The Road to Financial Sustainability. Comparative Analysis of Russia and the Caucasus Region

Ganna Sheremenko
The University of Georgia, anasher@uga.edu

Cesar L. Escalante
The University of Georgia, cescalan@uga.edu

Wojciech J. Florkowski
The University of Georgia, wojciech@uga.edu

Selected Paper prepared for presentation at the Southern Agricultural Economics Association Annual Meeting, Birmingham, AL, February 4-7, 2012

The Road to Financial Sustainability. Comparative Analysis of Russia and the Caucasus Region

Abstract

This paper examines delinquency, profitability, and outreach determinants of microfinance institutions' (MFIs) performance in Russia and the Caucasus. The estimation is done using the Seemingly Unrelated Regression (SUR) technique. The estimation results suggest that Russian and Caucasian MFIs are profit-driven but are expected to improve outreach in the long-run.

Keywords: Microfinance institution, SUR, Financial sustainability, Delinquency, Profitability, Social outreach

JEL Classifications: G20, G21

Introduction

Microfinance is a financial tool developed to spur economic development and promote business engagement of the poor. Poor people exposed to risks and external shocks often lose their unstable sources of income are considered "non-bankable" by commercial financial institutions. Therefore, the goal of microfinance is to make financial services, including microcredit, accessible to the poor.

In Russia and the Caucasus countries, microfinance is fairly new phenomenon. First microfinance institutions (MFIs) appeared in the region in the mid 1900s. The disintegration of the USSR led to the decline in income and the disappearance of social welfare system. Assuming $2/day poverty line, poverty rates increased from 2% to 21% during the period between 1988 and 1998 (Forster et al., 2003). In addition, ethnic conflicts that erupted after the USSR's dissolution contributed to poverty increase, including the civil war in Russia (North Caucasus region), Georgia, Armenia, and Azerbaijan (Bossoutrot, 2005). The poor in the former USSR region are literate and predominantly well-educated people who were left outside the productive process and were desperately trying to learn how to survive in a raw market structure and disrupted economy (Forster et al., 2003). They are both people fully relying on social welfare benefits and working age individuals, many of them with higher education, looking for jobs (Bossoutrot, 2005).

The primary goal of this research is to perform comparative analysis of the performance of microfinance institutions in Russia vs. MFIs in the Caucasus to assess factors responsible for achieving and maintaining financial sustainability of MFIs. Specifically, this study examines how various aspects of MFIs' operations, including fund sourcing, staffing, and gender policies, affect the loan size, interest, and loan delinquency rates. The results of this analysis will enable

microfinance providers and policy makers to review and possibly revise strategies and policies to improve the efficiency of financial services and effectively address the needs of growing microfinance sectors in their respective countries.

Literature Review: MFIs Sustainability vs. Outreach

MFIs aim at "a double bottom-line" that is a combination of financial and social returns (Brau and Woller, 2004). The tension between sustainability and outreach triggers a serious problem of the "mission drift" that occurs when MFIs, trying to reach financial self-sufficiency, tend to concentrate on relatively low-risk clients that require higher loan amounts, thus limiting their social outreach and drifting away from their true mission of poverty alleviation (Arena, 2008; Augsburg and Fouillet, 2010; Nawaz, 2010). Whereas several studies confirm the existence of the "mission drift" (Cull et al., 2007; Augsburg and Fouillet, 2010; Nawaz, 2010), other studies suggest that financial sustainability and social outreach complement and reinforce each other (Gonzalez and Rosenberg, 2006; Schicks, 2007; Armendáriz and Szafarz, 2011).

The current study approaches the issue of the possible trade-off between financial sustainability and social outreach resulting in the mission drift by investigating the relationship between the interest rate and borrowers' income, as well as borrowers' type. In case of a presence of the mission drift, MFIs will charge higher interest to wealthier clients, women, rural borrowers, as well as borrowers, engaged in farming. Furthermore, the study also investigates whether improved profitability, leverage, and delinquency will allow MFIs to operate more efficiently and increase poverty outreach. Such outcome is only plausible in the case of the absence of the mission drift.

Similar to Gonzalez and Rosenberg (2006), in this study, financial sustainability is considered to be the driving force behind the development of the microfinance sectors in Russian

and the Caucasus. Financial sustainability of microfinance institutions becomes feasible through loan expansion, loan portfolio diversification, increase in cost efficiency and loan productivity, clients and employees' training, institutional development, and increase in interest rate to cover transaction cost of lending (Khalily, 2004). Microfinance entities, incur three major types of costs associated with the provision of a loan: the cost of borrowed funds, the cost of loan default provision, and the transactional cost, including client identification and screening cost, loan application processing cost, loan disbursement cost, repayment collection cost, and the cost, associated with "following up on non-payment." The transaction cost is the major force pushing micro-loan interest rates up (Shankar, 2007). Charging high interest rates may limit the MFI's ability to serve the poor or increase the loan default potential, but MFIs have to cover the costs of lending. Conning (1999) concluded that sustainable MFIs servicing poorer borrowers must charge higher interest rates and bear higher administrative costs compared to the MFIs targeting the marginally poor.

The loan delinquency is a measure of the MFI's credit portfolio quality. Pretes (2002) emphasizes the seriousness of the loan default in the case of business failure or income decline from the MFI's and borrower perspective. Because the very poor "have a limited ability to assume risk," they may end up being worse off in the case of business failure (Pretes, 2002). Field and Pande (2008) found that switching to more flexible monthly installment schedules allows MFIs to save significantly on the transaction costs of repayment collection without encountering any added risk of loan default. Shankar (2007) points out that a more flexible payment collection lowers the transaction costs for MFIs, thus enhancing operational self-efficiency and sustainability.

The current study investigates delinquency, a component of financial sustainability, and analyzes the relationship between the delinquency rate and operational efficiency, the interest rate, the average loan amount, specific borrowers' characteristics, and overall economic conditions. Profit driven MFIs apply strict repayment policies and approach clients more conservatively, than outreach driven institutions. The comparison of the quality of loan portfolio of MFIs in Russia and the Caucasus will provide the insights into MFIs' operating conditions and show how such conditions, if not homogenous, affect financial sustainability of the institutions.

This study expands upon current empirical work by focusing on the analysis of financial sustainability of MFIs in Russia and the Caucasus. To perform quality comparative analysis, a broad range of possible factors has been selected to control for socio-economic and political differences between the selected countries and sub-regions, including financial indicators and region-specific demographic, economic, and poverty characteristics.

Methodology and Model

The examination of the MFIs' performance requires the specific analysis framework. The measurement the MFIs' performance involves five major areas: breadth of outreach, depth of outreach, portfolio quality (delinquency), operating efficiency, and profitability (Rosenberg, 2009). The breadth of outreach can be represented by the number of active clients, including borrowers, depositors, clients receiving other financial services, and the number of borrowers' accounts. The depth of outreach is usually defined by a rough proxy of the average outstanding balance as a percentage of per capita GNI. Rosenberg (2009) stresses that small loan amounts do not necessarily imply poor borrowers, while the increase in loan amounts does not manifest the

mission drift by the MFI. Therefore, it is more appropriate to use income level of borrowers as a measure of the depth of outreach.

According to Rosenberg, the analysis must also incorporate financial performance indicators. Portfolio quality (loan repayment) is a very important indicator of the MFIs' performance, because high delinquency makes financial sustainability less attainable. The standard measure of loan delinquency is portfolio at risk beyond 30 days. Common profitability measures include the return on assets and return on equity indicators. Two main indicators that measure operating efficiency are the operating expense ratio and cost per client/loan (Rosenberg, 2009).

The above described framework is of particular interest to this research. Recently, Quayes (2012) examined the issue of the trade-off between outreach, measured as the average loan amount per borrower normalized by gross national income, and financial sustainability, approximated with the operational self sufficiency ratio. The results showed that the depth of outreach and financial performance are not only positively correlated but, when account for dynamic interaction, reinforce each other. The author also asserts that financial sustainability positively affects the depth of outreach. Operationally self-sufficient MFIs provide, on average, smaller loans. However, Quayes noted that the breadth of outreach negatively affects the financial performance. Therefore, contrary to the common beliefs, Quayes argues that policy makers should encourage the financial sustainability drive of MFIs.

Sharing the belief that financial sustainability is crucial under the conditions of shrinking and inconsistent donor aid, Ayayi and Sene (2010) investigate the most relevant factors that promote financial self-sufficiency of MFIs. A high quality credit portfolio, adequate interest rates, and effective management are the three most significant components of the MFIs' financial

sustainability, while the client outreach and the age of MFIs affect it marginally. Specifically, Ayayi and Sene state that the portfolio quality as a result of solid credit risk management is the determining factor of financial sustainability, as its respective coefficient possessed the highest absolute value in the estimation results. The authors note that the percentage of women borrowers does not seem to have an effect on financial sustainability. They emphasize that the application of adequately high interest rates, as a main source of profit, in combination with quality management ensuring adequate cost control and information systems, and effective banking practices, are required to achieve and maintain financial sustainability. Moreover, Ayayi and Sene found that the same major findings are true for the geographical region, credit method, and legal status specifications.

Similar to Ayayi and Sene (2010) and Quayes (2012), in this study financial sustainability of MFIs is considered to be the driving force behind the poverty alleviation objective. The financial sustainability is assessed through portfolio quality (delinquency), profitability, and poverty outreach indicators. Following the methodology, described by (Rosenberg, 2009), Ayayi and Sene (2010), and Barry and Tacneng (2011), the following hypotheses were specified.

a) First, loan portfolio quality is assessed through the portfolio-at-risk indicator, where the inverse relationship with financial sustainability is assumed, as a significant reduction in the MFI's loan portfolio increases its profits, thus positively affecting financial sustainability of MFIs.
b) Second, profitability is measured with the application of interest rates that directly affect financial sustainability through the generation of adequate profit margins.

c) Finally, poverty outreach, measured as the average loan balance per borrower, is considered to have a positive impact on the financial sustainability of MFIs.

Determining how the described indicators are affected by various external and internal financial (such as socio-economic forces) is crucial for the policy development that, in turn, will enhance MFIs' financial efficiency.

For every country/region of interest in this study (i.e. Russia and the Caucasus), the following SUR model was specified to account for potentially correlated error terms (Zellner, 1971):

(1) $Y_i = \alpha + \beta X_i + \varepsilon_i,$

where Y is a profitability, delinquency, or outreach indicator for i_{th} region, X is a matrix of exogenous MFI-level and Country/Region-level control variables, and ε_i is the error term.

Based on the general model specification above, the final model with three separately estimated equations measuring delinquency, profitability, and outreach, respectively, was specified as follows:

(2) $PortRisk_i = \alpha_0 - \alpha_1 lnLoan_i - \alpha_2 Borstaff_i - \alpha_3 Women_i - \alpha_4 lnGlp_i + \alpha_5 Gpyield_i + \alpha_6 Rur_i - \alpha_7 lnInc_i + \alpha_8 Unemp_i + \alpha_9 Agric_i + \varepsilon_i,$

(3) $Gpyield_i = \beta_0 - \beta_1 lnLoan_i - \beta_2 lnGlp_i - \beta_3 ROE_i + \beta_4 OELP_i + \beta_5 DEratio_i - \beta_6 Women_i - \beta_7 Rur_i + \beta_8 lnInc_i - \beta_9 Agric_i + \beta_{10} PortRisk_i + \nu_i,$

(4) $lnLoan_i = \gamma_0 - \gamma_1 Borstaff_i - \gamma_2 lnBor_i - \gamma_9 ROE_i - \gamma_5 DCratio_i - \gamma_1 Women_i - \gamma_{10} Rur_i + \gamma_{12} lnInc_i - \gamma_{11} Agric_i - \gamma_6 PortRisk_i + \upsilon_i.$

where $PortRisk_i$ is a ratio of outstanding principal balance of loans past due more than 30 days to outstanding principal balance of all loans; $Loan_i$ is the average loan amount per borrower, that along with $Women_i$, the percent of women borrowers in each MFI, represents measures of the

depth of outreach; Bor_i, the number of active borrowers, is a measure of the breadth of outreach; $Gpyield_i$, a ratio of financial revenue from loan portfolio to the average gross loan portfolio, a proxy variable for the interest rate, which along with ROE_i, return on equity, represent revenue/profitability measures; $Borstaff_i$, the staff efficiency and productivity indicator, is the number of borrowers per staff member; and $OELP_i$, operating expense over loan portfolio, is used as an indicator of operational efficiency. In addition, Glp_i, the gross loan portfolio, is used to control for the size of MFIs, while $DEratio_i$, debt to equity ratio, $DCratio_i$, deposits to total capital ratio, are incorporated as indicators of financial health of MFIs that capture the funding arrangements considered by the MFIs. This study incorporates country-level controls of the depth of outreach, such as Rur_i, the percent of rural population, $Unemp_i$, the level of regional unemployment, $Agric_i$, the level of agricultural production as a fraction of the total value added in the region's economy (total value added is equivalent to regional gross domestic product less net taxes), and Inc_i, the average annual per capita income, in all three equations to capture country/region specific socio-economic characteristics. Similar to Barry and Tacneng (2011), lin-log functional form was applied in PortRisk and Gpyield equations, and log-lin specification was used in lnLoan equation, similar to Quayes (2012).

Data

The study uses the financial data for the period 2007-2008 (Appendix A) obtained from the Microfinance Information Exchange (MIX Market) online database (2011) and on the regional macroeconomic data obtained from the official national statistical bureaus' reports and databases in Russia, Armenia, Azerbaijan, and Georgia. The missing values were approximated with those from previous or more recent periods, based on the assumption that they remained constant throughout the years. However, 5 MFIs that account for 4.27% of total number of

observations were excluded from the data set because of the lack of data for 2007 and 2008 or data from other periods to estimate the missing values. The final panel dataset was composed of the financial and macroeconomic data from 73 MFIs in Russia and 39 MFIs in the Caucasus. Because the number of observations for different regions varied, the Bootstrap Excel statistical tool was used to generate the equal amount of observations across the regions (Barreto and Howland, 2006).

Similar to Ayayi and Sene (2010) and Quayes (2012), in this study, the MIX Market data were used to obtain the financial and outreach indicators from 112 MFIs in the selected countries. The included indicators are the portfolio at risk beyond 30 days and the borrowers per staff member ratio, the return on equity ratio, the operating expense per loan portfolio and the debt to equity ratios, the deposit to total capital ratio, calculated as a ratio of MFI's total deposits to total capital, the average yield on gross portfolio in percent, along with the data on non-ratio-based indicators, such as the average loan amount per borrower, MFI's gross loan portfolio, the number of active borrowers, as well as the percent of women borrowers, calculated as a fraction of total women borrowers in the total number of active borrowers in each institution. The average yield on gross portfolio is used to approximate the average interest rate, charged by MFIs (Srinivasan, 2009).

The current study incorporates region-specific macroeconomic indicators, including the percent of rural population, the level of unemployment, the average annual per capita income in national currency units, and the percent of agricultural output in total value added obtained from the official national statistics to capture the differences in poverty levels. Also, to account for the environment in which the selected MFIs operate, the study includes the general measures of overall socio-economic conditions of the regions (National Statistics Office of Georgia, 2011;

National Statistical Service of the Republic of Armenia, 2011; Russian Federation Federal State Statistical Service, 2011; The State Statistical Committee of the Republic of Azerbaijan, 2011).

MIX Market database has all individual currency figures converted into U.S. dollars. In addition, all dollar denominated variables are in 2005 dollars based on U.S. CPI, while non-dollar values of the annual per capita income in each country, before being deflated by CPI, were first converted into U.S. dollars based on the World Bank official exchange rates of 2007 and 2008 (World Bank, 2011).

Results

Though SUR estimation produced identical results, each two out of three equations were separately estimated for each country/region with OLS Robust Standard Error (RSE) procedure to address the issue of heteroskedasticity. In addition, each equation was tested for multicollinearity. The Variance Inflation Factor (VIF) values obtained for all independent variables are found to be less than 10 in the two sets of equations. The result rules out any serious multicollinearity in the portfolio at risk, the yield on gross portfolio, and the average loan amount equations for both Russia and the Caucasus (Appendix B, C, D). Finally, since the data are estimated as cross-sectional and not as panel with time co-variates, no serious autocorrelation issue is applicable.

With respect to the portfolio at risk equation, regression results for Russian MFIs, shown in table 4.1, suggest significant relationship of the average loan amount, the borrowers per staff ratio, a measure of staff efficiency, and the unemployment level to the portfolio at risk. Specifically, a 10% increase in the loan size decreases the delinquency rate by 3.1%, and 10 points increase in staff efficiency decreases risk by 0.2%, again suggesting that more efficient Russian MFIs have a better loan portfolio quality. In addition, as anticipated, the increase in the

unemployment level further increases the risk associated with the loan default in Russia. The regression results for the Caucasus Region, also depicted in table 4.1, showed a significant negative relationship between the borrowers per staff member ration and the portfolio at risk. According to the results, for every 10 points increase in the staff member's efficiency, the portfolio at risk declines by 0.2% in the Caucasus MFIs.

In the yield on gross portfolio equation, SUR estimation results were retained due to the absence of heteroskedasicity in either of the two country/region equations. Table 4.2 reports the estimation results of the equation 6 for Russia and the Caucasus. A negative relationship is found between the loan size and the interest rate, where a 10% increase in the loan amount results in 0.65% and 1.17% decline in the interest rate in Russian and Caucasian MFIs, respectively. This result suggests that smaller loans perceived as more risky by both region's MFIs, which is consistent with the earlier explanation that MFIs here lend less to higher risk clients. As a result, higher interest rates are charged on smaller loans. A highly significant positive relationship was found between the return on equity and the interest rate, suggesting that the more profitable MFIs in the two regions become the higher interest they charge, which manifests the mission drift in Russian and Caucasian MFIs. A similar significant positive relationship between the increase in operating expenses and the increase in interest, found in Russian MFIs, implies that higher interest is needed to cover the extra cost of low operational efficiency of MFIs in the region.

A positive association was established between the share of rural borrowers and the yield on gross portfolio in Russia (table 4.2.). A 10% increase in the share of rural borrowers resulted in 2.26% increase in the interest rate. The obtained results suggest that, in Russia, lending to rural borrowers is associated with higher risk to MFIs. Apparently, Russian MFIs perceive rural borrowers as those with low or unstable income, which makes them high risk borrowers. In

contrast, in the Caucasus, rural borrowers engaged in agricultural production are considered to be more reliable borrowers than off-farm rural borrowers, as 10% increase in agriculture-related borrowers decreases the interest rate by 1.5%. A plausible explanation is that Caucasian MFIs see farmers as borrowers with consistent history of employment, income, and marketable asset ownership. In contrast, off-farm rural borrowers are deprived of the permanent employment opportunities as a result of low economic activity in rural areas resulting in higher unemployment levels. Because rural borrowers do not have permanent employment and regular income or liquid assets, they are considered less reliable clientele.

Similarly to the previous equation, in the average loan amount equation, to the absence of heteroskedasicity allowed the application of SUR estimation technique. In case of Russia, *borstaff, women, lninc,* and *portrisk* found to be significantly related to the average loan amount. Income is positively associated with the loan size (table 4.3), while the percentage of women borrowers is inversely related to the loan amount. Borrowers with higher income are served with larger loans, while women borrowers are served with smaller loan amounts. Assuming the reverse relationship between the loan size and outreach, small loan disbursements among women borrowers manifest the increase in the depth of outreach. In addition, the improved staff efficiency positively affects the depth of outreach, and it can be expected that a 10% increase in the borrowers per staff member ratio results in reduced loan size by 3.4%, suggesting that as MFI becomes more efficient it is able to provide more loans to a larger number of poor clients. Similarly, the increased portfolio at risk level results in greater poverty outreach, as MFIs in Russia tend to offer smaller loans to protect themselves from growing risk of loan default. A 10% increase in delinquency rate reduces the loan size by 0.8%, manifesting significant caution on behalf of Russian MFIs that in the long-run results in improved poverty outreach.

In case of the Caucasus, five explanatory variables, such as *borstaff, lnbor, dcratio, rur,* and *lninc* are significantly related to the loan size in the Caucasus region loan size equation (table 4.3). The improvement of staff efficiency by 10% results in a 5.3% reduction in the loan amount, which translates into the improved depth of outreach. In addition, the increased number of borrowers, a measure of the breadth of outreach, also positively affects the depth of outreach, where the growth in the number of borrowers by 10% reduces the loan amount by 0.7%, again manifesting the improved poverty outreach by the region's MFIs. On the contrary, the increase in the percentage of rural borrowers, along with the increase in income, translates into larger loan sizes, thus negatively affecting the depth of outreach. Also, the improved deposit to capital ratio allows Caucasian MFIs to provide larger loans to borrowers, as they accumulate more deposits.

Conclusions

The collapse of state-ownership, a consequence of the dissolution of the Soviet Union, created new conditions. A new era of self-employment and small businesses began throughout the region. Microfinance has become a mechanism of financial support to small entrepreneurs that commercial banks considered "non-bankable." This study considers financial sustainability the key element of poverty outreach expansion. The objective of the study was a comparative analysis of the performance of MFIs in Russia and the Caucasus to assess and evaluate factors responsible for achieving and maintaining financial sustainability of MFIs. The analysis focused on three essential measures of the MFIs' performance: loan portfolio quality (delinquency), profitability, and outreach, measured by the portfolio at risk beyond 30 days, the interest rate, and the average loan amount.

The estimation results for the loan portfolio quality suggested that Russian MFIs lend less to high risk borrowers. Furthermore, both in Russian and Caucasian MFIs, the higher borrower-

per-staff ratio positively effects the loan portfolio quality. With regard to profitability MFIs in Russia and the Caucasus are cautious and conservative in the lending decisions. They also suffer from the mission drift. An alarming tendency of the mission drift translates the increase in profitability into the increase in the interest rate. Moreover, the mission drift detracts MFIs from the objective of poverty alleviation at the early stage of development. With respect to outreach, measured by the average loan amount, MFIs in Russia and the Caucasus possess rather conservative lending practices. However, they are expected to achieve a greater depth and breadth of outreach upon maturation.

The study has encountered several potentially serious limitations in the data selection process. Specifically, some observations were unusable as a result of limited availability of the location-specific indicators. Also, the proxy in the form of the yield on gross portfolio was used in the absence of data on interest rates.

From the perspective of future research, it is desirable to track how the relatively younger MFIs will weigh between social outreach and financial sustainability goals, as they mature. The contention of the current study is that young ECA MFIs prioritize financial sustainability. However, future research is needed to confirm or reject the current expectation.

References

Arena, T. 2008. "Social Corporate Governance and the Problem of Mission Drift in Socially-Oriented Microfinance Institutions." *Columbia Journal of Law & Social Problems* 41(3):269-316.

Armendáriz, B., and A. Szafarz. 2011. "On Mission Drift in Microfinance Institutions." In B. Armendáriz and M. Labie, ed. *The Handbook of Microfinance*. Toh Tuck Link, Singapore: World Scientific Publishing Co. Pte. Ltd, pp.341-366.

Augsburg, B., and C. Fouillet. 2010. "Profit Empowerment: The Microfinance Institution's Mission Drift." *Perspectives on Global Development & Technology* 9(3/4):327-355.

Ayayi, A.G., and M. Sene. 2010. "What Drives Microfinance Institution's Financial Sustainability." *Journal of Developing Areas* 44(1):303-324.

Barreto, H., and F.M. Howland. 2006. *Introductory Econometrics: Using Monte Carlo Simulation with Microsoft Excel*. New York: Cambridge University Press.

Barry, T.A., and R. Tacneng. 2011. "Governance and Performance: Evidence from African Microfinance Institutions." Working paper, Laboratoire d'Analyse et Prospective Économiques (LAPE), Universite de Limoges, France.

Bossoutrot, S.K. 2005. *Microfinance in Russia: Broadening Access to Finance for Micro and Small Entrepreneurs*. Washington DC: World Bank Publications.

Brau, J.C., and G.M. Woller. 2004. "Microfinance: A comprehensive Review of the Existing Literature." *Journal of Entrepreneurial Finance and Business Ventures* 9(1):1-26.

Conning, J. 1999. "Outreach, Sustainability and Leverage in Monitored and Peer-monitored Lending." *Journal of Development Economics* 60(1):51-77.

Cull, R., A. Demirgüç-Kunt, and J. Morduch. 2007. "Financial Performance and Outreach: A Global Analysis of Lending Microbanks." *Economic Journal* 117(1):517.

Field, E., and R. Pande. 2008. "Repayment Frequency and Default in Microfinance: Evidence from India." *Journal of the European Economic Association* 6(23):501-509.

Forster, S., S. Greene, and J. Pytkowska. 2003. *The State of Microfinance in Central and Eastern Europe and the New Independent States*. The Consultative Group to Assist the Poor (CGAP). Washington DC.

Gonzalez, A., and R. Rosenberg. 2006. *The State of Microcredit: Outreach, Profitability and Poverty*. Microfinance Information Exchange, Inc. (MIX) and The Consultative Group to Assist the Poor (CGAP). Washington DC.

Khalily, M.A.B. 2004. "Quantitative Approach to Impact Analysis of Microfinance Programmes in Bangladesh—What Have We Learned?" *Journal of International Development* 16(3):331-356.

Microfinance Information Exchange, Inc. (MIX). Washington DC. Internet site: http://www.mixmarket.org/ (Accessed August, 2011).

National Statistics Office of Georgia. Internet site: http://www.geostat.ge/index.php?action=wnews_archive&lang=eng (Accessed August, 2011).

National Statistical Service of the Republic of Armenia. Internet site: http://www.armstat.am/en/?nid=45 (Accessed August, 2011).

Nawaz, A. 2010. "Issues in Subsidies and Sustainability of Microfinance: An Empirical Investigation." Working paper 10/010, Solvay Brussels School of Economics and Management, Centre Emile Bernheim, Université Libre de Bruxelles.

Pretes, M. 2002. "Microequity and Microfinance." *World Development* 30(8):1341-1353.

Quayes, S. 2012. "Depth of Outreach and Financial Sustainability of Microfinance Institutions." *Applied Economics* 44(26):3421.

Rosenberg, R. 2009. *Measuring Results of Microfinance Institutions–Minimum Indicators that Donors and Investors Should Track.* Consultative Group to Assist the Poor (CGAP)/The World Bank. Washington DC, June.

Russian Federation Federal State Statistical Service. Internet site: http://gks.ru/wps/wcm/connect/rosstat/rosstatsite.eng/ (Accessed August, 2011).

Schicks, J. 2007. "Developmental Impact and Coexistence of Sustainable and Charitable Microfinance Institutions: Analysing BancoSol and Grameen Bank." *European Journal of Development Research* 19(4):551-568.

Shankar, S. 2007. "Transaction Costs in Group Microcredit in India." *Management Decision* 45(8):1331-1342.

Srinivasan, N. 2009. *Microfinance India: state of the sector report 2008*. New Delhi: Sage Publications Pvt. Ltd.

State Statistical Committee of the Republic of Azerbaijan. Internet site: http://www.azstat.org/indexen.php (Accessed August, 2011).

World Bank Indicators. Internet site: http://data.worldbank.org/indicator (Accessed August, 2011).

Zellner, A. 1971. *An Introduction to Bayesian Inference in Econometrics*. New York: John Wiley and Sons.

Table 4.1. OLS Regression Results for the Portfolio at Risk for Russia and the Caucasus

Variable name	Coefficient	RSE	P-value	Coefficient	RSE	P-value
	Russia			The Caucasus		
lnloan	-2.045**	0.9441	0.032	-0.732	0.6854	0.288
borstaff	-0.025**	0.0111	0.028	-0.021**	0.0094	0.027
women	0.075	0.0784	0.339	0.008	0.0291	0.788
lnglp	0.294	0.5669	0.605	0.292	0.2171	0.182
gpyield	0.048	0.0649	0.459	-0.055	0.0399	0.171
rur	0.060	0.1159	0.605	-0.043	0.0343	0.217
lninc	4.507	4.3936	0.307	0.067	0.5447	0.902
unemp	0.712*	0.4025	0.079	0.011	0.0422	0.791
agric	-0.421	0.3959	0.290	-0.090	0.0706	0.204
constant	-28.320	36.6903	0.442	8.335	6.3262	0.190
R^2	0.1292			0.0945		

* significant at the 10% level. ** significant at the 5% level.

Table 4.2. SUR Regression Results for the Yield on Gross Portfolio for Russia and the Caucasus

Variable name	Coefficient	SE	P-value	Coefficient	SE	P-value
	Russia			The Caucasus		
lnloan	-2.560**	1.2638	0.043	-3.944**	1.0652	0.000
lnglp	-0.392	0.7623	0.607	0.391	0.5506	0.477
roe	0.006**	0.0027	0.035	0.067**	0.0282	0.017
oelp	0.863**	0.0985	0.000	0.058	0.0538	0.281
deratio	0.000	0.0113	0.969	-0.399	0.4614	0.388
women	-0.034	0.0796	0.654	-0.001	0.0613	0.992
rur	0.226**	0.1056	0.032	-1.074	0.0731	0.142
lninc	-1.444	4.5027	0.748	-2.324	2.3297	0.318
agric	-0.359	0.3720	0.334	-0.496**	0.1856	0.008
portrisk	0.067	0.0904	0.459	-0.177	0.2124	0.404
constant	58.204	40.2054	0.148	82.258	18.7734	0.000
R^2	0.5157			0.1897		

* significant at the 10% level. ** significant at the 5% level.

Table 4.3. SUR Regression Results for the Average Loan Amount for Russia and the Caucasus

Variable name	Coefficient	SE	P-value	Coefficient	SE	P-value
	Russia			The Caucasus		
borstaff	-0.004**	0.0008	0.000	-0.006**	0.0015	0.000
lnbor	-0.020	0.0604	0.736	-0.073*	0.0434	0.093
roe	-0.000	0.0002	0.517	0.001	0.0020	0.532
dcratio	0.001	0.0009	0.203	0.232**	0.0961	0.016
women	-0.032**	0.0054	0.000	-0.006	0.0044	0.184
rur	-0.010	0.0078	0.201	0.015**	0.0050	0.003
lninc	0.665*	0.3377	0.049	0.454**	0.1638	0.006
agric	-0.012	0.0276	0.677	0.001	0.0131	0.937
portrisk	-0.013*	0.0067	0.056	-0.011	0.0152	0.478
constant	4.692	2.9762	0.115	4.417	1.3201	0.001
R^2	0.3775			0.2500		

* significant at the 10% level. ** significant at the 5% level.

Appendix

Appendix A. Variable Description and Simple Statistics

1. The Description and Simple Statistics of Variables Included in the Model for Russia

Variable Name	Variable Description	Mean	Standard Deviation	Minimum	Maximum
Rur	Rural population (percent)	31.92	1.27	0.00	73.78
Unemp	Level of unemployment (percent)	7.12	0.19	0.77	14.89
Agric	Agricultural output in total value added (percent)	8.39	0.40	0.00	19.80
Inc	Average annual per capita income (dollars)	5,010.61	1.02	2,938.87	15,452.70
Loan	Average loan amount per borrower (dollars)	1,878.46	1.10	162.73	35,274.55
Glp	Gross loan portfolio (dollars)	1,469,225.08	1.15	6,055.66	1,659,389,385.45
Borstaff	Borrowers per staff member ratio	86.05	8.72	13.00	627.00
Deratio	Debt to equity ratio	32.14	9.54	-327.12	871.26
Bor	Number of active borrowers (people)	784.44	1.11	95.00	64,056.00
OELP	Operating expense per loan portfolio (percent)	17.40	0.93	2.09	63.07
Portrisk	Portfolio at risk beyond 30 days (percent)	6.59	0.93	0.00	86.54
ROE	Return on equity (percent)	94.61	40.67	-653.99	3,806.35
Dcratio	Deposit to total capital (percent)	28.86	8.82	-269.89	789.96
Women	Women borrowers (percent)	60.37	1.17	12.82	86.00
Gpyield	Average yield on gross portfolio (percent)	39.09	1.40	15.21	91.52

Source: MIX Market (2011); Russian Federation Federal State Statistical Service (2011).
Note: All dollar values are real, 2005 base.

2. The Description and Simple Statistics of Variables Included in the Model for the Caucasus

Variable Name	Variable Description	Mean	Standard Deviation	Minimum	Maximum
Rur	Rural population (percent)	40.08	1.46	0.00	64.79
Unemp	Level of unemployment (percent)	14.55	0.90	2.18	39.91
Agric	Agricultural output in total value added (percent)	10.61	0.53	0.01	20.82
Inc	Average annual per capita income (dollars)	1,670.21	1.04	574.44	3,531.44
Loan	Average loan amount per borrower (dollars)	1,209.26	1.10	80.19	19,161.32
Glp	Gross loan portfolio (dollars)	6,016,148.30	1.21	26,844.34	284,726,177.27
Borstaff	Borrowers per staff member ratio	88.92	4.77	3.00	259.00
Deratio	Debt to equity ratio	3.32	0.22	0.01	15.35
Bor	Number of active borrowers (people)	3,934.36	1.18	50.00	104,910.00
OELP	Operating expense per loan portfolio (percent)	21.74	1.88	1.92	157.66
Portrisk	Portfolio at risk beyond 30 days (percent)	2.26	0.46	0.00	36.46
ROE	Return on equity (percent)	9.37	3.56	-288.93	78.90
Dcratio	Deposit to total capital (percent)	0.36	0.07	0.00	4.87
Women	Women borrowers (percent)	37.29	1.57	1.94	99.51
Gpyield	Average yield on gross portfolio (percent)	33.71	1.29	9.17	84.11

Source: MIX Market (2011); the National Statistical Service of the Republic of Armenia (2011); the State Statistical Committee of the Republic of Azerbaijan (2011); National Statistics Office of Georgia (2011); the World Bank (2011).
Note: All dollar values are real, 2005 base.

Appendix B. Heteroskedasticity and Multicollinearity Tests for the Portfolio at Risk

1. OLS Regression for Russia: Breusch-Pagan Test and Variance Inflation Factor Results

Source	SS	df	MS
Model	**2389.45619**	**9**	**265.495132**
Residual	**16110.366**	**136**	**118.458574**
Total	**18499.8222**	**145**	**127.584981**

Number of obs =	**146**
F(9, 136) =	**2.24**
Prob > F =	**0.0229**
R-squared =	**0.1292**
Adj R-squared =	**0.0715**
Root MSE =	**10.884**

portrisk_ru	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
lnloan_ru	**-2.045087**	**1.358651**	**-1.51**	**0.135**	**-4.731901**	**.6417277**
borstaff_ru	**-.0246098**	**.0105182**	**-2.34**	**0.021**	**-.0454101**	**-.0038094**
women_ru	**.0751626**	**.0748462**	**1.00**	**0.317**	**-.0728504**	**.2231756**
lnglp_ru	**.2937847**	**.7190789**	**0.41**	**0.684**	**-1.128238**	**1.715807**
gpyield_ru	**.0482179**	**.0644659**	**0.75**	**0.456**	**-.0792674**	**.1757032**
rur_ru	**.0601806**	**.1100948**	**0.55**	**0.586**	**-.1575385**	**.2778997**
lninc_ru	**4.507546**	**4.250732**	**1.06**	**0.291**	**-3.898534**	**12.91363**
unemp_ru	**.7115956**	**.4637964**	**1.53**	**0.127**	**-.2055899**	**1.628781**
agric_ru	**-.4210472**	**.3511658**	**-1.20**	**0.233**	**-1.115499**	**.2734045**
_cons	**-28.32008**	**38.29003**	**-0.74**	**0.461**	**-104.0409**	**47.40077**

1.1 estat hettest

Breusch-Pagan / Cook-Weisberg test for heteroskedasticity
Ho: Constant variance
Variables: fitted values of portrisk_ru

chi2(**1**) = **198.72**
Prob > chi2 = **0.0000**

1.2 estat vif

Variable	VIF	1/VIF
agric_ru	**3.60**	**0.277916**
rur_ru	**3.50**	**0.286097**
lnloan_ru	**2.72**	**0.367485**
lninc_ru	**1.92**	**0.521963**
lnglp_ru	**1.77**	**0.565548**
borstaff_ru	**1.50**	**0.665464**
gpyield_ru	**1.45**	**0.690738**
unemp_ru	**1.43**	**0.698512**
women_ru	**1.38**	**0.724514**
Mean VIF	**2.14**	

2. OLS Regression for the Caucasus: Breusch-Pagan Test and Variance Inflation Factor Results

Source	SS	df	MS
Model	**428.458357**	**9**	**47.6064841**
Residual	**4106.79797**	**136**	**30.1970439**
Total	**4535.25632**	**145**	**31.2776298**

Number of obs = **146**
F(9, 136) = **1.58**
Prob > F = **0.1282**
R-squared = **0.0945**
Adj R-squared = **0.0345**
Root MSE = **5.4952**

portrisk_cs	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
lnloan_cs	**-.7316309**	**.472216**	**-1.55**	**0.124**	**-1.665467**	**.2022051**
borstaff_cs	**-.0210711**	**.0088314**	**-2.39**	**0.018**	**-.0385356**	**-.0036065**
women_cs	**.0078313**	**.0246167**	**0.32**	**0.751**	**-.0408499**	**.0565124**
lnglp_cs	**.2915336**	**.2158174**	**1.35**	**0.179**	**-.1352584**	**.7183257**
gpyield_cs	**-.0549689**	**.0319489**	**-1.72**	**0.088**	**-.1181498**	**.008212**
rur_cs	**-.0426058**	**.028661**	**-1.49**	**0.139**	**-.0992846**	**.0140731**
lninc_cs	**.0674357**	**.94887**	**0.07**	**0.943**	**-1.809012**	**1.943884**
unemp_cs	**.011208**	**.0467236**	**0.24**	**0.811**	**-.0811907**	**.1036067**
agric_cs	**-.0901904**	**.0774092**	**-1.17**	**0.246**	**-.2432718**	**.0628911**
_cons	**8.33523**	**7.945695**	**1.05**	**0.296**	**-7.377865**	**24.04832**

2.1 estat hettest

Breusch-Pagan / Cook-Weisberg test for heteroskedasticity
Ho: Constant variance
Variables: fitted values of portrisk_cs

chi2(**1**) = **106.68**
Prob > chi2 = **0.0000**

2.2 estat vif

Variable	VIF	1/VIF
lnloan_cs	**1.40**	**0.714321**
borstaff_cs	**1.25**	**0.802298**
unemp_cs	**1.24**	**0.807405**
rur_cs	**1.23**	**0.813166**
gpyield_cs	**1.19**	**0.842391**
lninc_cs	**1.17**	**0.855632**
lnglp_cs	**1.16**	**0.859926**
agric_cs	**1.16**	**0.860657**
women_cs	**1.05**	**0.951242**
Mean VIF	**1.21**	

Appendix C. Heteroskedasticity and Multicollinearity Tests for the Yield on Gross Portfolio

1. OLS Regression for Russia: Breusch-Pagan Test and Variance Inflation Factor Results

Source	SS	df	MS
Model	21423.0883	10	2142.30883
Residual	19842.9702	135	146.984964
Total	41266.0585	145	284.593507

Number of obs =	146
F(10, 135) =	14.58
Prob > F =	0.0000
R-squared =	0.5191
Adj R-squared =	0.4835
Root MSE =	12.124

gpyield_ru	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
lnloan_ru	-2.729682	1.333806	-2.05	0.043	-5.36754	-.0918236
lnglp_ru	-.1820332	.8038113	-0.23	0.821	-1.771725	1.407658
roe_ru	.0061128	.0028752	2.13	0.035	.0004265	.0117991
oelp_ru	.8612581	.1040412	8.28	0.000	.6554966	1.06702
deratio_r	-.001717	.0119523	-0.14	0.886	-.0253549	.0219209
women_ru	-.0325598	.0839866	-0.39	0.699	-.1986594	.1335399
rur_ru	.2250088	.1113968	2.02	0.045	.0047003	.4453174
lninc_ru	-2.663025	4.750839	-0.56	0.576	-12.05872	6.732673
agric_ru	-.41587	.3928348	-1.06	0.292	-1.192776	.3610363
portrisk_	-.0108474	.0954528	-0.11	0.910	-.1996236	.1779288
_cons	67.7803	42.41091	1.60	0.112	-16.09543	151.656

1.1 estat hettest

```
Breusch-Pagan / Cook-Weisberg test for
          heteroskedasticity
        Ho: Constant variance
        Variables: fitted values of gpyield_ru

        chi2( 1)      =      1.62
        Prob > chi2   =    0.2033
```

1.2 estat vif

Variable	VIF	1/VIF
agric_ru	3.63	0.275566
rur_ru	2.88	0.346743
lnloan_ru	2.11	0.473125
roe_ru	1.97	0.507714
lninc_ru	1.93	0.518481
deratio_ru	1.87	0.534345
lnglp_ru	1.78	0.561592
women_ru	1.40	0.713959
oelp_ru	1.35	0.738056
portrisk_ru	1.15	0.872024
Mean VIF	2.01	

2. OLS Regression for the Caucasus: Breusch-Pagan Test and Variance Inflation Factor Results

Source	SS	df	MS
Model	**6815.63906**	**10**	**681.563906**
Residual	**28303.1388**	**135**	**209.65288**
Total	**35118.7779**	**145**	**242.198468**

Number of obs = **146**
F(10, 135) = **3.25**
Prob > F = **0.0009**
R-squared = **0.1941**
Adj R-squared = **0.1344**
Root MSE = **14.479**

gpyield_cs	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
lnloan_cs	**-3.886058**	**1.124546**	**-3.46**	**0.001**	**-6.110063**	**-1.662052**
lnglp_cs	**.1147961**	**.5814147**	**0.20**	**0.844**	**-1.035063**	**1.264655**
roe_cs	**.0658528**	**.0297979**	**2.21**	**0.029**	**.0069217**	**.124784**
oelp_cs	**.0615478**	**.0567676**	**1.08**	**0.280**	**-.050721**	**.1738166**
deratio_cs	**-.2707489**	**.4867625**	**-0.56**	**0.579**	**-1.233415**	**.6919176**
women_cs	**.021433**	**.064754**	**0.33**	**0.741**	**-.1066305**	**.1494965**
rur_cs	**-.0992213**	**.0771013**	**-1.29**	**0.200**	**-.251704**	**.0532614**
lninc_cs	**-2.242679**	**2.457263**	**-0.91**	**0.363**	**-7.102389**	**2.617031**
agric_cs	**-.4691909**	**.1958635**	**-2.40**	**0.018**	**-.8565486**	**-.0818332**
portrisk_cs	**-.304519**	**.2243437**	**-1.36**	**0.177**	**-.7482018**	**.1391639**
_cons	**83.93045**	**19.79359**	**4.24**	**0.000**	**44.78483**	**123.0761**

2.1 estat hettest

Breusch-Pagan / Cook-Weisberg test for heteroskedasticity
Ho: Constant variance
Variables: fitted values of gpyield_cs

chi2(**1**) = **0.05**
Prob > chi2 = **0.8177**

2.2 estat vif

Variable	VIF	1/VIF
rur_cs	**1.28**	**0.780143**
lnglp_cs	**1.22**	**0.822618**
deratio_cs	**1.15**	**0.866781**
oelp_cs	**1.15**	**0.868463**
lnloan_cs	**1.14**	**0.874494**
roe_cs	**1.13**	**0.882190**
lninc_cs	**1.13**	**0.885796**
portrisk_cs	**1.09**	**0.918483**
agric_cs	**1.07**	**0.933351**
women_cs	**1.05**	**0.954454**
Mean VIF	**1.14**	

Appendix D. Heteroskedasticity and Multicollinearity Tests for the Average Loan Amount

1. OLS Regression for Russia: Breusch-Pagan Test and Variance Inflation Factor Results

Source	SS	df	MS
Model	65.931483	9	7.32572034
Residual	108.695595	136	.799232317
Total	174.627078	145	1.20432468

Number of obs =	146
F(9, 136) =	9.17
Prob > F =	0.0000
R-squared =	0.3776
Adj R-squared =	0.3364
Root MSE =	.894

lnloan_ru	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
borstaff_ru	-.0035818	.0007835	-4.57	0.000	-.0051312	-.0020324
lnbor_ru	-.0191919	.0625619	-0.31	0.759	-.1429118	.1045281
roe_ru	-.0001239	.000206	-0.60	0.548	-.0005312	.0002834
dcratio_ru	.0011496	.0009226	1.25	0.215	-.0006749	.0029741
women_ru	-.0315248	.0055747	-5.66	0.000	-.0425491	-.0205006
rur_ru	-.0099786	.0080561	-1.24	0.218	-.02591	.0059528
lninc_ru	.6706641	.3500042	1.92	0.057	-.0214905	1.362819
agric_ru	-.0115464	.0285748	-0.40	0.687	-.0680548	.044962
portrisk_ru	-.0126492	.0069091	-1.83	0.069	-.0263123	.001014
_cons	4.640951	3.084154	1.50	0.135	-1.458151	10.74005

1.1 estat hettest

```
Breusch-Pagan / Cook-Weisberg test for heteroskedasticity
         Ho: Constant variance
         Variables: fitted values of lnloan_ru

         chi2(1)      =     0.73
         Prob > chi2  =   0.3913
```

1.2 estat vif

Variable	VIF	1/VIF
agric_ru	3.53	0.283190
rur_ru	2.77	0.360499
lninc_ru	1.93	0.519430
roe_ru	1.86	0.537960
dcratio_ru	1.76	0.569636
borstaff_ru	1.24	0.809176
lnbor_ru	1.19	0.842550
women_ru	1.13	0.881161
portrisk_ru	1.10	0.905031
Mean VIF	1.83	

2. OLS Regression for the Caucasus: Breusch-Pagan Test and Variance Inflation Factor Results

Source	SS	df	MS	Number of obs = 146
Model	47.3926561	9	5.26585068	F(9,136) = 5.04
Residual	142.186006	136	1.04548534	Prob > F = 0.0000
				R-squared = 0.2500
Total	189.578662	145	1.30743905	Adj R-squared = 0.2004
				Root MSE = 1.0225

lnloan_cs	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
borstaff_cs	-.0061188	.0015491	-3.95	0.000	-.0091823	-.0030554
lnbor_cs	-.0730296	.0449946	-1.62	0.107	-.1620092	.0159501
roe_cs	.0011962	.0020298	0.59	0.557	-.0028179	.0052102
dcratio_cs	.2342209	.0995821	2.35	0.020	.0372912	.4311507
women_cs	-.0057728	.0045436	-1.27	0.206	-.0147582	.0032125
rur_cs	.0151303	.0051772	2.92	0.004	.004892	.0253685
lninc_cs	.453078	.1697417	2.67	0.009	.1174036	.7887525
agric_cs	.0009665	.0136047	0.07	0.943	-.0259376	.0278706
portrisk_cs	-.0104325	.0157592	-0.66	0.509	-.0415972	.0207322
_cons	4.412881	1.367998	3.23	0.002	1.707582	7.118179

1.1 estat hettest

Breusch-Pagan / Cook-Weisberg test for heteroskedasticity
Ho: Constant variance
Variables: fitted values of lnloan_cs

chi2(1) = 0.01
Prob > chi2 = 0.9203

1.2 estat vif

Variable	VIF	1/VIF
rur_cs	1.16	0.862822
lnbor_cs	1.14	0.873492
borstaff_cs	1.11	0.902775
lninc_cs	1.08	0.925715
portrisk_cs	1.08	0.928218
dcratio_cs	1.07	0.932818
roe_cs	1.05	0.948103
agric_cs	1.04	0.964698
women_cs	1.03	0.966711
Mean VIF	1.09	