Relationship Lending in Microcredit: Evidence from Bangladesh

Sugato Chakravarty
Abu Zafar Shahriar

Purdue University
812 West State Street, West Lafayette, IN 47906

Objective

- The objective of the paper is to empirically examine whether relationships between a borrower and a potential lender matter in the application and approval of microcredit.

What is relationship lending, and why does it matter?

- Banks gather information about a borrower through the development of long term relationship.
- Such information is likely to mitigate information asymmetry.
- Banking literature shows that bank-borrower relationship affects
    - availability of credit; and
    - the terms of credit, such as interest rate and collateral requirements.
- Examples include Petersen and Rajan (1994), Berger and Udell (1995, 2002), Cole (1998), Chakravarty and Scott (1999), Cole et al. (2004), and Chakravarty and Yilmazer (2009).

Motivation to conduct the study

- Information and enforcement problems in the rural credit markets.

- Joint liability-based micro-lending: its success and limitations.

- MFI's reliance of alternative lending technology in addition to joint liability contract:

  - Muhammad Yunus (1997) and other MFI loan officers emphasize on the importance of developing and maintaining a long term and meaningful relationship between the bank and the borrowers.

Motivation to conduct the study (cont.)

- Paucity of empirical research to examine the potential role of relationship lending in microcredit.
- Use of relationship driven information can
    - Reduce overall riskiness of the borrowing pool;
    - Increase profitability;
    - Reduce reliance on subsidies; and
    - Lower service charge.
- Increased understanding of relationship lending is necessary.

The 3 major streams of *the Microfinance Literature*

- **Outreach and impact evaluation:**
  - Cherry picking vs. reaching the poorest (Navajas et al., 2000; and Hulme and Mosley, 1996).
  - Impact of microcredit in reducing poverty (Pitt and Khandker, 1998; Hossain, 1988; and Morduch, 1998)
- **Financial sustainability of MFIs:**
  - The debate over efficiency vs. outreach (Robinson, 2001; Karlan and Zinman, 2008; and Dehejia, Montgomery and Morduch, 2007)

The 3 major streams of *the Microfinance Literature (cont.)*

- The third stream of literature deals with the informational aspect of microcredit (Ghatak, 1999 and 2000; Van Tassel, 1999; Stiglitz, 1990; Varian, 1990; and Armendariz de Aghion, 1999).

- Our study falls under the rubric of this category. It contributes to this literature by showing that MFIs rely substantially on *relationship lending,* in addition to joint liability contracts, to mitigate the information problem.

Testable Hypotheses

Bank-borrower relationship and the decision to apply for microcredit

H1: The probability of applying for microcredit increases as the length of membership with the potential MFI increases.

H2: Those who have maintained non-mandatory savings accounts with an MFI or those who previously received loans from an MFI are more likely to apply for a new loan from the same MFI.

Bank-borrower relationship and the approval of microcredit

- H3: Relationship measures should positively affect loan approval decisions.

    - Extant theoretical models argue that the loan contract indirectly takes care of informational asymmetry through joint liability. Hence, there is no need to rely on "costly" relationship measures.

Relationship with multiple lenders

H4: Borrowers with relationships with multiple lenders are more likely to apply for a new loan.

H5: Borrowers associated with multiple MFIs are less likely to be approved for loans.

The Data

■ Driven by the paucity of relevant secondary data, we conducted a unique household survey in rural Bangladesh, and collected data from 1,076 households from a representative sample of 34 villages.

The sampling method

Stage 1: six districts were chosen randomly from the six administrative divisions in Bangladesh.

Stage 2: from each district, two counties were chosen based on population density.

Stage 3: from each county, one union was chosen randomly.

Stage 4: from each union, three villages were chosen randomly. In Meherpur district, two villages were chosen from each union.

- The six divisions are divided in 64 *districts*.
- The 64 districts are divided in 491 *counties*.
- The 491 counties are divided into 4,498 *unions*.
- The unions are collections of *villages*. There are roughly 85 thousand villages in the country.

Divisions ➔ *Districts* ➔ *Counties* ➔ *Unions* ➔ *Villages*

The sampling method (cont.)

- Thus, data was collected from a representative sample from 34 villages in Bangladesh in the summer, 2009.

- In each village, 32 households were approached randomly for interview. Only one adult member was interviewed from each household.

- 1,076 respondents completed the interview.

In every stage of the sampling, urban population was avoided purposefully.

The survey districts
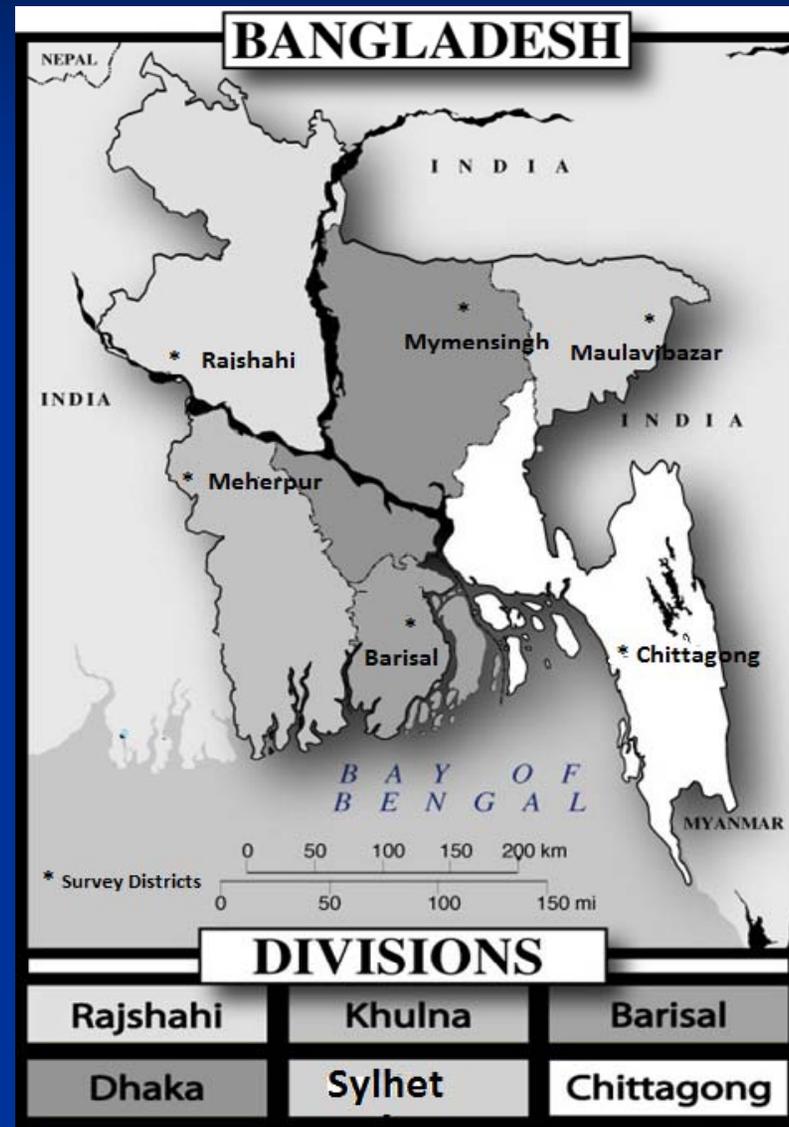
Variables

- Dependent variables
  - Probability of applying for microcredit
  - Probability of being approved for microcredit
- Relationship variables
  - Length of Membership with the potential MFI
  - Maintenance of non-mandatory savings account with the potential MFI
  - Previous loans with the potential MFI
  - Potential borrower's relationship with multiple lenders.

Controlled for…

- **Individual characteristics of the respondents**
    - Age
    - Gender
    - Education
- **Household characteristics of the respondents**
    - Physical capital (measured as household assets)
    - Human capital (measured as average years of schooling of the household members)
    - Outstanding debt
    - Dependency ratio
    - Gender of the household head
    - Exposure to disasters (flood, river erosion, disordering rain, bad harvest, and income shock due to illness)

The estimation model

- We specify the *loan application (y_1)* and *loan approval (y_2)* decisions to be functionally related to:
  - Relationship variables
  - Individual characteristics of the respondents.
  - Household characteristics of the respondents.
- The following variables are expected to affect the loan application, but not the loan approval decision:
  - Households exposure to natural disaster (flood, river erosion, and disordering rain)
  - Bad harvest
  - Income shock due to illness of an earning member.

We assume two latent variables, y_1^* and y_2^*, such that
(a) the borrower applies for a loan only if $y_1^* > 0$, and
(b) the lender approves a loan application only if $y_2^* > 0$.

We then estimate the following equations:

$$y_1^* = x_{1i}\,\beta_1 + \varepsilon_{1i} \qquad\qquad (1)$$

$$y_2^* = x_{2i}\,\beta_2 + \varepsilon_{2i} \qquad\qquad (2)$$

β_1 and β_2 are the vectors of unknown parameters
x_{1i} and x_{2i} are the vectors of exogenous variables
ε_{1i} and ε_{2i} are standard normally distributed error terms.

We use the *Heckman two stage method* to analyze the overall loan granting process to control for potential *selection bias*.

Heckman two stage method to control for selection bias in the loan approval decision

The following likelihood function is maximized assuming that ε_{1i} and ε_{2i} are bi-variate standard normally distributed with correlation coefficient, ρ and cdf Φ_2:

$$\prod_{i=1}^{N_1} \Phi_2(x_{2i}\beta_2, x_{1i}\beta_1; \rho) . \prod_{i=N_1+1}^{N} \Phi_2(-x_{2i}\beta_2, x_{1i}\beta_1; \rho) . \prod_{i=N+1}^{M} \Phi(-x_{1i}\beta_1)$$

The first term of the likelihood function denotes the likelihood of a borrower applying and being approved for microcredit, the second term denotes the likelihood of a borrower applying and being rejected for a loan, and the third term denotes the likelihood of a respondent not applying for a loan.

Empirical Results

Bank-borrower Relationship and Micro-Loan Application Decisions
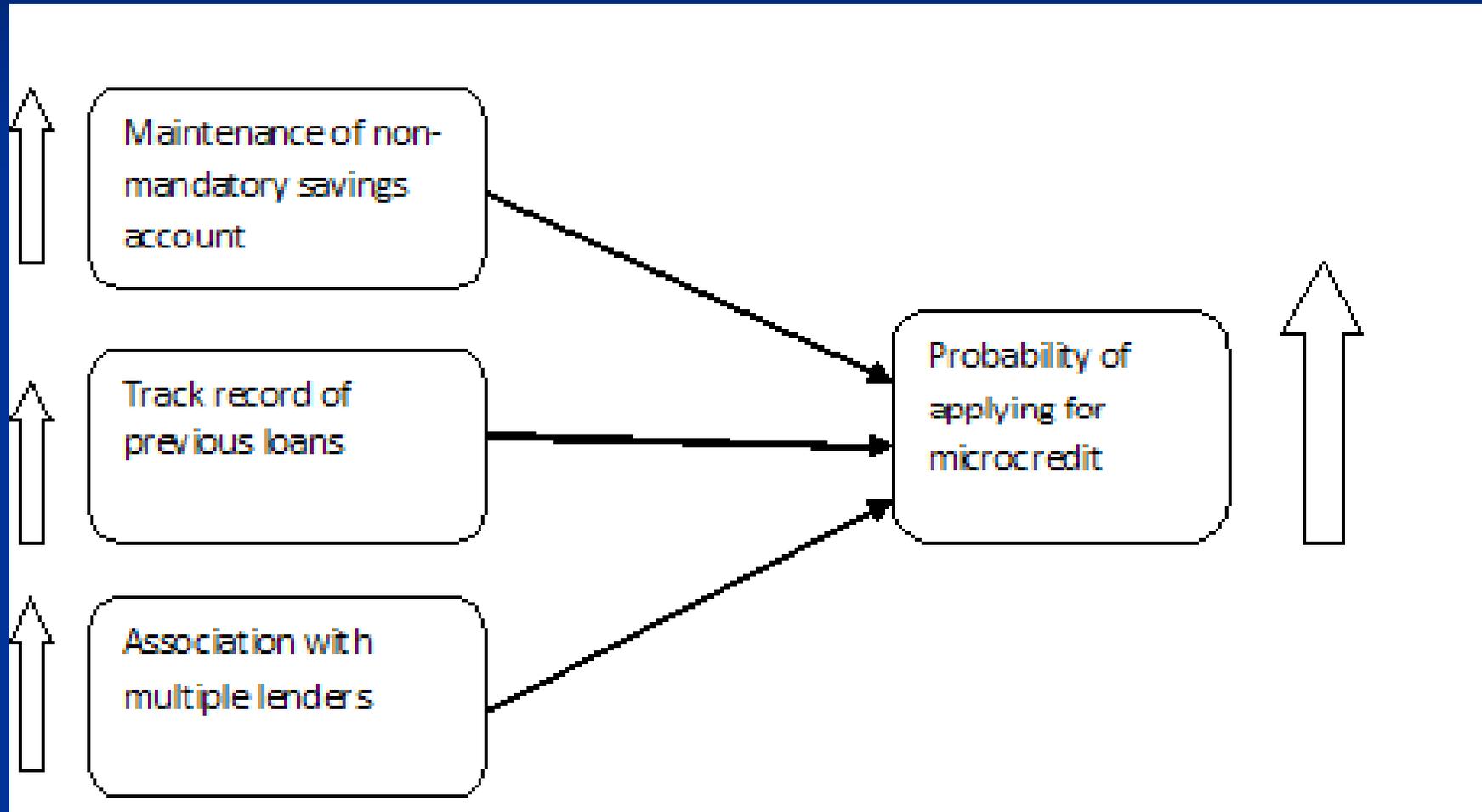
Bank-borrower Relationship and Loan Approval Decisions
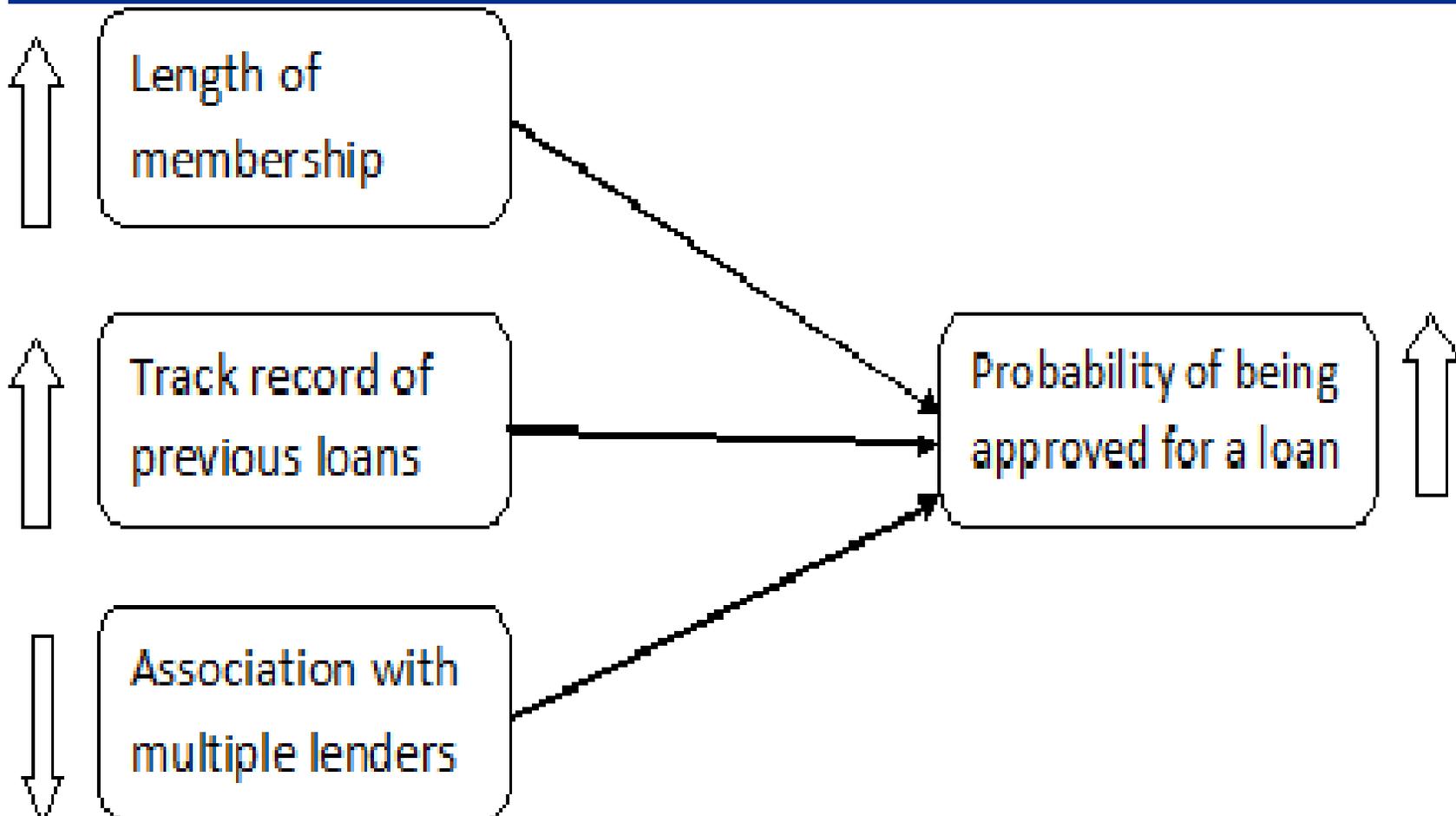
Robustness check based on the *eligibility criteria*

- Households that own less than a half acre of arable land are considered "eligible" for receiving microcredit in Bangladesh.

- To check robustness of our results, non-eligible respondents are dropped form the sample.

- Our main results hold true for the sub-sample of eligible borrowers only.

MFI's loan approval decisions: comparing large versus small MFIs

- In the context of small business lending in the USA, small banks rely more on soft relationship driven information.

- The situation appears opposite in the microcredit sector of Bangladesh where large MFIs have more favorable organizational structure for relationship lending.

- Our data also suggests that it is the large, rather than small MFIs in Bangladesh, that rely more on relationship metrics in approving loans.

Concluding remarks

- Increased understanding of the relationship dynamics in microcredit is required for a more successful expansion of such programs in the developing world as well as in the U.S.

- Our study is a modest step towards that.

- Our finding that soft information metrics, like relationships, matter in group-based loan approval decisions compliments our intuition from extant theoretical models.

Tables showing empirical results

Regression Results for Applying, and Being Approved, for Microloans

	Panel A		Panel B	
	Applied for a micro loan		Approved for a micro loan	
	coeff	ME	coeff	ME
Relationship Variables				
LENGTH	0.006	0.001	0.007*	0.001
SAVINGS	0.690***	0.244	-0.526	-0.096
PRE_LOAN	0.821***	0.316	0.553**	0.064
MULT_REL	0.582**	0.193	-0.827***	-0.196
LENGTH_OTHER	0.014***	0.003	-0.005*	-0.001
SAV_ONE	0.505***	0.193	0.337*	0.045
SAV_ALL	1.899***	0.585	0.486	0.54
PRE_LOAN_ONE	-0.135	-0.049	-0.243	-0.043
PRE_LOAN_ALL	-0.545	-0.181	0.468	0.053
MULT_REL_OTHER	0.701***	0.277	-0.541**	0.109
Individual Characteristics				
AGE	0.041**	0.018	-0.038*	-0.006
AGESQUARED	-0.001**	0.000	0.001*	0.000
EDUC	-0.011	-0.002	0.021	0.003
AVG_SCH	-0.006	-0.002	-0.005	-0.001
GENDER	0.210*	0.100	0.009	0.001
Household Characteristics				
FEM_HEAD	-0.347*	-0.114	-0.463*	-0.091
Ln(HH_ASS)	0.019*	0.006	-0.021	-0.003
OUT_DEBT	0.255**	0.109	-0.245*	-0.041
DEP_RATIO	0.064	0.016	-0.076	-0.012
BAD_HARV	-0.1154	-0.048		
SHOCK	-0.021	-0.004		
DISASTER	0.036	0.035		
CONSTANT	-1.984		2.265	
rho	-0.987			
Prob > chi 2	0.004			
Log likelihood	-590.712			
Prob > chi 2	0.000			

Regression Results for Applying and Being Approved for Microloans: The Sample of Eligible Households

	Panel A Applied for group loan		Panel B Approved for group loan Hedman two stage model		Panel C Approved for group loan Probit model	
	coeff	ME	coeff	ME	coeff	ME
Relationship Variables						
LENGTH	0.003	0.001	0.008***	0.002	0.009*	0.003
SAVINGS	0.975****	0.348	-0.460	-0.122	-0.108	-0.032
PRE_LOAN	0.932***	0.361	1.145**	0.174	1.362***	0.329
MULT_REL	0.838***	0.306	-0.957***	-0.311	-0.962***	-0.342
LENGTH_OTHER	0.006	0.002	-0.006	-0.001	-0.005	-0.002
SAV_ONE	0.714***	0.277	0.979*	0.168	1.154***	0.309
SAV_ALL	7.332	0.012	1.117	0.146	1.151**	0.254
PRE_LOAN_ONE	0.409	0.157	-0.842***	-0.263	-0.672**	-0.229
PRE_LOAN_ALL	-1.215*	-0.265	0.451	0.086	0.255	0.071
MULT_REL_OTHER	0.715***	0.277	-0.149	-0.037	0.078	0.023
Individual Characteristics						
AGE	0.014	0.005	-0.001	-0.000	-0.005	-0.001
AGESQUARED	-0.000	-0.000	0.000	0.000	0.000	0.000
EDUC	0.006	0.003	0.015	0.003	0.011	0.003
AVG_SCH	0.011	0.002	0.035	0.008	0.042	0.012
GENDER	0.209	0.066	0.295	0.071	0.317	0.098
Household Characteristics						
FEM_HEAD	-0.421*	-0.125	-1.144**	-0.376	-0.816**	-0.298
Ln(HH_ASS)	0.022	0.008	-0.051*	-0.012	-0.049*	-0.015
OUT_DEBT	0.576***	0.234	-0.606**	-0.172	-0.405*	0.131
DEP_RATIO	0.188	0.061	-0.197	-0.047	-0.212	-0.065
BAD_HARV	-0.221	-0.071				
SHOCK	-0.032	-0.036				
DISASTER	0.011	0.023				
CONSTANT	1.981		1.316		0.403	
rho	-0.268					
Prob > chi 2	0.555				Log likelihood	-97.856
Log likelihood	32.65				Prob > chi 2	0.000
Prob > chi 2	0.014				Pseudo R^2	0.242

Regression Results for Applying and Being Approved for Microloans from Large and Small Microfinance Institutions

	Panel A		Panel B		Panel C		Panel D	
	Applied for group loan to a large MFI		Applied for group loan to a small MFI		Approved for group loan by a large MFI		Approved for group loan b a small MFI	
	coeff	ME	coeff	ME	coeff	ME	coeff	ME
Relationship Variables								
LENGTH	-0.009	0.000	0.012***	0.001	0.014**	0.004	-0.001	-0.000
SAVINGS	0.479***	0.157	0.484***	0.076	-0.135	-0.042	-0.323	-0.013
PRE_LOAN	0.651***	0.227	0.105	0.015	1.643**	0.286	0.646	0.013
MULT_REL	0.336	0.108	0.126	0.030	-1.773***	-0.624	-0.266	-0.012
LENGTH_OTHER	0.008***	0.002	-0.002	-0.000	-0.002	-0.001	-0.001	-0.000
SAV_ONE	0.271**	0.088	0.491***	0.083	0.753**	0.192	-0.063	-0.002
SAV_ALL	1.456***	0.533	0.141	0.019	1.938	0.247	0.689	0.023
PRE_LOAN_ONE	0.242	0.078	0.416***	0.048	-2.411	-0.078	0.593	0.013
PRE_LOAN_ALL	-0.082	0.017	0.477	0.087	0.601	0.143	-0.676	-0.047
MULT_REL_OTHER	0.499**	0.171	0.163	0.018	-0.305	-1.001	-0.356	-0.016
Individual Characteristics								
AGE	0.045**	0.014	0.000	0.000	-0.018	-0.005	-0.012	-0.000
AGESQUARED	-0.001*	-0.000	-0.000	-0.000	0.000	0.000	0.000	0.000
EDUC	0.013	0.004	-0.042***	-0.005	-0.003	-0.001	0.067**	0.002
AVG_SCH	-0.023	-0.006	0.033	0.004	0.064	0.019	-0.099**	-0.003
GENDER	0.090	0.027	0.276**	0.036	-0.134	-0.041	-0.029	-0.001
Household Characteristics								
FEM_HEAD	-0.004	-0.000	-0.501***	-0.045	-0.105*	-0.386	0.034	0.001
Ln(HH_ASS)	0.018	0.005	0.002	0.000	-0.026	-0.008	-0.006	-0.000
OUT_DEBT	0.274**	0.089	0.106	0.013	-0.582**	-0.195	0.301	0.008
DEP_RATIO	0.022	0.006	0.010	0.000	-0.171	-0.052	-0.101	-0.003
BAD_HARV	0.002	0.006	-0.354	-0.032				
SHOCK	-0.043	-0.011	-0.064	-0.008				
DISASTER	0.052	0.023	0.315**	0.068				
CONSTANT	-2.178		-1.711		1.05		2.078	