

Relationship Lending in Microcredit: Evidence from Bangladesh

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Abstract

We use primary data compiled from the field in 34 randomly selected villages in Bangladesh to examine the role of bank-borrower relationships in the application and approval of microcredit. We find evidence that potential borrowers who have maintained a longer membership with their microcredit provider, those who have non-mandatory savings accounts, and those who have a track record of previous loans are more likely to apply, and be approved, for group-based micro loans. Having relationships with multiple lenders increases the probability of applying for a loan but reduces the probability of being approved for it. We also provide evidence that it is the large (rather than small) microfinance institutions who rely more on relationship metrics. Our findings complement the intuition provided in the theoretical literature in that, in addition to joint liability contracts, micro lenders in Bangladesh appear to substantially rely on relationship driven information in extending loans.

Key words: microcredit; adverse selection; joint liability; peer pressure; relationship lending.
JEL Classification: G21; D82; O16.

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1. Introduction

Since the early nineties, it has been well accepted that soft information, generated in the process of interactions between borrowers and lenders, collectively defined as “relationships”, can help mitigate adverse selection problems and simultaneously improve loan efficiencies.¹ This stream of relationship research owes its origin to an influential paper by Stiglitz and Weiss (1981) in which a profit maximizing behavior by banks is to deny credit to some high risk borrowers: a phenomenon also known as “credit rationing” that is driven by asymmetric information between bank and borrower. Empirical research on relationships has been primarily performed with data compiled within the United States and the main findings are that relationship measures are correlated with loan availability and, to a limited extent, with loan rates.²

We explore the role of relationships in the application of micro loans made by peasants and others as well as the approval of such loans by the micro finance institutions (MFIs) in rural Bangladesh. People of modest means lacking physical assets for collateral and with no verifiable credit histories are the typical clientele of microcredit. Micro loans are usually made to finance income generating activities and it should be underscored that the term microfinance encompasses a wide range of financial services to the poor that includes microcredit, savings and insurance. Beginning in the mid-seventies, savings and credit institutions in Bangladesh started extending small loans to groups of poor women in the villages in order to empower them to invest in micro level businesses.³ This form of micro-enterprise credit is based on solidarity based group lending where every group member is tasked to ensure the repayment of all members. To date, several studies have investigated the various aspects of microcredit.⁴

¹ See, for example, Petersen and Rajan (1994), Berger and Udell (1995, 2002), Cole (1998), Chakravarty and Scott (1999), Cole, Goldberg and White (2004), and Chakravarty and Yilmazer (2009).

² There have also been studies examining borrower-lender relationships in markets outside the United States. See, for example, Degryse and Cayseele (2000), Angelini, Di Salvo and Ferri (1998), Weinstein and Yafeh (1998) and Harhoff and Korting (1998).

³ Around 1976, Professor Muhammad Yunus along with his graduate students at the Chittagong University in Bangladesh took the initiative of addressing the banking problem faced by the poor through a program of action based research. Specifically, Yunus designed an experimental credit program to serve the needs of the poor that spread rapidly to hundreds of villages. Through a special relationship with the rural banks, he disbursed and recovered thousands of loans. Unfortunately, in spite of the success of this pilot program, the banks refused to continue with the loan granting project at the end of the pilot fearing it was too expensive and risky. Undaunted, Yunus, through the support of donors, decided to form the Grameen Bank in 1983 that now serves more than 8 million borrowers. The initial success of the Grameen Bank also stimulated the establishment of several other microfinance institutions in Bangladesh like BRAC (Bangladesh Rural Advancement Committee), ASA (Association for Social Advancement), Proshika, etc.

⁴ See Armendariz de Aghion and Morduch (2005) for a detailed overview of the microfinance literature.

The goal of this paper is to marry the two streams of literature discussed above in examining whether relationships between a borrower and a potential lender matter in the application, and approval, of microcredit. Examining the role of relationships in microcredit is a non trivial exercise for several reasons. First, it draws attention to the role that soft relationship-driven information might play, in addition to joint liability and peer monitoring, in mitigating information asymmetry in the microcredit sector. Second, it emphasizes on the fact that soft information, if successfully utilized by the microfinance institutions, is likely to reduce the average riskiness of the pool of loans. This, in turn, is likely to increase profitability and reduce MFIs' reliance on governmental, as well as private sector, subsidies. In other words, use of soft relationship information might help MFIs achieve financial sustainability—a major concern among practitioners and policymakers.

Asymmetric information and enforcement problems have restrained traditional financial institutions to extend credit to the poor in developing countries. The use of collateral, a common solution to address these problems in credit markets, is constrained by the limited availability of pledgeable assets, the absence of secondary markets to liquidate these assets, and insufficient legal infrastructure (Hasan, 2002). The failure of government sponsored specialized rural credit institutions to channel credit to the poor in many of these countries⁵ have further established the idea that “the poor are non-bankable”. In recent times, microcredit programs (such as those administered by the Grameen Bank of Bangladesh) have, however, shown that credit can successfully be extended to the poor without pledgeable assets while ensuring high repayment rates. This indicates that the microcredit programs have largely been successful in mitigating the information and enforcement problems in the rural credit markets. The current theoretical literature on microcredit suggests that the microfinance institutions have successfully innovated loan contracts such that, when a borrower accepts the contract, she freely chooses actions in her own interest that serves to reduce the probability of default. Specifically, researchers have argued that the joint liability feature of group-based microcredit is able to resolve the screening, incentive and enforcement problems in the rural credit markets (see, for example, Stiglitz, 1990; Varian, 1990; Besely and Coate, 1995; Ghatak, 1999 and 2000; Ghatak and Guinnane, 1999; Armendariz de Aghion, 1999; and Van Tassel, 1999).

It is, however, worth noting that joint liability in group loan situations does not add to the bank's storehouse of information on a borrower. Put differently, it is a behavior inducing mechanism and not an information gathering tool. This is because villagers choose credit worthy borrowers as borrowing

⁵ Expectations that these institutions would provide poor farmers with easy access to credit in rural areas have proved to be unfounded as funds have often been skewed in favor of wealthier and influential farmers (Huppi and Feder, 1990). In addition, high default rates have prevented these institutions from being self-sustaining (Hoff and Stiglitz, 1990).

partners based on locally available information not necessarily available to the bank. This raises the question of whether micro lenders rely only on indirect mechanisms such as joint liability lending, or do they take initiatives to add to their storehouse of information so as to make more informed future lending decisions. This question is non-trivial from a policy perspective as extant studies show that there exist several factors that adversely influence the effectiveness of the joint liability mechanism and, more importantly, micro lenders often have little control over such factors. For instance, Wydick (1999), and Ahlin and Townsend (2007) provide evidence that, while existence of social connections among group members is a prerequisite for sharing mutual responsibility under group lending, strong social ties may also induce the borrowers to free ride or to collude against a bank. Wenner (1995), and Sharma and Zeller (1997), on the other hand, suggest that, in areas where people have multiple sources of lending (as is the case in most of Bangladesh), joint liability is not an efficient mechanism for ensuring high repayment rates. Given such practical limitations, it is quite reasonable to expect that micro lenders might rely on some alternative lending techniques, in addition to joint liability contracts, that eventually add to their information database on a given borrower. Muhammad Yunus, the pioneer micro lender, points to relationship lending in this regard while he attributes the success of Grameen Bank in ensuring high repayment rates to the relationships they develop with their borrowers (Yunus, 1997). He argues that Grameen Bank (and, presumably, other micro lenders as well) develop and maintain close ties with the borrowers during the loan application, approval and utilization stages. Such ties should help reduce informational asymmetry by producing valuable soft information on the creditworthiness of a borrower, and the level of effort that a borrower generally exerts in her project implementation. In direct conversations, several MFI loan officers have also argued that they invest enormous effort in developing long term relationships with their borrowers, and that they rely substantially on relational values in screening their clients.⁶ A careful investigation of the literature, however, reveals a distinct paucity of empirical research to substantiate the role that bank-borrower relationships might play in the microcredit sector. Our study aims to fill this gap in the literature.

A major obstacle that we faced in conducting this research is the lack of relevant secondary data. While secondary data sets on microcredit are available, they usually do not contain all of the information required for such analyses. For example, the World Bank-BIDS data set contains information on program participation (whether or not the respondent is a member of an MFI) as well as individual and household

⁶ In particular, we interviewed loan officers from Grameen Bank, BRAC, ASA, and some other small locally based microfinance institutions for this project.

characteristics of respondents from nearly 1,800 rural households in Bangladesh.⁷ But it does not have any information on loan approval decisions of the MFIs. The Townsend Thai Survey Data,⁸ on the other hand, contains information on 262 borrowing groups from the Bank of Agriculture and Agricultural Cooperative (BAAC) in Thailand. By design, this data base contains information only on clients, whose loan applications have been approved. Accordingly, information on credit constrained or discouraged borrowers are not observed in this data. Several authors have used data collected by the BRAC-ICDDR,B Joint Research Project at Matlab.⁹ The objective of this project is to evaluate the impact of different socio-economic and health care programs initiated by BRAC and ICDDR,B on participating households' welfare. A wide range of information is collected under this project from 12,000 households in two phases (1992-1995, and 1996-2000). However, the database does not contain any information on microcredit application, or approval, decisions. Another data set that is being widely used by the researchers in recent times is the MIX Market data,¹⁰ which contains information on MFI performance (self sufficiency, outreach, repayment etc.) for more than 1400 MFIs. But it does not contain any client-specific information. Thus, loan application or approval decisions for individual clients are not observed from the MIX Market data. Motivated by a lack of secondary data, we designed and conducted a unique household survey in Bangladesh. The survey was carried out from May to August in 2009 in 34 randomly selected villages from the six administrative divisions of the country (we discuss the sampling procedure in detail later in the paper). A questionnaire was designed to collect explicit information on the loan application and approval processes prevalent in the microcredit sector. In addition, different measures of relationship lending; price and non-price terms of microcredit; and individual, as well as household characteristics, are directly observed in our data set compiled with 1,076 rural households.

Upon estimating our model, which is analogous to the Heckman (1976) sample selection approach, by accounting for any potential self selection problems, we find that relationship measures

⁷ The World Bank and Bangladesh Institute of Development Studies (BIDS) surveyed 1,798 households in 87 villages in Bangladesh during 1991-92. The second round of the survey was conducted in 1998-99. In the second round 1,638 households were re-traced. The survey's main focus was to provide data for impact evaluation analysis of three major microcredit programs in Bangladesh (Grameen Bank, BRAC, and the Rural Development-12 program of the Bangladesh Rural Development Board). This data set is available from the website of World Bank: (<http://econ.worldbank.org/WBSITE/EXTERNAL/EXTDEC/EXTRESEARCH/0,,contentMDK:21470820~pagePK:64214825~piPK:64214943~theSitePK:469382,00.html>)

⁸ Detailed information on this survey is available at <http://cier.uchicago.edu/data/>

⁹ The International Centre for Diarrheal Disease Research, Bangladesh (ICDDR,B) is an international health research organization located in Dhaka, Bangladesh. Matlab is a sub-district under Comilla district in Bangladesh. Information on this project can be found from: <http://centre.icddr.org/activity/index.jsp?activityObjectID=234>

¹⁰ This data set is available at www.mixmarket.org

significantly increase the probability of applying for microcredit and lower the probability of being rejected for a loan. Specifically, we find that the likelihood of applying, and being approved, for microcredit increases as the length of membership with the potential MFI increases. Furthermore, those who have taken loans from the same MFI before, or those who have maintained a non-mandatory savings account,¹¹ are more likely to apply and be approved for microcredit compared to those who have not taken any loan before or those who have no non-mandatory savings accounts with the MFI. Maintaining association with multiple lenders, on the other hand, increases the probability of applying for microcredit, but reduces the likelihood of being approved for a loan. Our findings that soft information metrics, like relationships, matter in group loan approval decisions compliment the intuition from extant theoretical models and supports anecdotal evidence. Extant theoretical models predict that the micro lenders rely on the joint liability aspect of group lending in order to screen, monitor and, ultimately, enforce repayment from their clients. In this regard, both the theoreticians and empirical researchers have largely ignored the role that relationship driven information might play. In this paper, we empirically show that micro lenders substantially rely on relationship driven soft information to resolve the asymmetric information problem. We discuss this issue in detail later in the paper.

Our estimation results also show that it is the relatively larger MFIs (those with more than one hundred thousand active members) who rely more on relational metrics compared to their smaller counterparts. This finding contradicts findings reported in the literature involving small businesses within the United States (see, for example, Berger, Miller, Petersen, Rajan and Stein, 2005; and Cole, Goldberg and White, 2004).¹² One explanation behind our findings is that the loan officers from the large MFIs in Bangladesh enjoy more authority in choosing their borrowers, and in designing their loan products to suit their customers. The small MFIs, on the other hand, display little flexibility in that regard. Since the loan officers come in direct contact with the clients, they have the greatest access to soft relationship driven information. Thus, it is not unlikely that with greater flexibility to screen borrowers, the loan officers from large MFIs make greater use of relational values in the loan granting process relative to their counterparts in the small MFIs.

¹¹ Borrowers from most of the MFIs in Bangladesh have to maintain a mandatory savings account in order to receive a micro loan. In addition to the mandatory savings, MFIs offer other non-mandatory savings schemes to their clients.

¹² Specifically, in the context of the small business enterprises within the United States, empirical evidence suggests that it is the small banks rather than the large ones that rely on relationship measures. Large banks are, in general, reluctant to extend small loans; and if they do extend small loans, they do so based typically on tangible financial metrics and are less dependent on relational measures.

To ensure the robustness of our findings, we examine the role of relationships in the subsample of eligible borrowers only. Households that own less than a half acre of arable land are considered eligible for microcredit in Bangladesh. However, in practice, many non-eligible (i.e., owning more than half acre of arable land) households also receive micro loans. For example, based on a household survey of 14 Bangladeshi villages, Zaman (1996) provides evidence that almost 30 percent of the microloan recipients from BRAC come from non-eligible households. Similar patterns are also found in our field data. In particular, nearly four hundred out of 1,076 households in our data set are non-eligible for microcredit. And it is evident that at least twenty three percent of these non-eligible households have received a group loan in the last twelve months. Upon removal of these non-eligible households from our analysis, we find that our main result, that relationships impact application and approval decisions of microcredit, holds true for the subsample of eligible borrowers as well.

The remainder of this paper is structured as follows: Section 2 reviews the background literature and develops the testable hypotheses. Section 3 describes the data and variables. Section 4 constructs the empirical framework. Section 5 presents the findings of our empirical analysis including the results of our robustness test. Finally, section 6 concludes.

2. Background Literature and Development of Testable Hypotheses

2.1. Microfinance literature

Research on microfinance has evolved along three main streams. The first stream of microfinance literature deals with the outreach and impact evaluation of microcredit. For example, studies by Chemin (2008), Khandker (2005), Pitt and Khandker (1998), Wahid (1994) and Hossain (1988) show positive impact, while Ahmad (2007), Coleman (1999), and Morduch (1998) fail to show any significant impact of microfinance on poverty alleviation and asset accumulation. Regarding the depth of outreach of microfinance programs, some studies indicate that it is the ‘better off’ among the poor, who benefit from microcredit (see for example, Navajas, Schreiner, Meyer, Gongalez-Vega and Rodriguez-Meza, 2000; and Hulme and Mosley, 1996). Others (for example, Khandker, 2005) find that it is the extremely poor who benefit more from microcredit relative to the moderately poor.

The second stream deals with the question of financial sustainability of the microfinance institutions.¹³ Two countervailing approaches have emerged within this stream. The advocates of the *financial systems approach* argue that MFIs should increase interest rates in order to reduce their reliance on subsidies (see, for example, Robinson, 2001). A key assumption that leads to this argument is that poor

¹³ See Cull, Demircuc-Kunt, and Morduch (2007) for a detailed discussion.

borrowers are not sensitive to interest rates because they need access to credit and, not necessarily, cheap credit. Empirical evidence, however, shows that the demand for credit by the poor households falls substantially as interest rate rises (see, for example, Karlan and Zinman, 2008; and Dehejia, Montgomery and Morduch, 2007). This has led the advocates of the *poverty lending approach* to argue that the microfinance interest rates could be subsidized in order to achieve its prime objective of poverty alleviation through the extension of credit.

The third stream of the microfinance literature, and one that our study belongs to, comprises of a theoretical and an empirical branch that model how joint liability in group loans alleviates information asymmetries. In a typical rural credit market, where borrowers know each other's type but the bank does not, loans have to be offered to all borrowers at the same nominal interest rate. Now, if there are enough risky borrowers in the market, the equilibrium interest rate may be high enough to drive the safe borrowers away from the market as in the lemons model of Akerlof (1970). Ghatak (1999 and 2000), theoretically, shows that the joint liability contract can resolve this problem. The basic idea is as follows: since borrowers are held mutually responsible for repayments under joint liability lending, both safe and risky borrowers prefer a safe borrowing partner in forming groups. However, since potential borrowers know each others' risk type, the individuals with the safest projects only accept other safe borrowers as partners. Next, those with the lowest risk, among the ones remaining, group together; and the process continues until the individuals with the highest risk are forced to group together. In this way, if borrowers have perfect information about each other's type, they select homogenous partners with respect to investment risk—a mechanism that is known as 'assortative matching' (Stiglitz, 1990).¹⁴ Once homogenous risk groups are formed, the safe borrowers effectively face lower borrowing costs than do the risky types because their partners are less likely to fail. And, this is precisely what happens under full-information credit contracts, where risky borrowers pay more for a loan because they succeed less often. Furthermore, with joint liability lending, lenders are better insured against default risk, which enables them to charge lower interest rates to both risky and safe borrowers. The lower interest rate encourages the safe borrowers to reenter the market. In this way, the joint liability aspect of microcredit reduces the average riskiness of the pool of the applicants even if the lender does not know the risk type of the borrower a priori. Extant theoretical models have also shown that if group members are held jointly liable for repayment of a loan, they will monitor their peers and pressure those individuals who misuse their loans to act responsibly. As a result, group lending schemes mitigate problems associated with moral

¹⁴ Recent studies have, however, shown that under certain circumstances, such as when group members can transfer resources among themselves for the purpose of risk sharing, homogenous matching may not occur (see, for example, Sadoulet, 1999; Sadoulet and Carpenter, 2001; and Guttman, 2008).

hazard and contract enforcement (see, for example, Stiglitz, 1990; Varian, 1990; and Armendariz de Aghion, 1999).

Several empirical studies examine whether joint liability actually helps reduce existing information asymmetries. These studies implicitly assume that high repayment rates imply reduced information problems, and consequently, they analyze whether joint liability lending improves loan repayment rates of the MFIs (Hermes and Lensink, 2007). For example, using evidence from a natural experiment with 2,000 group borrowers of FINCA, Peru, Karlan (2007) shows that joint liability contracts, by ensuring peer monitoring and enforcement, improves the repayment performance of the groups. Based on information from 25 borrowing groups in Costa Rica, Wenner (1995) shows that a well defined and enforceable joint liability contract (that is formally written) increases repayment rates. Zeller (1998) finds similar evidence among the group borrowers in Madagascar.

In contrast to the above mentioned studies, the current study sets out to empirically examine how factors beyond joint liability might be at play to ameliorate information asymmetries between borrower and lender in the microcredit sector. This is a non-trivial task as empirical studies show evidence that joint liability has some practical limitations. For example, an individual borrower's reliance on fellow borrowers to repay the loan may open the door for free riding problem within the group. Abbink, Irlenbusch, and Renner (2006) express it succinctly as follows: "*If the success of an individual project is not sufficiently verifiable by other group members, the dominant strategy for each individual is to shirk and hold others liable for own default*". Thus, under joint liability contract, repayment by an individual borrower largely depends on her belief that other members will do the same. And, this belief in turn, depends on the existence of social capital within the group (Cassar, Crowley, and Wydick, 2007). Thus, the existence of close social ties among group members is a prerequisite for the success of joint liability contracts. Ahlin and Townsend (2007), however, show evidence that loan repayment is indeed negatively related with higher levels of social connections among group members.¹⁵ When group members share close ties, it is possible for them to collude against the bank and default intentionally, especially in the absence of an appropriate legal mechanism to induce repayments. In an influential study by Wydick (1999), who uses data from 146 borrowing groups in Guatemala, the author shows that social ties within groups reduces the pressure that members put on each other to enforce repayments. Using data on 128 borrowing groups in Bangladesh, Sharma and Zeller (1997) also find that when relatives and friends are present in the same group, all of the acts of screening, monitoring and enforcement become less efficient. Furthermore, Wenner (1995), and Sharma and Zeller (1997) suggest that when micro borrowers have

¹⁵ They use Townsend Thai Survey data.

alternative sources to borrow, banks cannot successfully harness the collateral effect of joint liability. Being aware of such perils of joint liability, MFIs are likely to rely on some alternative lending technologies. Based on anecdotal evidences, the present study hypothesizes that relationship lending is that alternative.

2.2. Relationship literature

In order to extend credit to creditworthy borrowers and to ensure high repayment rates, it is important for a lender to gather information about the creditworthiness of potential borrowers. There are several ways to collect this information. Compiling soft information that accrues from a continual connection between borrower and lender has been shown in the literature to be one way of reducing the informational asymmetry between borrower and lender. Through development of long-term relationships, lenders acquire valuable soft information about the potential borrowers and use it to make (future) loan approval decisions and in designing specific loan contracts. The empirical relationship literature provides support for the importance of bank-borrower relationship in terms of credit availability and credit terms such as interest rates and collateral requirements. In particular, researchers studying credit availability effects of relationship banking 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). All of these studies use the length of interaction between borrower and lender in order to measure the strength of a relationship, but report mixed results.¹⁶ The theoretical research on bank-borrower relationship provides opposing views on how the length of relationship should affect loan pricing.¹⁷ The empirical research too (cited above) both supports and rejects the hypothesis that the length

¹⁶ Using the 1987 version of the NSSBF (National Survey of Small Business Finances) data set, Petersen and Rajan (1994) find that the length of relationship is a significant determinant of credit availability. This finding has been supported by Chakravarty and Scott (1999), who use data from the 1989 Survey of Consumer Finances and show that relationship duration and the number of activities between a family and a potential lender significantly lower the probability of being credit rationed. Cole (1998), on the other hand, finds that the length of relationship plays no significant role in determining credit availability. However, using the 1993 version of the NSSBF data set, he finds that borrowers who have maintained a savings account or who have received a loan and other financial services from a particular credit source are more likely to be approved for a new loan. The findings by Cole (1998) are supported by Chakravarty and Yilmazer (2009), as they find no significant impact of the length of relationship on loan approval decisions.

¹⁷ For example, Boot and Thakor (1994) predict that, as a relationship matures, both the interest rate and the collateral requirements should decline. Other models predict (see, for example, Greenbaum, Kanatas, & Venezia, 1989 and Sharpe, 1990) that as the relationship matures and the bank obtains an informational monopoly, firms with existing relationships suffer from being charged higher loan rates. The problem is exacerbated when the borrower faces high switching costs to move to other lenders.

of relationship reduces the loan rates in the US loan markets.¹⁸ Such ambiguity spills over into the international arena as well (see, for example, Harhoff and Korting, 1998; and Degryse and Cayseele, 2000). Another stream of the relationship literature examines the impact of a bank's organizational structure on relationship lending (see, for example, Berger and Udell, 2002; Cole et al., 2004; and Berger et al, 2005). Using data from the 1993 National Survey of Small Business Finances (NSSBF) dataset, Cole et al., (2004), for example, show that the large banks (US\$ 1 billion or more in assets) do not rely on relationship measures; rather they are more likely to approve a loan when the applicant keeps formal financial records, has a larger enterprise, has an enterprise of greater age, has greater cash reserves, and is not minority-owned. Small banks, on the other hand, rely more heavily upon pre-existing relationships that provide information about the character of the borrower. Thus, the small banks assign less weight to the formal financial variables.

In this study, we contribute to the arguably fractured relationship literature by investigating how bank-borrower relationships affect loan application decisions of the borrowers, and loan approval decisions of the lenders, within the microcredit sector. However, unlike most of the relationship studies, we are unable to examine the impact of relationships on interest rates or collateral requirements since the major microfinance institutions in Bangladesh charge the same annual interest rate to all borrowers and they do not require any collateral.¹⁹ Accordingly, we investigate the role of bank-borrower relationships only on the probability of applying, and being approved, for microcredit.

2.3. Hypotheses development

2.3.1. Role of relationships in the loan application stage

Regarding the role of relationships in the loan application stage of microcredit, anecdotal evidence suggests that a prevailing bank-borrower relationship is likely to encourage potential borrowers to apply for micro loans. Based on a population survey of over 24,000 households, Evans, Adams, Mohammed and Norris (1999) provide evidence that only one-third of the eligible households in rural Bangladesh apply for a micro loan. Hashemi (1997), on the other hand, suggests that over half of such eligible non-participants do not apply for a loan because they feel that they would not be able to generate adequate profit to repay their loans. However, as potential borrowers become members of an MFI, they

¹⁸ Chakravarty and Yilmazer (2009) find that the effect of relationships in determining the loan rates depends on exogenous factors such as the prevailing economic climate.

¹⁹ Grameen Bank, for example, charges an annual flat rate of 10 percent on all income generating loans, while ASA charges 12.5 percent on all basic loans. Other lending organizations have their own flat rates. The use of the term "flat" rate can be clarified with an example. Suppose someone borrows \$1,000 from Grameen Bank. Within one year (50 weeks), she must repay \$1,100 in total. This \$1,100 is divided into 50 installments, \$22 each, and the borrower pays \$22 every week for the next 50 weeks.

attend weekly meetings, participate in skill-development training programs and discuss possible investment alternatives with the loan officers. Besides, prior receiving any loans, borrowers from most of the MFIs in Bangladesh open a mandatory savings account and begin to deposit money in that account on a weekly basis. All of these activities serve to reduce the extent of borrower discouragement in applying for a loan. Accordingly, we hypothesize that the probability of applying for microcredit increases as the length of membership increases. It should be mentioned here that, in addition to mandatory savings, MFIs offer other non-mandatory savings schemes to their clients. Individuals who have maintained such non-mandatory savings accounts with an MFI or those who previously received loans from an MFI are likely to feel more confident about repaying loans in a timely manner. Accordingly, they are more likely to apply for a new loan compared to those who do not have a non-mandatory savings account or those who have not borrowed before.

2.3.2. Role of relationships in the loan approval stage

Clients of microcredit tend to be informationally opaque as they cannot provide any financial statements to the MFI while applying for a loan. They can neither offer credit scores nor provide similar certification measures to the MFIs to prove their eligibility. Furthermore, micro loans are not backed by collateral. As a result, MFI loan officers cannot rely on the commonly used transactions-based lending technologies prevalent in traditional commercial banking in more developed economies.²⁰ In the absence of transactions - based lending technologies, the group lenders offer joint liability contracts as a substitute for collateral. Theoretically, this joint liability contract should take care of the screening, monitoring and enforcement problems. Accordingly, there should be no need for the lenders to rely upon costly relationship measures in approving group loans.²¹ However, in direct conversations, MFI loan officers have argued that in addition to joint liability and peer monitoring, they also rely on soft relationship driven information in the loan granting process. Thus, we do not have a clear a priori expectation regarding the role of relationship on group loan approval decisions. If joint liability and peer monitoring can resolve the screening, monitoring and enforcement problems in micro-lending, we should expect to

²⁰ Berger and Udell (2002) categorize four types of lending technologies in small business financing in developed countries—financial statement lending, asset-based lending, credit scoring, and relationship lending. The first three categories are often referred to as transactions-based lending, under which the lending decisions are based on ‘hard information’.

²¹ Relationship lending is costly from the MFI’s point of view because loan officers spend time and exert effort to develop relationships. On the other hand, if banks rely on joint liability and peer monitoring, the costs of screening and monitoring are transferred on to the borrowers.

not find any significant role of the relationship variables in group loan approval decisions. If, on the other hand, group lenders do happen to rely on soft relationship-driven information, we should expect to find a significant impact of these variables. Accordingly, we develop four testable hypotheses regarding the role of bank-borrower relationship in the loan approval stage, and empirically test their validity with data collected from the field in Bangladesh.

In particular, we hypothesize that the likelihood of being approved for a micro loan increases as the length of membership with the MFI increases. The intuition is straight forward. As the relationship continues, MFI loan officers gather more confidence about the creditworthiness of a potential borrower. Loan officers also acquire valuable information about financial strength of their clients through observing the cash flow in non-mandatory savings accounts. However, lenders acquire information about a potential borrower perhaps most efficiently through observing her past repayment behavior. Thus, we hypothesize that individuals who have a track record of previous loans, or non-mandatory savings accounts, are more likely to be approved for a micro loan compared to those who have not borrowed before or those who do not have such a savings account.

2.3.3. Impact of relationship with multiple lenders

In the present study, we also examine the role of borrowers' relationships with multiple lenders. Extant evidence suggests that multiple relationships reduce the incentive to repay a micro loan. When a micro borrower defaults on a loan obligation, she is denied access to future credit from the same MFI. If this borrower has access to credit from more than one source, the threat of denial for a future loan becomes less restrictive. For this reason, MFI loan officers do not want to extend loans to those who belong to more than one organization at a time (Meyer, 2002). Wright (2000), however, suggests that although it is against the rules, borrowers often develop multiple relationships, especially in areas where many MFIs are operating contemporaneously. Since credit ceilings are low in microcredit programs, enterprising borrowers may be tempted to apply for loans from several MFIs simultaneously in order to obtain the total amount desired. Thus, we hypothesize that in the application stage of microloans, borrowers with multiple relationships are more likely to apply for a new loan with a particular MFI. On the other hand, we expect that borrowers associated with multiple MFIs are less likely to be approved for such loans.

3. Data and Variables

3.1. The Data

In this section, we describe the data used in the study. Next, we formalize the operational definitions of the relevant variables. In order to collect data for this study, we conducted a household survey in 34 villages of Bangladesh over the summer of 2009. We used a multi-stage sampling method to select the specific villages to survey. In the first stage, the following six districts were chosen randomly²² from the six administrative divisions of the country in order to collect data from a representative sample: Mymensingh, Rajshahi, Meherpur, Barisal, Maulavibazar and Chittagong.²³ In the second stage, two counties were selected from each of the six districts as follows. First, all of the counties in each district were ranked based on population density, but only after excluding counties that are part of district headquarters in order to avoid urban population.²⁴ Next, one county was randomly selected from those that had more than the median population density, and one was randomly selected from those that had less than the median population density. In the third stage, one union was randomly selected from each of the 12 counties but only after excluding unions that are part of county headquarters. In the fourth stage, three villages were randomly selected from each of the 12 unions. The only exception was Meherpur district, where 2 villages were randomly selected from each county.

Data was collected by a team of thirty four field investigators who also happened to reside in the six survey districts. In each survey village, a central point was selected by the surveyors (the following were typically used as centers: school/college, mosque, and bridge/culvert). Starting from this center, surveyors walked in a random direction, knocked on every fifth house and invited the household head or his/her spouse to participate in the survey. Thirty two respondents were interviewed from each village. Thus, a total 1,088 respondents were interviewed of which 1,076 responses were complete and used for the current analysis. Individual and household level information was collected from each respondent. At the individual level, information was collected on program participation (whether or not the respondent is

²² We have used a simple lottery to randomize our choices in every stage of the sampling.

²³ At the time of data collection, Bangladesh was divided into six administrative divisions. The six divisions were divided into 64 districts, 491 counties or sub-districts, and 4,498 unions—a union being the lowest administrative unit in the rural areas, consisting of a group of villages. However, in early 2010, the old Rajshahi division was divided into two divisions: Rangpur and Rajshahi. Accordingly, there are now seven administrative divisions in Bangladesh.

²⁴ The theoretical models on group lending described above are based on a crucial assumption that the group borrowers have the necessary information on each other, which they exploit in forming groups and obtaining loans. This assumption, although appropriate in the rural areas of Bangladesh, is often violated in the urban settings where people living in close proximity do not know each other well. Laffont and N'Guessan (2000) provide evidence that when group members do not know each other, the collateral effect of group lending does not work. Therefore, we felt that including urban settings in our survey design would introduce noise in the data without an obvious upside.

a member of an MFI), microcredit application and approval decisions within the past one year, and the price, and non-price, terms of the most recent microloan. In order to collect information on relationship variables, respondents were asked questions on the length of their membership with an MFI, the maintenance of non-mandatory savings accounts, and the existence of previous loans from the lender at the time of their application for the most recent loan. Questions were asked on multiple MFI memberships, and on other group members' relationships with the lender. Furthermore, data was collected on factors that, the extant studies²⁵ suggest, might affect the application and the approval decisions of microcredit. Such factors include demographic characteristics of the individuals, such as age and education; borrowing household's endowment of physical capital, such as ownership of land, and other tangible assets; borrowing household's endowment of human capital such as the average years of schooling of the household members; indebtedness of the household members; and their exposure to crises, such as flooding, river erosion, and disordering rain.²⁶

3.2. Defining credit constrained borrowers and relationship variables

Credit constrained borrowers are defined as those who had their request for credit rejected by financial institutions (Jappelli, 1990). Based on this idea, Cox and Jappelli (1993), and Chakravarty and Yilmazer (2009), among many others, define a credit constrained borrower as one who applied for a new loan in the past three years and whose application was denied, or sometimes denied sometimes approved. In the present context we define credit-constrained borrowers as those who applied for a micro loan in the previous year and whose applications were denied. For those who applied more than once for a micro loan in the previous year, credit constrained borrowers are those whose applications were denied at least once. We choose one year as the time horizon because most of the microloans (such as those extended by the Grameen Bank) are awarded on a one-year basis. In our sample, 372 respondents applied for a group loan of whom 27 applied more than once. Out of those who applied only once, 85 were denied and, out of those who applied more than once, 16 were denied for at least one loan application in the last one year. Thus, we have 101 constrained and 271 non-constrained borrowers in the sample.

Our choice of relationship variables is guided by the extant relationship literature appropriately modified to make them relevant to the microcredit sector. Thus, for example, the length of relationship (LENGTH) in our study is measured as the duration (in months) of membership with an MFI. In order to capture the breadth of relationship, we look at the different financial services provided by a typical MFI,

²⁵ See, for example, Zeller (1994), Zaman (1996), and Evans et al. (1999).

²⁶ The survey instrument is available upon request.

such as savings, credit, and insurance. While having a mandatory savings account is a pre-requisite for applying for microcredit in most cases, having a non-mandatory savings account is indeed a choice variable. Accordingly, we introduce (the maintenance of) a non-mandatory savings account (SAVINGS) as a relationship variable such that SAVINGS equals one if the respondent has maintained a non-mandatory savings account with the potential MFI, and zero otherwise. Lenders acquire information about a potential borrower through observing her past repayment behavior. Hence, we introduce a relationship variable, PRE_LOAN, such that it equals one if the respondent has a track record of previous loans with the MFI, and zero if she has no previous loans. Buying insurance, however, is not a pure choice variable. Insurance schemes are available only beyond a certain threshold level of loan. As a result, we choose to not include (the purchase of) insurance as a relationship variable. Finally, MULT_REL is introduced as a relationship variable in order to capture relationships with multiple MFIs such that it equals one if the individual has associations with more than one MFI, and zero otherwise.

3.3. Other factors affecting loan application and loan approval decisions

In the present study, we expect that the potential lenders' relationships with other group members may also affect the probability of applying, and being approved, for a group loan. In order to control for the effects of the relational values of other group members, the following variables are introduced: LENGTH_OTHER measures the average length of membership of the borrowing partners. SAV_ONE is a dummy variable that equals one if at least one (but not all) of the other group members, excluding the respondent, has maintained a non-mandatory savings account with the MFI and zero otherwise. SAV_ALL is a dummy variable that equals one if all other group members have maintained non-mandatory savings accounts with the same MFI and zero otherwise. PRE_LOAN_ONE is a dummy variable that equals one if at least one (but not all) of the group members, excluding the respondent, has track record of previous loans and zero otherwise. PRE_LOAN_ALL is a dummy variable that equals one if all other group members have taken loans from the MFI before and zero otherwise. Multiple relationship (MULT_REL_OTHER) is also introduced as a control variable such that it equals one if at least one member of the group maintains association with multiple lenders, and zero otherwise.

Zaman (1996), Hashemi (1997), and Evans et al. (1999) examine the role of individual and household level characteristics in explaining non-participation in microcredit programs in Bangladesh, while Zeller (1994) examines the impact of similar characteristics in explaining both borrower discouragement and credit rationing in the microcredit sector of Madagascar. Consistent with these studies, we include the following variables to control for the effects of individual and household-specific characteristics on the loan application and approval decisions. GENDER is a dummy variable that equals

one if the respondent is female, and zero otherwise. Based on information from 147 microcredit programs across the world, Armendariz de Aghion and Morduch (2005) provide evidence that individual lending programs serve a larger population of male clients, whereas group lenders prefer women as their clients. Following this evidence, we expect that women are more likely to apply, and be approved, for group loans. Following the empirical evidence from Zaman (1996), we also expect that the probability of applying and being approved for microcredit rises with age of the applicant and then declines beyond a certain age. That is, we expect a positive sign associated with AGE and a negative sign with AGESQUARED. Education (EDUC) is defined as the numbers of years of schooling. A better educated person is likely to be more skilled and enterprising, and is therefore likely to have a higher propensity of applying, and being approved, for a loan.

We further expect that household characteristics, such as the endowment of physical and human capital, dependency ratio (defined below), and the gender of household head would affect the application and approval decisions associated with microcredit. A household's endowment of physical capital is measured in terms of the market value of its assets (HH_ASS) divided by the number of household members. In our regressions, we use the natural logarithm of one plus the market value of household assets in order to deal with the skewness of the household assets and to include households without any tangible assets. Based on the evidence presented in Armendariz de Aghion and Morduch (2005) that group loans are not generally extended to wealthier borrowers, we expect a negative coefficient associated with $\ln(\text{HH_ASS})$ for group-based microcredit approval decisions. Endowment of human capital is measured as the average number of years of schooling by all household members (AVG_SCH). Consistent with the definition provided by the United Nations Population Fund (UNFPA), the dependency ratio (DEP_RATIO) of a household is measured as the ratio of the economically inactive (ages under 15 or above 64) household members to the economically active (ages between 15 and 64) household members. We expect that households with more dependents would have a higher demand for credit and, therefore, would be more likely to apply for a loan. However, these households are also less likely to be approved for a loan as it is possible that they will use their loans for consumption purposes rather than investing them in income generating activities. FEM_HED is a dummy variable that equals one if the household head is a female and zero otherwise. A comprehensive survey in 14 Bangladeshi villages conducted by BRAC and ICDDR, B, reveals a lack of participation by female headed households in microcredit programs due to the barriers to entry for the most vulnerable members of society (Zaman, 1996). Based on this finding, we expect a negative coefficient associated with FEM_HED.

Zeller (1994) shows evidence that household events such as exposure to natural disaster (DISASTER), bad harvest (BAD_HRV) and income shocks due to illness of an earning member

(SHOCK) affect loan application decisions as people demand for more credit in periods of crises. However, there is no evidence that lenders respond to such crises. Accordingly, we hypothesize that these household events increase the likelihood of applying for a micro loan, while leaving the likelihood of being approved for a loan unaffected. We define DISASTER as a dummy variable such that it equals one if the household experienced natural disasters such as flooding, river erosion or disordering rain in the last one year, and zero otherwise. We define BAD_HRV as a dummy variable such that it equals one if the household experienced bad harvest in the last one year, and zero otherwise. Finally, we define SHOCK as a dummy variable such that it equals one if the household experienced income shocks due to illness of an earning member in the last one year, and zero otherwise. In addition, we hypothesize that factors that affect the repayment ability of the borrower, such as outstanding debt (OUT_DEBT) is likely to affect loan application and approval decisions. Outstanding debt (OUT_DEBT) of a household is defined as a dummy variable such that it equals one if the household has any outstanding debt, and zero otherwise. While lenders are less likely to approve loans to applicants who already have outstanding debts, it's impact on the probability of applying for a loan is unclear. On the one hand, an individual with an outstanding loan may be reluctant to apply for a new loan to avoid increasing her debt burden. On the other hand, she may actually seek new credit in order to repay previous loans. Table I shows the formal definitions of the independent variables used in our study.

<Table I here>

Table II presents the summary statistics of the variables introduced above.²⁷ Twenty seven percent of the respondents in our sample have membership with at least one MFI. The average length of membership is around five months. Twenty four percent of the respondents have a non-mandatory savings account; 13 percent have a track record of previous loan; and 6 percent have relationships with multiple MFIs. It is further evident that 55 percent of the respondents are female; average age of the respondents is 38 years. On average, respondents have spent four years in school; the average number of years of schooling of the household members is also slightly more than 4 years. On average, the market value of assets that a household possess is 131,368 Taka (\$1,932). The average dependency ratio within a household is 44 percent; 22 percent of the households have an outstanding loan; and 8 percent of the households are headed by a female. Over the past year, 13 percent of the households appear to have experienced natural disasters or income shocks due to illness of an earning member while 8 percent of the households experienced a bad harvest.

²⁷ In Appendix I, we present a side by side comparison of our data set with the WB-BIDS (1998/99) data set wherever possible to provide comfort to the reader that our data set does not have any aberrant properties.

<Table II here>

3.4. Comparing across those who applied for and those who chose not to apply for microcredit

Table III presents summary statistics of the variables introduced above for those who applied for a microloan at least once, and those who chose not to apply, within the previous one year. It is evident that, on average, non-applicants have a smaller length of membership compared to those who have applied for a loan within the past one year (2.6 months as compared to 10.7 months for loan applicants). While only 13 percent of the non-applicants have maintained non-mandatory savings accounts, the corresponding figure is 45.6 for the loan applicants. More than 27 percent of the loan applicants have a track record of previous loans, while less than five percent of the non-applicants have such track records. Loan applicants are more likely to have multiple relationships than the non-applicants (12.7 percent versus 0.3 percent). Fifty two percent of the non-applicants in our sample are females. Females comprise 59.4 percent of those who applied for loans. Also, among the variables measuring household characteristics, there are significant differences across applicants and non-applicants. For example, non-applicant households possess more assets than the households applied for loans. This is due to the fact that the pool of non-applicants in our sample includes wealthier non-eligible respondents who do not need microcredit at all as they are ‘bankable’ in the traditional sense. Non-applicants are less likely to have an outstanding loan, and their households have lower dependency ratios.

<Table III here>

3.5. Comparing across credit constrained and non-constrained borrowers

Table IV compares across constrained and non-constrained micro borrowers. It is evident that, on average, non-constrained borrowers (whose loan applications were approved) display a longer length of membership. Furthermore, they are more likely to have non-mandatory savings accounts and previous loans with the MFI. Credit constrained borrowers, on the other hand, are more likely to have multiple relationships. The average length of membership of the fellow group members is higher for non-constrained borrowers (19 months versus 13 months). Among non-constrained borrowers, forty two percent of the groups have at least one member with non-mandatory savings accounts, while the corresponding number is only twenty six percent for the constrained borrowers. In eleven percent of the non-constrained groups, all members have non-mandatory savings accounts while in only one percent of the constrained groups do all members have such accounts. It is further evident that, on average, non-constrained group borrowers are wealthier, compared to the constrained borrowers.

<Table IV here>

Overall, there are significant differences in characteristics between those who applied for a micro loan and those who chose not to apply. Furthermore, among those who applied for microcredit, there are significant differences in characteristics between those who applied and got rejected, relative to those who applied and got approved, for a microloan.

4. The Estimation Model

In this section, we present a formal empirical model to examine the role of bank-borrower relationships in the overall micro lending process. We assume that the loan granting process is comprised of two-stages. First, in the loan application stage, a borrower faces two choices: she either applies for a loan or feels discouraged to do so. Second, in the loan approval stage, a lender either extends or denies the loan application. The loan application (y_1) and loan approval (y_2) decisions are functionally related to the relationship variables, and individual as well as household characteristics, as defined earlier.²⁸ In analyzing the determinants of credit rationing among borrowing groups in Madagascar, Zeller (1994) argues that negative household events such as exposure to natural disasters, bad harvests, or income shocks due to the illness of an earning member, increases the demand for loan, whereas there is no evidence that lenders respond to such credit demands. Accordingly, we hypothesize that there are at least three variables in our model (DISASTER, BAD_HRV, and SHOCK) that affect the loan application (y_1), but not the loan approval (y_2), decision.

We assume that there exist two latent variables y_{1i}^* and y_{2i}^* such that the borrower applies for a loan ($y_{1i} = 1$) only if $y_{1i}^* > 0$; and does not apply for a loan ($y_{1i} = 0$), otherwise. Similarly, the lender approves a loan application ($y_{2i} = 1$) only if $y_{2i}^* > 0$; otherwise the application is rejected ($y_{2i} = 0$). We assume that the following functional relationships hold:

$$y_{1i}^* = x_{1i}\beta_1 + \varepsilon_{1i} \tag{1}$$

²⁸ Most of the studies that examine the role of relationships in small business lending include firm-specific characteristics as control variables, such as profit margin, business assets, age of the firm, firm's ownership structure, the industry it belongs to, and so on. However, we are not aware of any study investigating the availability of microcredit, which introduces firm-specific characteristics as control variables. The reason lies in the underlying difficulties in measuring these variables in the context of microcredit. For example, it may be straightforward to measure the age of a small business such as a neighborhood shop. But it is not an easy task to measure the same for a farmer, a fisherman, or a potter, for example, who inherits his professional identity as well as some, or most, of the physical inputs used in his business which is typically passed down from father to son for generations. Regarding business assets, it is evident that most of the micro-enterprises are owned by the households, and not by individuals. Sometimes, property rights within households are not very well defined and, as a result, household assets (which we already include as a control variable) are highly correlated with business assets.

$$y_{2i}^* = x_{2i}\beta_2 + \varepsilon_{2i} \quad (2)$$

Here β_1 and β_2 are the vectors of unknown parameters; x_{1i} and x_{2i} are the vectors of exogenous variables and a constant term. $\varepsilon_{1i} \sim N(0,1)$ and $\varepsilon_{2i} \sim N(0,1)$ are the error terms.

In order to measure the probability of applying for a loan ($y_{1i} = 1$), we apply a probit model to equation (1). However, while measuring the probability of loan approval, we are left with a *self selected* sample: we do not observe the loan approval decision of the lender when the borrower is discouraged from applying for a loan. Since a borrower's application decision is influenced by the factors that are also correlated with the lender's loan approval decision (i.e., the correlation coefficient ρ between ε_1 and ε_2 might not be zero), an application of binary choice models, such as probit or logit, to measure the probability of loan approval will produce biased predictions. To see this, we write the population regression function (PRF) for equation (2) as follows:

$$E(y_{2i}^* | x_{2i}) = x_{2i}\beta_2 \quad (3)$$

The PRF for the subsample of non-discouraged borrowers ($y_{1i}^* > 0$) is

$$E(y_{2i}^* | x_{2i}, y_{1i}^* > 0) = x_{2i}\beta_2 + E(\varepsilon_{2i} | x_{2i}, y_{1i}^* > 0) \quad (4)$$

Assuming that ε_1 and ε_2 are bivariate standard normally distributed, we have

$$E(\varepsilon_{2i} | x_{2i}, y_{1i}^* > 0) = \rho\lambda_i, \quad (5)$$

with $\lambda_i = \frac{\varphi(-x_{1i})}{\Phi(x_{1i})}$, where φ and Φ are the standard normal pdf and cdf, respectively.

Thus, estimates of β_2 from a non-random sub-sample are biased if $\rho \neq 0$. Heckman (1976) has developed a two-step method for correcting for selectivity bias in a linear regression model with normally distributed error terms. In order to correct for sample selection bias within a probit model, however, Wyand and Bernard (1981) have developed a corrective method analogous to Heckman's method, while Venti and Wise (1982) have developed maximum likelihood estimators to correct for the selection bias. These methods have been applied as standard tools for empirical estimation where there are sample selection problems in binary response models (see, for example, Dubin and Rivers, 1989; Greene, 1998; and Montmarquette, Mahseredjian and Houle, 2001).

In order to estimate the loan approval decisions, conditional on the decision to apply for a loan, we maximize the following likelihood function assuming that ε_1 and ε_2 are bivariate standard normally distributed with correlation coefficient ρ and cdf Φ_2 :

$$\prod_{i=1}^{N_1} \Phi_2(x_{2i}\beta_2, x_{1i}\beta_1; \rho) \cdot \prod_{i=N_1+1}^N \Phi_2(-x_{2i}\beta_2, x_{1i}\beta_1; \rho) \cdot \prod_{i=N+1}^M \Phi(-x_{1i}\beta_1) \quad (6)$$

Here, 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. Unbiased parameter estimates are derived by maximizing equation (6) with respect to β_1 , β_2 and ρ .

5. Empirical Results

5.1. Role of relationship lending in the application and approval of microcredit

The results of our estimation are shown in Table V. The independent variables capturing bank-borrower relationships, and other individual as well as household characteristics, have been discussed in section 3. Coefficients of the probit model after controlling for selection bias are estimated by maximizing equation (6). The marginal effects of the independent variables are calculated while holding all other explanatory variables at their respective sample means. Panel A of Table V shows the determinants of loan application decisions, while Panel B shows the drivers of loan approval decisions by the MFI.

<Table V here>

It is evident from panel A of Table V that the decision to apply for micro loans is significantly affected by relationship variables. For example, potential borrowers who have taken loans before are 31.6 percentage points more likely to apply for loans compared to those who do not have any previous loans; and those who have maintained a non-mandatory savings account are 24.4 percentage points more likely to apply for a loan compared to those who do not have any such savings accounts. Borrowers with multiple relationships are 19 percentage points more likely to apply for loans. Table V shows further evidence that the probability of applying for a loan is affected by the MFIs' relationships with other group members. The likelihood of applying for a loan increases as the average length of membership of the fellow group members increases. If at least one (but not all) of the other group members has maintained a non-mandatory savings account, the probability of applying for a loan increases by 19 percentage points. If all of the members of a group have maintained non-mandatory savings accounts with the MFI, that particular group is 58 percentage points more likely to apply for a new loan compared to a group where none of the members has yet opened a non-mandatory savings account.

We mentioned earlier that we do not have a clear prior on the nature of the net effect of relationship measures on the group loan approval process. Panel B of Table V, however, shows that relationship variables significantly affect loan approval decisions. For example, as the length of membership increases by one month, the probability of being approved for a loan increases by 0.1 percentage points. Those who have track records of previous loans are 6.4 percentage points more likely to be approved for a loan compared to those who have not taken any loans from the MFI before. Furthermore, applicants with multiple relationships are 19.6 percentage points less likely to be approved

for a loan. If at least one (but not all) of the other group members has maintained a non-mandatory savings account, the probability of being approved for a loan increases by 4.5 percentage points.²⁹

At first blush, lenders' dependence on relationship metrics for group loans might be construed as a surprising finding. After all, the underpinnings of group lending rest on a crucial assumption that the villagers in developing countries are in a better position than banks to evaluate their neighbors' creditworthiness and risk attitudes. If loans are given in a group, rather than individually, and if borrowers are allowed to form their own groups, potential borrowers should choose creditworthy (and presumably safe) borrowers in order to reduce the expected cost of bailing out a defaulting partner in the future. Furthermore, once the loan is disbursed to a group, group members are likely to monitor each other and pressure those individuals who misuse their loans to act responsibly. As a result, group lending schemes should, at least in theory, mitigate problems associated with adverse selection and moral hazard. However, as touched upon earlier, the joint liability mechanism is a behavior inducing device that does not add to the lender's knowledge base on the borrowers and, hence, cannot be utilized in making better informed lending decisions. Moreover, there exist some factors that adversely influence the effectiveness of the joint liability mechanism, such as higher levels of relatedness among group members, or the presence of multiple lenders in the same geographic area (see, for example, Ahlin and Townsend, 2007, Wydick, 1999, and Wenner, 1995). Given such practical limitations of joint liability based lending, it is therefore not unlikely for the micro lenders to rely on alternative lending technologies that produces valuable information about potential borrowers. The present study suggests that relationship lending is that alternative. Thus, the findings here serve to complement the intuition provided in the theoretical literature in that, in addition to the joint liability contract, micro lenders in Bangladesh substantially rely on relationship driven information in approving loans.

5.2. Robustness checks of our main findings

Based on a household survey, Zaman (1994) provides evidence that almost 30 percent of the borrowers from BRAC in Bangladesh are non-eligible to receive any microcredit. Upon further examination, Zaman uncovers that a substantial portion of these non-eligible borrowers were indeed eligible when they received microloans for the first time. However, through their micro loans, these marginally "poor" borrowers increased their land holdings to the point where they now had more than the stipulated amount of land (i.e., they had transformed themselves to being marginally "rich"). The question

²⁹ Note that ρ , capturing the correlation between error terms in the loan application and loan approval stages of the model, is significantly different from zero and quite large implying a significant correlation between the error terms.

here is why do these ineligible borrowers continue to receive micro loans? One possible explanation is that such borrowers have maintained relationships with their MFIs for a longer time relative to the new members and that they have proven their creditworthiness through the successful repayment of previous loans. If that is the case, i.e., if the loans provided to these marginally rich borrowers are necessarily relationship driven, the presence of such borrowers in our data would overestimate the impact of relationships in the loan approval process. If that is not the case, however, their presence in the data is not likely to significantly impact our overall findings. To investigate this matter, and to explore the robustness of our findings reported above, we re-estimate our regression model with only the subsample of eligible borrowers.

After excluding the non-eligible household members from our data, we are left with 675 respondents, out of whom 222 applied for group loans. Panels A of Table VI shows the determinants of loan application decisions by the eligible respondents, while panel B shows the determinants of loan approval decisions by the MFIs for such borrowers. Table VI provides evidence that the loan application decisions by eligible respondents are significantly affected by SAVINGS, PRE_LOAN and MULT_REL. Having non-mandatory savings account, for example, increases the probability of applying for a loan by 34.8 percentage points. Eligible household members with a track record of previous loans and multiple relationships are, respectively, 36.1 percentage points and 30.6 percentage points more likely to apply for loans. Finally, the results reported in panel B suggest that group lenders rely on relationship measures while approving loan applications by eligible applicants. Specifically, as the duration of membership increases by a month, the probability of being approved for a loan increases by 0.2 percentage points. Potential eligible borrowers are 17.4 percentage points more likely to be approved for a loan if they have taken loans from the same MFI before; and 31 percentage points less likely if they have multiple relationships. In sum, we find evidence that our main results, that relationship measures play significant roles in the application, and approval of microloans, broadly holds true in the sub-sample of eligible borrowers as well. This implies that our main findings are not affected by the inclusion of non-eligible borrowers.³⁰

<Table VI here>

³⁰ From table VI, ρ is statistically insignificant. Consequently, the model provides no evidence of self selection problem in the subsample of eligible borrowers. However, one should be careful not to overly rely on this finding because multi-equation selection models are highly sensitive to specification error. Small changes in the selection model can substantially change outcome estimates (Briggs 2004). Accordingly, based on our theoretical arguments, we still rely on Heckman two stage model. As a robustness check, however, we also apply a simple probit model to the loan approval decision for eligible borrowers. Panel C of Table VI shows no material changes in our main findings when we estimate the loan approval decision with a simple probit model.

Related to the above discussion, and in the interest of thoroughness in our investigation, we perform a similar analysis as above with the subsample of non-eligible borrowers. While we do not formally present these results in the interest of brevity, we find evidence that relationship variables play much less of a role in explaining the application and approval decisions of microcredit in this subsample. Particularly, we find evidence that the MFIs' loan approval decisions are affected only by multiple relationships. No other relationship variables have any significant effect on the loan approval decisions. This confirms our suspicion that even though the non-eligible borrowers may have had longer relationships with the MFIs, their loans are not necessarily relationship driven as are the loans made to the eligible borrowers.

5.3. The microfinance institution's loan approval decisions: comparing large and small MFIs

As Berger and Udell (2002) argue in the context of small business lending in the United States, relationship lending requires an organizational structure that has comparative advantage in the production and utilization of soft information. Specifically, organizations that delegate more authority to the loan officers who deal directly with the customers are in a better position to make the most efficient use of soft relationship driven information. Furthermore, empirical studies by Cole et al. (2004), and Berger, Miller, Petersen, Rajan and Stein (2005) have shown that it is the small banks in the U.S. that have an organizational structure that is favorable to relationship lending. As a result, small banks extend more relationship driven loans relative to the large banks. These studies have further shown that a bank's organizational structure motivates a borrower's decision to apply for credit at a large vs. a small bank. Knowing that the large banks rely more on hard information while the small banks have an advantage in making loans based on soft information, borrowers self select banks based on their relative strengths. Thus, borrowers with strong relationship features feel more comfort to apply to a small bank while borrowers with strong hard financial credentials might choose a large bank.

In the microcredit sector of Bangladesh, however, the situation appears opposite to the intuition presented above. Namely, it is the loan officers from the large MFIs who enjoy more autonomy. For example, the Grameen Bank's Generalized System (GGS), introduced in 2000, gives the Grameen Bank loan staff, who deal directly with the clients, the authority to approve/deny loan applications. Furthermore, under the GGS, loan staff enjoy the authority to design their loan product to ensure best fit for their clients in terms of duration, timing of the loan, scheduling the installment payments, etc.³¹ By contrast, the loan staff in the small MFIs do not appear to enjoy such flexibilities as they have to strictly

³¹ http://www.grameen-info.org/index.php?option=com_content&task=view&id=30&Itemid=99999999&limit=1&limitstart=0.

adhere to the guidelines laid out by the MFI. Thus, large MFIs appear to be engaged in relationship lending more than the small MFIs. However, we are unaware of any prior studies, theoretical or empirical, that can guide us in explaining a potential borrower's decision to apply for loan to a large vs. a small MFI. But, consistent with the above mentioned studies, we expect that borrowers with stronger relationships are more likely to apply for a loan to a large MFI, assuming that the borrowers know about the large MFI's comparative advantage in making relationship driven loans.

The goal of this section is to formally establish what appears evident from stylized facts presented above: (a) potential borrowers with strong relationship features are more likely to apply for a loan to a large MFI; and (b) large MFIs rely more on relationship lending while small MFIs rely more on hard information and less so on soft information. For this to be true we expect that in the regression of loan application-approval decisions, the relationship variables in the sub-sample of large MFIs, will play a more significant role relative to those associated with small MFIs. By contrast, in the sub-sample of small MFIs, individual and household level characteristics should play a more significant role. We estimate the MFI's loan approval decision, given that the individual has applied for loan to a large versus a small MFI, using the Heckman two stage method described earlier. Formally, we define large MFIs as those with more than one hundred thousand active members. We choose this cutoff value based on the definition of large MFIs provided by the Bangladesh Microcredit Regulatory Authority (2008).³²

Panels A and B of Table VII show the determinants of loan application decisions to a large versus a small MFI. Panels C and D, on the other hand, show the determinants of loan approval decisions by a large versus a small MFI. Out of 372 loan applications, 271 were forwarded to a large MFI and 95 were forwarded to small MFIs. The results do not show any clear evidence of whether relationship variables play a more important role in the group loan application decision to a large MFI as opposed to a small MFI. For example, the decision to apply for a loan to a large MFI is significantly affected by SAVINGS and PRE_LOAN; whereas, the decision to apply for a loan to a small MFI is affected by LENGTH and SAVINGS. However, there is very strong evidence that it is the large MFIs, and not the small ones, that rely substantially on relationship measures in approving loans. For example, those who have maintained membership for a long time, and those who have a track record of previous loans, are more likely to be approved for a loan by a large MFI. Furthermore, association with multiple MFIs significantly reduces the

³² Bangladesh Microcredit Regulatory Authority (2008) categorizes the MFIs into five groups based on borrower outreach: (a) very large MFIs with more than one million active members, (b) large MFIs with more than hundred thousand but less than a million active borrowers, (c) medium MFIs with more than fifty thousand but less than hundred thousand members, (d) small MFIs with more than ten thousand but less than fifty thousand members, and (e) very small MFIs with less than ten thousand active members. There are only two MFIs that fall into the category of very large. There are fifteen large NGO-MFIs in Bangladesh including the Grameen Bank.

likelihood of being approved for a loan from a large MFI. Small MFIs do not rely on any of these relationship variables in approving loans; rather, they rely on hard information such as gender of the household head and outstanding debt of the applicant's household.

<Table VII here>

In sum, our empirical findings suggest that the large MFIs rely more on relationship lending. Ideally, based on intuition honed on lending practices of mature loan markets like those in the United States and Western Europe, large financial institutions with multiple managerial layers are likely to avoid relationship lending as their organizational complexity makes it costly and relatively inefficient to transfer soft locally generated information to the decision makers in central urban locations far removed from where the potential customers might be located. The large MFIs in Bangladesh also have more managerial layers compared to their small counterparts;³³ and, in this sense, our findings might seem counterintuitive at first blush. However, a closer examination of the roles that different managerial layers play within the large MFIs reveals that the upper management of larger MFIs does not typically interfere in the loan granting process. The upper management of Grameen Bank (the Head office and zonal offices), for example, is responsible for monitoring, supervising and evaluating the social development programs of the bank. The loan granting and designing authority are delegated to the loan officers. In contrast, the loan staff in the small MFIs do not have such flexibilities in terms of product design or client screening. Although these institutions have fewer managerial layers, the decision-making is highly centralized and the loan staff have no authority to go beyond the rules set by a specific institution. Thus, our finding, that large MFIs rely more on relationship values, is not surprising within the context of micro lending in Bangladesh.

6. Concluding Discussion

We examine the role of bank-borrower relationships in the application, and approval of group-based microloans. Understanding the role of relationship lending in the microcredit sector is important. To date, there is an estimated 2,153 microfinance institutions in the world and an estimated 90 million people have received a microloan. That number is expected to increase to 175 million people by the year 2015.³⁴ A major challenge for microcredit programs around the world is to become financially self-sustaining (Bernanke, 2007). In order to accomplish that goal, microfinance institutions must pay

³³ The Grameen Bank, for example, has at least four steps of managerial hierarchy. A branch office is the lowest administrative unit; about 10-15 branch offices are supervised by an area office. The area managers are accountable to the zone offices located in district headquarters. The head office located in the capital of Bangladesh, Dhaka, is at the top of this management pyramid.

³⁴ See Microcredit Summit Campaign at <http://www.microcreditsummit.org/>.

attention to increasing the income generated through these kinds of loan programs by improving loan efficiencies through, among other things, reducing default rates. In reality, the probability that a micro borrower will default on her loan obligations depends on several factors that cannot be readily observed by the lender at the time of loan disbursement. Such factors include, among many others, the borrower's inherent attitudes towards risk, her entrepreneurial ability, and the way she feels about not repaying loans in a society where there is a possibility of being publicly embarrassed for defaulting. In a world of imperfect information, pre-existing, as well as ongoing, relationships can provide the lender with these valuable information. Such information could be effectively used by the lenders to modify the terms of any future loans such that the likelihood of being rejected for a loan by an otherwise creditworthy borrower is reduced on the one hand, and the rate of loan repayment is increased, on the other. Given the important role that relationships could play in the microcredit sector, it is thus, critical that the development finance community increases its understanding of this very powerful tool in the microcredit field for a more successful expansion of such programs – not only in places like Bangladesh but also in other emerging economies around the world. Our study takes a modest step in that regard in addressing the paucity of research examining the role of relationships in the microcredit sector.

In order to do so, we organized and performed a field level investigation and collected primary data from 34 randomly selected villages in Bangladesh. Our analysis yields significant evidence that bank-borrower relationships have a significant impact on the probability of applying, and being approved, for microcredit. Specifically, potential borrowers with long term memberships with a specific MFI, having non-mandatory savings accounts and with track records of previous loans, are more likely to apply and be approved for group-based microcredit. Association with multiple lenders increases the probability of applying but reduces the probability of being approved for a loan. Group-lenders' dependence on relationship factors in screening clients suggests that our theoretical models that assume that joint liability and peer monitoring features are able to resolve the information asymmetry problem may need to be appropriately amended to include the effects of relationships. Finally, unlike the emergent intuition from empirical studies involving small business lending within the United States, it appears that it is the large microfinance institutions that rely more on relationship lending. Nevertheless, our findings should serve to provide guidance to regulators, practitioners and researchers in designing optimal microloan contracts in various underdeveloped and emerging economies around the world.

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Table I: Operational Definitions of the Independent Variables

Variable Names	Definitions
Relationship variables	
LENGTH	The duration of membership (in months)
SAVINGS	= 1 if maintained a non-mandatory savings account; = 0 otherwise
PRE_LOAN	= 1 if respondent has track record of previous loans successfully; = 0 if do not have any previous loan
MULT_REL	= 1 if maintained relationship with multiple lenders; = 0 otherwise
LENGTH_OTHER	Average length of membership of the borrowing partners
SAV_ONE	= 1 if at least one (but not all) of the other group members, excluding the respondent, has maintained a non-mandatory savings account; = 0 otherwise
SAV_ALL	= 1 if all other group members have maintained non-mandatory savings accounts; = 0 otherwise
PRE_LOAN_ONE	= 1 if at least one (but not all) of the group members, excluding the applicant, has taken loans before; = 0 otherwise
PRE_LOAN_ALL	=1 if all other group members have taken loans before ; = 0 otherwise
MULT_REL_OTHER	= 1 if at least one group member, other than the respondent, has relationship with more than one lender; = 0 otherwise
Individual characteristics	
GENDER	= 1 if the respondent is female; = 0 otherwise
AGE	Age of the respondent
AGESQUARED	Square of age
EDUC	Years of schooling
Household characteristics	
HH_ASS	Market value of household assets divided by the number of household members
DEP_RATIO	Ratio of economically inactive (age under 15 or above 64) household members to economically active (age between 15 and 64) household members
OUT_DEBT	=1 if the household has any outstanding debt; = 0 otherwise
AVG_SCH	Average number of years of schooling by the household members
FEM_HED	= 1if the household head is a female; = 0 otherwise
DISASTER	= 1 if the household experienced natural disasters such as flooding, river erosion or disordering rain in last 12 months; = 0 otherwise
BAD_HARV	= 1 if the household experienced bad harvesting in last 12 months; = 0 otherwise
SHOCK	= 1 if the household experienced income shocks due to illness of an earning member; = 0 otherwise.

Table II: Summary Statistics of the Variables

Variable Names	Mean	Std Dev
Relationship Variables		
Member of MFI	27.16	44.5
LENGTH	5.42	16.91
SAVINGS	0.24	0.42
PRE_LOAN	0.13	0.43
MULT_REL	0.06	0.24
LENGTH_OTHER	8.69	22.47
SAV_ONE	0.21	0.41
SAV_ALL	0.03	0.17
PRE_LOAN_ONE	0.11	0.31
PRE_LOAN_ALL	0.02	0.15
MULT_REL_OTHER	0.11	0.32
Individual Characteristics		
GENDER	0.55	0.49
AGE	38.54	12.57
EDUC	4.37	4.21
Household Characteristics		
HH_ASS	131,368	298,125
DEP_RATIO	0.44	0.89
OUT_DEBT	0.22	0.42
AVG_SCH	4.32	1.88
FEM_HED	0.08	0.28
DISASTER	0.13	0.33
BAD_HARV	0.08	0.28
SHOCK	0.13	0.33

Table III: Univariate Statistics for Applicants and Non-applicants for Microcredit

Variable Names	Non-applicants (n= 704)		Applied for Group-based Loan (n=372)	
	Mean	Std Dev	Mean	Std Dev
Relationship Variables				
LENGTH	2.63	9.22	10.715	24.978
SAVINGS	0.131	0.337	0.456	0.498
PRE_LOAN	0.048	0.214	0.276	0.448
MULT_REL	0.028	0.163	0.127	0.334
LENGTH_OTHER	3.674	13.68	18.164	31.143
SAV_ONE	0.121	0.326	0.381	0.486
SAV_ALL	0.004	0.065	0.077	0.268
PRE_LOAN_ONE	0.074	0.262	0.174	0.379
PRE_LOAN_ALL	0.019	0.139	0.029	0.169
MULT_REL_OTHER	0.056	0.231	0.223	0.416
Individual Characteristics				
GENDER	0.525	0.49	0.594	0.491
AGE	39.31	13.42	37.159	10.695
EDUC	4.58	4.29	3.983	4.04
Household Characteristics				
HH_ASS	136,022	324,913	123,1844	239,574
DEP_RATIO	0.41	0.47	0.512	1.378
OUT_DEBT	0.19	0.39	0.277	0.448
AVG_SCH	4.4	1.9	4.197	1.866
FEM_HED	0.09	0.29	0.072	0.259
DISASTER	0.118	0.323	0.145	0.352
BAD_HARV	0.078	0.299	0.077	0.268
SHOCK	0.137	0.344	0.118	0.323

Table IV: Univariate Statistics for Credit Constrained and Non Credit Constrained Borrowers

Variable Names	Applied for Group Loan (n = 372)			
	Approved (n=275)		Denied (n=97)	
	Mean	std Dev	Mean	std Dev
Relationship variables				
LENGTH	11.62	25.55	8.12	22.61
SAVINGS	0.48	0.5	0.39	0.49
PRE_LOAN	0.33	0.47	0.11	0.32
MULT_REL	0.1	0.3	0.19	0.39
LENGTH_OTHER	19.58	31.21	13.04	27.58
SAV_ONE	0.42	0.49	0.26	0.44
SAV_ALL	0.11	0.31	0.01	0.1
PRE_LOAN_ONE	0.18	0.38	0.18	0.39
PRE_LOAN_ALL	0.03	0.18	0.03	0.16
MULT_REL_OTHER	0.22	0.42	0.23	0.42
Individual characteristics				
GENDER	0.6	0.48	0.57	0.49
AGE	36.89	10.76	37	11.13
EDUC	3.87	4.09	3.98	3.99
Household characteristics				
HH_ASS	123,923	206,649	114,976	265,103
DEP_RATIO	0.41	0.45	0.68	2.5
OUT_DEBT	0.27	0.44	0.28	0.453
AVG_SCH	4.18	1.97	4.3	1.81
FEM_HED	0.06	0.24	0.09	0.28
DISASTER	0.12	0.32	0.17	0.38
BAD_HARV	0.07	0.26	0.11	0.32
SHOCK	0.11	0.32	0.11	0.32

Table V: Regression Results for Applying, and Being Approved for Microloans

The dependent variables in the regressions are the probability of applying and being approved for a micro loan. The variables are defined in Table I. Data are from the 2009 household survey conducted in Bangladesh by the researchers. Results are for 1076 respondents. 372 applied for a group loan, and 275 loan applications were approved by the lenders. “Coeff” represents the coefficient estimates and “ME” represents the marginal effects of the variables computed at their sample averages.

	<u>Panel A</u>		<u>Panel B</u>	
	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			

*** indicates that the coefficients are significant at 0.01 level. ** indicates that the coefficients are significant at 0.05 level. * indicates that the coefficients are significant at 0.1 level.

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

The dependent variables in the regressions are the probability of applying and being approved for a micro loan. The variables are defined in Table I. Data are from the 2009 household survey conducted in Bangladesh by the researchers. Results are for 675 eligible households. 222 applied for a group loan, and 158 were approved for it. “Coeff” represents the coefficient estimates and “ME” represents the marginal effects of the variables computed at their sample averages.

	<u>Panel A</u>		<u>Panel B</u>		<u>Panel C</u>	
	Applied for group loan		Approved for group loan		Approved for group loan	
			Heckman two stage model		Probit model	
	coeff	ME	coeff	ME	coeff	ME
Relationship Variables						
LENGTH	0.003	0.001	0.008***	0.002	0.009*	0.003
SAVINGS	0.973***	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

*** indicates that the coefficients are significant at 0.01 level. ** indicates that the coefficients are significant at 0.05 level. * indicates that the coefficients are significant at 0.1 level.

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

The dependent variables in the regressions are the probability of applying and being approved for a group micro loan by large and small MFIs. The variables are defined in Table I. Data are from the 2009 household survey conducted in Bangladesh by the researchers. Large MFIs are defined as institutions with more than a hundred thousand members. “Coeff” represents the coefficient estimates and “ME” represents the marginal effects of the variables computed at their sample averages.

	<u>Panel A</u>		<u>Panel B</u>		<u>Panel C</u>		<u>Panel D</u>	
	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 by 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	0.595	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
AGESOUARED	-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	

*** indicates that the coefficients are significant at 0.01 level. ** indicates that the coefficients are significant at 0.05 level. * indicates that the coefficients are significant at 0.1 level.

Appendix I

In 1991/92 the Bangladesh Institute of Development Studies (BIDS) and the World Bank jointly carried out a survey. The objective of the survey was to provide data for impact evaluation analysis of three major credit programs in Bangladesh: Grameen Bank, BRAC, and the Rural Development-12 program of the Bangladesh Rural Development Board. In 1998/99, a second round of the survey was conducted. Here we provide a side-by-side comparison of our field data with the WB-BIDS (1998/99) for overlapping variables.

	Data used in the present study	WB-BIDS data
Number of villages covered	34	87
Number of households interviewed	1,076	1,738
Number of respondents interviewed	1,076	3,135
Average age of the household members	24.6	22.2
Average years of schooling of the household members	4.37	3.8
Male-female ratio in the pool of respondents	112.7	108.3
Fraction of households joined microcredit program**	27 percent	52.7 percent
Fraction of Households that are non-eligible	37.2 percent	36.2 percent
Dropout rate (proportion of past members that are no longer members of any MFI)	5.1 percent	3.5 percent
Average amount of loan received	10,398 Taka	6,268 Taka
Ownership of arable land under cultivation	77.5 decimal (at the household level)	32.7 decimal (at the individual level)
Market value of landed property	563,659 Taka (at the household level; measured in year 2009)	165,140 Taka (at the individual level; measured in year 1998/99)

** According to a World Bank survey in 2005, 37 percent of all households in Bangladesh have received microcredit.