a business. Policy strategies that increase the signal coverage, improve the affordability, and the speed of the mobile phone service can be an effective tool for poverty alleviation and economic growth (Driesbach et al., 2009). In addition, other information and communication technologies such as Internet access can reduce their vulnerability to unpredictable shocks and make low-income households more informed about market conditions and borrowing costs (World Bank, 2007).

Similarly, the ownership of livestock is a strategic asset for agricultural investments and the food supply of small farmers. The importance of livestock for the Kyrgyz microfinance lies on its use as collateral to guarantee the loan repayment (Ngo, 2008). From this point of view, subsidies that address the livestock sector could be combined with policies that stimulate education and farmers’ training including schooling and extension services. This can substantially contribute to rural poverty alleviation through a more productive use of microfinance for the diffusion and the adoption of farming technologies (Muhongayire et al., 2013).

The study also identified a geographical component of the loan allocation. The Naryn region has the largest impact on the loan use probability to buy food and the smallest (negative) impact on the probability to start a new business. Given the high poverty rate in the region, this suggests that microfinance was able to partially relax low-income borrowers’ substantial credit constraints, but the risk of defaults for low-income rural households was likely in Kyrgyzstan in the 2006-2010 period (Schicks, 2012; PlaNet Finance Foundation, 2013).

Regardless of microfinance, the under-development of the traditional credit channel represents one of the most difficult challenges in the Kyrgyz Republic (Microfinance Center, 2011). Policies that support financial literacy, increase the market competition, and conclude the reform of property rights can be effective, but they should be combined with to other market and political liberalizations. Otherwise, the transition from a centrally planned economy to a market economy will leave the country mired in poverty.

**References**

Armendariz, B. and M. Labie. 2011. *The Handbook of Microfinance*. Hackensack, NJ. World Scientific Publishing Co. Inc.

Barnett, J. B., C. B. Barnett, and J. R. Skees. 2008. “Poverty Trap and Index-Based Risk Transfer Products.” *World Development* 36(10): 1766-1785.

Cappellari, L. and P. Jenkins. 2006. “Calculation of Multivariate Normal Probabilities by Simulation, with Application to Maximum Simulated Likelihood Estimation.” *The Stata Journal* 6(2): 156-189.

Driesbach, C. , R. Walton, B. Kolko, and A. Seidakmatova. 2009. “Asking Internet Users to Explain Non-Use in Kyrgyzstan.” *IEEE International Professional Communication Conference.* Available at: https://www.deepdyve.com/lp/institute-of-electrical-and-electronics-engineers/asking-internet-users-to-explain-non-use-in-kyrgyzstan-Anrucjh2ei (accessed December 8, 2014).

Esenaliev, D., A. Kroeger, and S. Steiner. 2011. “The Kyrgyz Integrated Household Survey.” Working paper 62, German Institute for Economic Research. Berlin, Germany.

EurasiaNet. 2014. “Kyrgyzstan: Teachers Quitting to Take Better Paying, Unskilled Jobs.” Available at: <http://www>.eurasianet.org/node/70636 (accessed November 4 2014).

Greene, W. H. 2012 *Econometric Analysis*, Harlow Essex, UK: Pearson Education Limited.

Huang, N. 2014. “Market Fever at Osh Bazaar in Bishkek, Kyrgyzstan.” Available at: <http://www>.wildjunket.com/2014/09/11/osh-bazaar-bishkek-kyrgyzstan/ (accessed November 5, 2014).

Jenkins, P., L. Cappellari, P. Lynn, A. Jackle, and E. Sala. 2005. “Patterns of Consent: Evidence From a General Household Survey.” Working paper 490. German Institute for Economic Research, Berlin, Germany.

Kyrgyz Republic. 2002. *The Kyrgyz Republic Law on Micro-finance organization in the Kyrgyz Republic*. House of Government, 124, Bishkek. Kyrgyzstan.

Karlan, D. and N. Goldberg eds. 2011. “Microfinance Evaluation Strategies: Notes on Methodology and Findings.” In *The Handbook of Microfinance*. Hackensack, NJ: World Scientific Publishing Co. Inc.

Katsushi, S. I., A. Thankom, and S. K. Annim. 2010. “Microfinance and Household Poverty Reduction: New Evidence from India.” *World Development* 38(12):1760-1774.

Khandker, S. R. 2005. “Microfinance and Poverty: Evidence Using Panel Data from Bangladesh.” *The World Bank Economic Review* 19(2):263 286.

Kompanion. 2013. “Kompanion’s First Housing Loan Client Reflects on her Investment.” Available at: (accessed January 29, 2015).

Lerman, Z. and D. Sedik. 2009. *Agrarian Reform in Kyrgyzstan: Achievement and Unfinished Agenda*. Food and Agricultural Organization, Rome. Italy.

Microfinance Center. 2011. “Research on the Level of Indebtedness and Repayment Performance of Individual Borrowers in Kyrgyzstan.” Available at: <http://www>.mfc.org.pl/sites/mfc.org.pl/files/Indebtedness%20report%20Kyrgyzstan\_ENG.pdf (accessed August 24, 2014).

Ngo, M., T. 2008. *The Social Outcomes of Rural Finance Services. Microfinance and Gender Empowerment in Kyrgyzstan*. World Bank. Washington D. C.

MixMarket Microfinance Information Exchange. 2014. “Kyrgyzstan Market Profile. Audit Files 2006-2010: Aiyl Bank, Bai Tushum, FMCC, Kompanion, and Mol Bulak Finance.” Available at: <http://www>.mixmarket.org/mfi/country/Kyrgyzstan (accessed December 2013).

Muhongayire, W., P. Hitayezub,O. L. Mbatiac, and S. M. Mukoya-Wangiad. 2013. “Determinants of Farmers’ Participation in Formal Credit Markets in Rural Rwanda.” *Journal of Agricultural Science* 4(2): 87-94.

Mullahy, J. 2011. “Marginal Effects in Multivariate Probit and Kindred Discrete and Count Outcome Models with Applications in Health Economics.” Working Paper 17588. National Bureau of Economic Research. Cambridge, MA.

National Statistical Committee of the Kyrgyz Republic. 2014. Available at: <http://www>.stat.kg/ (accessed June 11, 2014).

–––. 2010. Kirgizstan Integrated Household Survey year 2006, 2007, 2008, 2009, 2010.

–––. 2009. *Population and Housing Census of the Kyrgyz Republic of 2009*. Book I 2009, Bishkek. Kyrgyzstan.

Parkinson, J. and L. Talipova. 2005. *Kyrgyz Republic: Sanitation Assessment and Recommendations for Urban Upgrading in Bishkek and Osh*. World Bank. Washington D. C.

Petrick, M. 2005. Empirical Measurement of Credit Rationing in Agriculture: A Methodological Survey. *Agricultural Economics* 33: 191-203.

PlaNet Finance Foundation. 2013. *Microfinance Index of Market Outreach and Saturation.* Part 1, 13-03, Paris. France.

Raghunathan, U. K., C. L. Escalante, J. H. Dorfman, G. C. W. Ames, and J. E. Houston. 2011. “The Effect of Agriculture on Repayment Efficiency: A Look at the MFI Borrowing Groups.” *Agricultural Economics* 42: 465-474.

Schicks, J. 2012. “Over-Indebtedness in Microfinance, an Empirical Analysis of Related Factors on the Borrower Level.” Working paper 12(17), Centre Emile Bernheim, Brussel. Belgium.

Slay, B. 2011. *Energy and Communal Services in Kyrgyzstan and Tajikistan: A Poverty and Social Impact Assessment.* United Nations Development Program*.* Bratislava Regional Center, Bratislava. Slovakia.

Smith, M. G. 2013. EurasiaNet. “Kyrgyzstan could microfinance bubble burst?” Available at: <http://www>.eurasianet.org/node/65527 (accessed January 23, 2014).

Stiglitz, J. E. 1990. Peer Monitoring and Credit Markets. *The World Bank Economic Review* 4(3): 351-366.

Thieme, S. 2008. Social Research Center American University of Central Asia. “Where to Return to? Rural Urban Inter-linkages in Times of Internal and International Labor Migration.” Available at: <https://www.auca.kg/uploads/Migration_Database/susan_paper_2.pdf> (accessed January 19, 2015).

Train, K. 2009. *Discrete Choice Methods with Simulation.* Cambridge, MA: Cambridge University Press.

United Nations Economic Commission for Europe. 2009. *Country Profile Kyrgyzstan, Chapter 4 Housing Conditions and New Constructions.* Institute for Real Estate, Construction and Housing. Vienna, Austria

Weiss, J. and H. Montgomery. 2004. “Great Expectations: Microfinance and Poverty Reduction in Asia and Latin America.” Working Paper 33142 (3), Munch Personal RePEc Archive, Munch. Germany.

World Bank. 2014a. “Country and Lending Group.” Available at: <http://data>.worldbank.org/about/country-and-lending-groups#Lower\_middle\_income (accessed September 8, 2014).

–––. 2014b. “Poverty Gap at $1.25 a Day.” Available at: <http://data>.worldbank.org/indicator/SI.POV.GAPS (accessed September 8, 2014).

–––. 2014c. “World DataBank?” Available at: http://databank.worldbank.org/data/home.aspx (accessed August 26, 2014).

–––. 2011. *The Kyrgyz Republic: Poverty Profile and Overview of Living Conditions*. Poverty Reduction and Economic Management Unit, Europe and Central Asia Region. Washington D. C.

–––. 2009. “Land Registration Spurs Incentives and Growth. International Development Agency at Work: Kyrgyz Republic.” Available at: <http://web>.worldbank.org/WBSITE/EXTERNAL/EXTABOUTUS/IDA/0,,contentMDK:22303407~menuPK:4754051~pagePK:51236175~piPK:437394~theSitePK:73154,00.html (accessed October 9, 2014).

–––. 2007. “Mobile Cell Phones and Poverty Reduction: Technology Spending Patterns and Poverty Level Change Among Households in Uganda.” Available at: <http://microdata>.worldbank.org/index.php/citations/1273?collection=central (accessed December 5, 2014).

–––. 2005. *Mining Industry as a Source of Economic growth in Kyrgyzstan.* Project Implementation Unit of the World Bank. Washington D. C.

–––. 2004. *Microfinance and The Poor in Central Asia*. Agricultural and Rural Development. Discussion Paper 6. Washington D. C.

Youatt, E. 2013. “Microfinance in Crosshair: Will Kyrgyzstan’s usury bill backfire?” Next Billion Development Through Enterprise. Available at: [http://www.nextbillion.net](http://www.nextbillion.net/blogpost.aspx?blogid=3545) (accessed February 12, 2014).

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| Table 1. Microfinance Loans in Kyrgyzstan, 2006-2011  |
|  | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 |
| Loan Volume (million dollar)a  | 78.9 | 112.4 | 148.8 | 161.2 | 195.4 | 274.8 |
| Number of Loans | 172,702 | 188,166 | 311,126 | 412,302 | 484,953 | 579,714 |
| Loan Amount (dollar)a | 457 | 597 | 478 | 391 | 403 | 474 |
| Annual Real Interest Rate (%)b | 34 | 36 | 36 | 40 | 36 | 44 |
| Interest Payment (dollar)c | 155 | 215 | 172 | 156 | 145 | 209 |
| a Monetary values are in real terms deflated by the CPI (2005 = 100). |  |  |  |
| b The interest rate is the arithmetic average of interest rate for different loan sizes ($200, $500, and $1,000). |
| c The average interest payment is the product of the average annual real interest rate multiplied by the average loan amount.  |
| Source: National Statistical Committee of the Kyrgyz Republic, 2014. |

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| Table 2. Performance and Portfolio Risk of the Largest Microfinance Institutions in Kyrgyzstan, 2006-2010 |
| Microfinance Institution | Aiyl Bank | Bai Tushum | FMCC | Kompanion | Mol Bulak Finance |
|  | Portfolio at Risk > 30 daysa |
| 2006 | 3.94% | 3.65% | 1.68% | 0.57% | 0.00% |
| 2007 | 5.16% | 0.00% | 0.92% | 0.11% | 0.52% |
| 2008 | 5.45% | 1.08% | 0.56% | 0.36% | 0.14% |
| 2009 | 1.36% | 2.72% | 0.58% | 0.01% | 0.71% |
| 2010 | 3.63% | 2.53% | 3.89% | 2.33% | 2.23% |
|  |  |  |  |  |  |
| Microfinance Institution | Aiyl Bank | Bai Tushum | FMCC | Kompanion | Mol Bulak Finance |
|  | Operational Self-sufficiency Indexb |
| 2006 | 164% | 140% | 148% | 132% | 213% |
| 2007 | 168% | 164% | 132% | 135% | 166% |
| 2008 | 106% | 133% | 125% | 125% | 108% |
| 2009 | 111% | 130% | 129% | 114% | 110% |
| 2010 | 135% | 128% | 111% | 116% | 115% |

a The portfolio at risk more than 30 days indicates the portfolio share of loans overdue

from 30 days or more.

b Financial revenue / (financial expenses + operating expenses + net impairment loss).

The operational self-sufficiently index is defined as the financial revenues divided by

the summation of the financial expenses, operational expenses, and net impairment loss.

Source: Mix Market Microfinance Information Exchange, 2014.

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| Table 3. Variable Definition |
| Variable Name | Unity | Description |  |
| Food Products | Binary | 1 if microfinance loan used to buy food products |
| Start a Business | Binary | 1 if microfinance loan used to start a new business |
| Agricultural Needs | Binary | 1 if microfinance loan used to invest in agricultural equipment |
| House Expenses | Binary | 1 if microfinance loan used to invest for housing expenses |
| Healthcare Expenses | Binary | 1 if microfinance loan used for healthcare expenses |
| Educational Expenses | Binary | 1 if microfinance loan used for educational expenses |
| Other Expenses | Binary | 1 if microfinance loan used for other expenses |
| Gender | Binary | 1 if household head is female |
| Age | Years | Household head age |
| Family Size | Members | Number of family members |
| Education | Years | Years of school attendance of the household head (World Bank 2011): 0 (illiterate), 2 (incomplete elementary degree), 4 (elementary degree, 4th grade), 7 (incomplete basic secondary degree), 9 (basic secondary degree, 9th grade), 11 (professional and special secondary school, 10th-11th grades), 13 (incomplete university degree), and 15 (complete university degree, 14th-16th grades). |
| Residence | Binary | 1 if household head dwells in rural area |
| Off-farm Incomea | Real dollars | Income from wages, self-employment, pension, scholarship, alimony, unemployment benefit, social benefit, subsidies, leasing, remittances, financial activities, and other. |
| Livestock | Binary | 1 if ownership of livestock |
| Land | Binary | 1 if ownership of arable land |
| Refrigerator | Binary | 1 if ownership of refrigerator  |
| Textile | Binary | 1 if ownership of sewing machine and/or knitting machine. |
| Mobile Phone | Binary | 1 if ownership of mobile phone |
| Transportation | Binary | 1 if ownership of truck, car, and/or minivan |
| Hot Water | Binary | 1 if hot water supply present in the house |
| Sanitation | Binary | 1 if sanitation system present in the house |
| 2008 | Binary | 1 if year 2008 |
| 2009 | Binary | 1 if year 2009 |
| 2010 | Binary | 1 if year 2010 |

a Based on the official period average exchange rate and 2010 base year (World Bank 2014c).

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| Table 4. Household Characteristics of Microfinance Borrowers in Kyrgyzstan, 2006-2010 |
| Variable Namea | Mean | Standard Deviation |
| Food Products | 0.46 | 0.50 |
| Start a Business | 0.26 | 0.44 |
| Agricultural Needs | 0.29 | 0.46 |
| House Expenses | 0.08 | 0.27 |
| Healthcare Expenses | 0.04 | 0.19 |
| Educational Expenses | 0.05 | 0.22 |
| Other Expenses | 0.17 | 0.38 |
| Gender (1=female) | 0.28 | 0.45 |
| Age (years) | 48.18 | 10.62 |
| Family Members | 4.40 | 1.56 |
| Education (years) | 10.60 | 2.64 |
| Residence (1 = rural ) | 0.73 | 0.44 |
| Off-farm Income (real dollar) | 528 | 602 |
| Livestock (1= if own livestock) | 0.58 | 0.49 |
| Land (1 = if own arable Land) | 0.55 | 0.50 |
| Food Storage (1 = if own refrigerator) | 0.61 | 0.49 |
| Textile (1 = if own textile durables) | 0.61 | 0.49 |
| Mobile Phone (1 = if own mobile phone) | 0.63 | 0.48 |
| Transportation (1 = if own transportation) | 0.28 | 0.45 |
| Hot Water (1 = if house has hot water supply) | 0.14 | 0.34 |
| Sanitation (1 = if house has sanitation facilities) | 0.33 | 0.47 |
| Naryn (1 = if Naryn district) | 0.56 | 0.50 |

a For the variable definition, see Table 1. Statistics based on 608 households.

Source: Kyrgyzstan Integrated Household Survey (KIHS 2010).

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| Table 5. Regional Access to Microfinance in Kyrgyzstan, 2006-2010 |
| Oblast (Region) | Number of Households with Microfinance Access | Share | Number of Microfinance Loans | Share | Share of Households in the Sample |
| Issykul | 41 | 9.1% | 55 | 9.0% | 13.3% |
| Jalal-Abad | 23 | 5.1% | 35 | 5.8% | 13.3% |
| Naryn | 231 | 51.4% | 342 | 56.3% | 10.6% |
| Batken | 51 | 11.4% | 53 | 8.7% | 10.3% |
| Osh | 29 | 6.5% | 31 | 5.1% | 13.4% |
| Talas | 40 | 8.9% | 49 | 8.1% | 10.7% |
| Chui | 31 | 6.9% | 37 | 6.1% | 13.1% |
| Bishkek | 3 | 0.7% | 6 | 1.0% | 15.2% |
| Total | 449 | 100.0% | 608 | 100.0% | 100.0% |

Source: Kyrgyzstan Integrated Household Survey (KIHS 2010).

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| Table 6. Multivariate Probit Model SMLE Results (multiplied by 100) |
|  | Loan Purposea |
| Independent Variable | Food Products | Start a Business | Agricultural Needs | Other Purchases |
| Gender (1 = Female) | **32.75\*\*** | 5.13 | −8.09 | −13.44 |
|  | (15.73) | (15.62) | (19.19) | (16.12) |
| Age | −0.52 | 0.11 | 0.85 | −0.50 |
|  | (0.73) | (0.67) | (0.74) | (0.67) |
| Family Size | 6.10 | 7.71 | 0.81 | **16.29\*\*\*** |
|  | (4.90) | (5.26) | (5.23) | (4.72) |
| Education | 0.71 | 2.09 | **9.71\*\*\*** | −2.30 |
|  | (2.93) | (2.70) | (3.30) | (3.01) |
| Residence (1 = Rural) | −5.22 | −17.21 | **76.26\*\*\*** | **−29.76\*** |
|  | (18.63) | (15.40) | (18.16) | (15.63) |
| Region (1 = Naryn) | **108.46\*\*\*** | **−27.16\*** | −2.41 | −21.60 |
|  | (15.88) | (14.46) | (16.29) | (14.65) |
| Lag Livestock (1 = Livestock in *t−1*) | **−49.84\*\*\*** | --- | **77.74\*\*\*** | --- |
|  | (17.84) | --- | (19.39) | --- |
| Lag Land (1 = Arable Land in *t−1*) | 6.59 | --- | 14.62 | --- |
|  | (19.92) | --- | (18.53) | --- |
| Lag Mobile Phone (1 = Mobile Phone in *t−1*) | **−32.51\*** | **42.48\*\*** | 7.72 | −21.50 |
|  | (16.74) | (17.42) | (19.18) | (16.78) |
| Lag Off-farm Income (ln(income) in *t−1*) | 10.31 | −2.57 | **−31.28\*\*\*** | **20.60\*\*** |
|  | (9.67) | (9.77) | (10.18) | (9.19) |
| Lag Textile (1 = Textile Machinery in *t−1*) | --- | **24.27\*** | --- | --- |
|  | --- | (13.36) | --- | --- |
| Lag Food Storage (1 = Refrigerator in *t−1*) | 12.99 | **28.58\*** | 10.21 | --- |
|  | (14.66) | (15.24) | (16.54) | --- |
| Lag Transportation (1 = Vehicles in *t−1*) | --- | −1.02 | 2.14 | −5.60 |
|  | --- | (16.99) | (17.67) | (15.99) |
| Lag Sanitation (1 = Sanitation System in *t−1*) | --- | --- | --- | 8.27 |
|  | --- | --- | --- | (15.93) |

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| Table 6. Continued  |
|  | Loan Purposesa |
| Independent Variable | Food Products | Start a Business | Agricultural Needs | Other Purchases |
| Lag Hot Water ( 1 = Hot Water Supply in *t−1*) | --- | --- | --- | 2.35 |
|  | --- | --- | --- | (55.78) |
| 2008 (1 = 2008) | −3.74 | −17.88 | −7.39 | 3.74 |
|  | (19.53) | (20.02) | (23.00) | (21.11) |
| 2009 (1 = 2009) | **57.52\*\*\*** | −5.63 | −22.50 | 10.19 |
|  | (21.26) | (23.94) | (24.85) | (22.92) |
| 2010 (1 = 2010) | 4.99 | **−92.84\*\*\*** | 23.86 | −1.60 |
|  | (23.06) | (25.24) | (24.28) | (23.57) |
| Intercept | −113.50 | −66.99 | −82.04 | **−158.58\*\*** |
|  | (78.33) | (75.69) | (85.75) | (78.70) |
| Correlation Matrix | Food Products | Start a Business | Agricultural Needs | Other Purchases |
|  |  | $$ρ\_{12}$$ | $$ρ\_{13}$$ | $$ρ\_{14}$$ |
| Food Products | --- | −6.90 | **−42.39\*\*\*** | **−33.13\*\*\*** |
|  | --- | (7.93) | (7.46) | (7.25) |
|  |  |  | $$ρ\_{23}$$ | $$ρ\_{24}$$ |
| Start a Business | --- | --- | **−34.73\*\*\*** | **−29.45\*\*\*** |
|  | --- | --- | (7.34) | (7.51) |
|  |  |  |  | $$ρ\_{34}$$ |
| Agricultural Needs | --- | --- | --- | **−41.98\*\*\*** |
|   | --- | --- | --- | (7.39) |
| Observations | 445 |
| Number of Draws | 1000 |
| Log Likelihood Function | −862.61 |
| Deviance test Chi2*(1,713)* Goodness of Fit (*p-value*) |  1,725.22 (0.41) |
| Likelihood Ratio test Chi2*(6)* (*p-value*) $(H\_{0}:no correlation)$ |  142.12 (0.00) |
| Wald test Chi2*(1)* (*p-value*) $(H\_{0}:ρ\_{12}=0)$ |  0.75 (0.39) |

a Cluster-robust standard errors defined at the household level (330 clusters).

The symbols \*, \*\*, and \*\*\* represent significance at the 10%, 5%, and 1%, respectively.

Source: Kyrgyzstan Integrated Household Survey (KIHS 2010).

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| Table 7. Average Partial Effects and Predicted Probabilities (multiplied by 100)a |
|  | Loan Purposeb |
| Independent Variable | Food Products | Start a Business | Agricultural Needs | Other Purchases |
| Gender (1 = Female) | **10.96\*\*** | 1.48 | −2.24 | −4.46 |
|  | (5.38) | (4.54) | (5.31) | (5.31) |
| Age | −0.17 | 0.03 | 0.23 | −0.17 |
|  | (0.25) | (0.19) | (0.21) | (0.23) |
| Family Size | 2.04 | 2.21 | 0.23 | **5.48\*\*\*** |
|  | (1.65) | (1.55) | (1.45) | (1.74) |
| Education | 0.24 | 0.60 | **2.70\*\*\*** | −0.77 |
|  | (0.98) | (0.78) | (1.03) | (1.02) |
| Residence (1 = Rural) | −1.75 | −4.91 | **23.50\*\*\*** | **−9.90\*** |
|  | (6.26) | (4.47) | (6.79) | (5.20) |
| Region (1 = Naryn) | **37.99\*\*\*** | **−7.94\*** | −0.67 | −7.35 |
|  | (5.85) | (4.52) | (4.54) | (5.11) |
| Lag Livestock (1 = Livestock in *t−1*) | **−16.69\*\*\*** | --- | **22.74\*\*\*** | --- |
|  | (6.18) | --- | (6.88) | --- |
| Lag Land (1 = Arable Land in *t−1*) | 2.19 | --- | 3.99 | --- |
|  | (6.59) | --- | (5.06) | --- |
| Lag Mobile Phone (1 = Mobile Phone in *t−1*) | **−10.70\*** | **11.99\*\*** | 2.14 | −7.24 |
|  | (5.55) | (5.21) | (5.29) | (5.75) |
| Lag Off-farm Income (ln(income) in *t−1*) | 3.44 | −0.74 | **−8.69\*\*\*** | **6.93\*\*** |
|  | (3.27) | (2.80) | (3.22) | (3.20) |
| Lag Textile (1 = Textile Machinery in *t−1*) | --- | **7.10\*** | --- | --- |
|  | --- | (4.11) | --- | --- |
| Lag Food Storage (1 = Refrigerator in *t−1*) | 4.36 | **8.10\*** | 2.88 | --- |
|  | (4.96) | (4.44) | (4.98) | --- |
| Lag Transportation (1 = Vehicles in *t−1*) | --- | −0.29 | 0.60 | −1.87 |
|  | --- | (4.85) | (4.93) | (5.30) |
| Lag Sanitation (1 = Sanitation System in *t−1*) | --- | --- | --- | 2.74 |
|  | --- | --- | --- | (5.37) |
| Lag Hot Water ( 1 = Hot Water Supply in *t−1*) | --- | --- | --- | 0.79 |
|  | --- | --- | --- | (18.95) |
| Predicted Unconditional Probability | 47.84 | 24.6 | 32.48 | 29.29 |

a Average partial effects and standard errors averaged over all the observations.

b Cluster-robust standard errors in parenthesis. Clusters defined at the household level (330 clusters).Standard errors calculated with the delta method.

The symbols \*, \*\*, and \*\*\* represent significance at the 10%, 5%, and 1%, respectively.

Source: Kyrgyzstan Integrated Household Survey (KIHS 2010).



A Central Asia Map

B Kyrgyzstan Map

Figure 1. Central Asia and Regions of Kyrgyzstan

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Figure 2.Kyrgyzstan Gross National Income Per Capita in constant 2005 U. S. dollar (World

 Bank, 2014a).