Microfinance and Moneylender Interest Rate: Evidence from Bangladesh

Mallick, Debdulal

Deakin University

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Debdulal Mallick*
Deakin University and BRAC

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Abstract

The linkage between the formal and informal credit markets has long been of great interest to development economists. This paper addresses one important aspect of the linkage by empirically investigating the impact of the microfinance program expansion on the moneylender interest rates in Bangladesh, and finds that moneylender interest rates increase with microfinance program expansion. MFI program expansion increases moneylender interest rates in the villages in which more loans are invested in productive economic activities than consumption. Borrowers resort to moneylenders for additional funds because of inadequate supply, unavailability of seasonal working capital from MFIs, and tight repayment schedule, which in turn increases demand for moneylender loans.

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1 Introduction

Bangladesh has the largest operation of the microfinance[1] program in the world with about 12.4 million active borrowers and over 629 microfinance institutions (MFIs) engaged in microfinance (World Bank 2003, p. 21). One of the arguments given for expanding the microfinance industry is to substitute for informal credit market[2] and help poor people escape the clutches of 'evil moneylenders' who allegedly charge usurious rates of interest (Meyer, 2002). This is a decade old problem for the policymakers in the developing countries. As early as in the 1950s the Indian government tried to provide positive institutional alternatives to the moneylenders (Bell, 1990). The linkage between the formal and informal credit markets has also been of great interest to development economists. Morduch (1999, p. 1595) raises the question, "how will the existence of a subsidized program affect the profitability of both formal and informal institutions operating nearby?" This paper addresses one important aspect of the linkage by empirically investigating the impact of the microfinance program expansion on the moneylender interest rates in Bangladesh.

Recent theoretical development points out that the response of the interest rates in the informal sector to the expansion of the formal credit depends on the characteristics of both sectors such as market structure in the informal sector as well as repayment schedule of the formal sector. Hoff and Stiglitz (1993, 47-48; 1998) outline conditions under which increasing access to formal credit may increase or decrease interest rates in the informal sector. If some borrowers can satisfy all their borrowing needs from the formal sector at lower interest rates, there will be less demand for informal credit. Under perfect competition and perfect information, this would exert downward pressure on interest

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[1] In this paper no distinction is made between "microfinance" and "microcredit" as microfinance operation is defined to include lending activities only.

[2] Informal sector includes friends, relatives, neighbors, moneylenders, employers, input suppliers, and shopkeepers. Microfinance institutions (MFIs), government institutions, commercial banks, cooperatives, and other NGOs are defined as the formal sector (McKernan, Pitt and Moskowitz, 2005).

rates. But in a monopolistically competitive market[3] with free entry and one moneylender being an imperfect substitute for another, a subsidy in the formal sector may cause the interest rates in the informal sector to rise because the induced new entry drives up the marginal enforcement cost of lending in the informal sector (Hoff and Stiglitz, 1998). Bose (1998) extends Hoff and Stiglitz (1998) by including heterogeneous agents who differ in their probability of default. The subsidized programs diminish optimal scale and siphon off the best borrowers. As a result, the informal lenders are left with a riskier pool of borrowers that leads to higher enforcement costs, and consequently they charge higher interest rates as risk premium. Jain (1999) reaches similar conclusion by considering a case in which scale advantages of the formal sector outweigh the informational advantages of local moneylenders, while Floro and Ray (1997) consider the case in which an expansion of formal credit may strengthen the ability of informal lenders to collude among themselves.

Jain and Mansuri (2003) follow an entirely different route that resembles the present scenario in Bangladesh that a microfinance program may well have a "crowding-in" effect on informal lenders. Under some circumstances this "crowding-in" effect might be strong enough to raise the interest rates in the informal sector. For example, the tight repayment schedule of MFIs (in Bangladesh the first weekly installment of MFI loans is due immediately) forces many borrowers to borrow from moneylenders to repay MFI loans. Borrowers also find difficult to finance long-gestation projects and even seasonal working capital needs for agricultural production by MFIs loans.

Although there are numerous theoretical models that explain the interest rates in the informal sector as a result of MFI program expansion, empirical evidence is scant. To the best of our knowledge, this is the first paper that investigates this linkage in the

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[3] There is evidence that rural informal credit markets are not perfectly competitive. One celebrated study is by Aleem (1990) who studied services, costs, and charges of 14 informal market moneylenders and their clients in Chambar, Pakistan. His estimated the resource costs incurred by informal lenders for screening, pursuing delinquent loans, overhead, and cost of capital and found that lenders charge interest rates that are equal to their average cost of lending but exceed their marginal cost. His finding suggests that the informal credit market is characterized by monopolistic competition in the presence of imperfect information. Iqbal (1988) found evidence of the reduction of moneylender monopoly power in rural India as a result of increased competition from formal lending agencies. Kochar (1997, p. 366) obtained a negative but insignificant (statistically) coefficient of per capita formal credit on the probability of borrowing from informal sector, and concluded that a more thorough analysis of the relationship between formal and informal credit is warranted.

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context of Bangladesh. This paper analyzes village level survey data from 156 villages in three districts in northern Bangladesh, and finds that moneylender interest rates increase with MFI program expansion. The interest rates are found to be higher in the villages where higher percentage of households borrows from MFIs after controlling uses of MFI and moneylender loans, adoption of modern agricultural production technology, quality of cultivable land, village level physical infrastructure, incidence of poverty, and a proxy for competition among moneylenders.

We find that use of moneylender loan in productive purposes than consumption lowers interest rates. But MFI program expansion increases moneylender interest rates in the villages in which more loans are invested in productive activities. Productive use of loan lowers the default risk. On the other hand, since MFIs do not supply adequate amount for productive investment or for seasonal working capital, and repayment is required immediately after borrowing, borrowers resort to moneylenders for additional funds to sustain their projects. The increased demand raises moneylender interest rates. Although it is not our purpose to test competing theories, our empirical results favor Jain and Mansuri (2003) hypothesis. We cannot directly test the hypothesis because there is no variation in the repayment schedule of MFI loans; for all MFIs in Bangladesh maturity of loan is usually one year and borrowers are required to begin repayment immediately after loan is disbursed (usually after one or two weeks). It is also found that competition among moneylenders lowers interest rates. Interest rates are also higher in the villages located away from place of commercial activities. Results are robust to correction for endogeneity.

The results have important policy implications. MFIs can enhance productive investment by borrowers by allowing more flexibility in loan disbursement and repayment schedule. Borrower projects will also be more profitable if MFIs expand their program of loan-only to loan-plus such as credit with skill development training, information and provision of inputs. On the other hand, competition between formal and informal lenders will increase borrowers' access to fund at competitive interest rates.

The rest of the paper is organized as follows. Section 2 provides a brief literature review of the formal-informal linkages in the rural credit market in Bangladesh. Section 3 discusses in detail the data collection methodology. Results are presented in section 4 that

include descriptive statistics, OLS and 3SLS estimation results. Finally, section 5 concludes.

2 Formal-informal linkages in credit market in rural Bangladesh

Very little is known about the response of the informal lenders to the MFI program expansion. However, there is widespread evidence that MFI clients borrow from informal sources as part of their financial management strategy. Sinha and Matin (1998) report that about 87% of rural households in the northern Bangladesh borrow from informal sources and the percentage is higher among the MFI borrowers. Husain et al. (1998) find that 11.6% of borrowers from BRAC also borrowed from moneylenders. Zeller et al. (2001) report similar practices among the rural households in Bangladesh they surveyed in 1994. MFI borrowers received 20% of their total debt outstanding from friends and relatives and another 18% from shopkeepers and other informal sources.

McKernan, Pitt and Moskowitz (2005) document that during the 1998/99 time period, the informal sector was at least as important as the formal sector in Bangladesh. About 29% of the rural households received money (in the form of loan and gift) from the formal sector compared to 24% households receiving money from the informal sector. Average amount of money received from the informal sector was significantly larger than the average amount received from the formal sector. An average household received 2,125 Taka in formal loans, 1,440 Taka in informal loans, and 3,040 Taka in informal gifts. Only 6% of households received money from both sectors and 49% from either formal or informal sector. Roughly 2% of rural households received credit from moneylenders, accounting for 23% of all non-relative credit and 9% of the informal credit received.

Household consumption and payment of other loans are the two most frequently reported uses of the informal loans. Sinha and Matin (1998) point out that due to the large increase in MFI lending some internal cross-financing was taking place in which the proceeds from one loan were being used to repay another. Clients borrow from informal sources so they could maintain high repayment rates with MFIs and become eligible for larger future loans. Atique Rahman (1992) also provides evidence of similar practices. Aminur Rahman (1999) observes that MFI employees are expected to increase

disbursement of loans among their members and press for high recovery rates to earn profit necessary for economic viability of the institution. To ensure timely repayment in the loan, centers employees and borrowing peers inflict an intense pressure on women clients. Many borrowers maintain their regular repayment schedules through a process of loan recycling that considerably increases the debt-liability on the individual households, and increases tension and frustration among household members. Zeller et al. (2001) report that nine percent of the funds borrowed from informal sources were used to pay existing debt. Todd (1996) also describes the complex financial management practices of women members of the Grameen Bank. Clients borrow to pay moneylender and other informal loans, and borrow small sums informally to meet loan installments.

3. Data collection

Data were collected in 2002 from 156 villages in three districts in northern Bangladesh (Kurigram, Rangpur and Nilphamari) as part of the baseline survey for BRAC's CFPR/TUP (Challenging the Frontiers of Poverty Reduction– Targeting the Ultra Poor) program.[4] Before launching the CFPR/TUP program on a pilot basis BRAC first needed to select the villages and the extreme poor therein. In the first step of the selection, BRAC's Research and Evaluation Division (RED) conducted Participatory Rural Appraisal (PRA) in the villages randomly selected to determine the extent of poverty and also to identify the extreme poor in the selected villages.[5] Households initially selected by PRA were surveyed to cross-check the information gathered by PRA, and also to create a baseline for future program evaluation. Along with the baseline household survey, comprehensive village level information was collected by Focus Group Discussion (FGD)[6]. This paper uses village level survey data for all these villages. Note that the household survey was conducted only among the extreme poor selected by PRA and therefore does not represent the village population.

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[4] The CFPR/TUP program is designed to target only the extreme poor whose poverty lasts long or throughout their entire life, and who even lack the opportunities for upward mobility through regular microfinance programs (Matin and Halder, 2004, p. 5).

[5] For a detail description of this data collection method, see BRAC (2004).

[6] Stewart and Shamdasani (1990), and Litosseliti (2003) provide nice discussions on Focus Group Discussion.

There were several preparatory stages before the FGD. The first stage was to build rapport with the community members. This was not difficult because in most situations the community members were already familiar with BRAC programs and staff. BRAC's Program Organizers walk around the community inviting people of all walks of life to the PRA meeting. The PRA sessions and the next household surveys enabled the research team to build good rapport with the community and to have a good idea about who to invite for the FGD. These are the people who are the most knowledgeable about the village. Given the type of issues to be covered in the FGD, members of different socio-economic background, age and occupation were selected. The group of invitees generally included school teachers, elected Union Parishad (smallest local administrative unit) members, health workers, students and MFI clients. Local bazaar, school or the well traveled place in the village was selected as the venue for the FGD. The size of the group ranged between 8 and 10. The group seated on chairs around a table so that maximum opportunity for eye contact is possible with both the moderator and other group members. If chairs were not available for everyone, the group sat on the ground making a circle. The moderator, who was a researcher from RED and also well trained in qualitative research and data collection, was fully aware of the fact that MFI clients are poor women and being borrowers they are less powerful in the community. The moderator encouraged them to freely express their opinion by explicitly asking them and by providing verbal rewards for such opinions. This was necessary because their responses are crucial for some information. They borrow from different sources including MFIs and moneylenders and have also close contacts with other MFI clients, and therefore they are better informed about the rural credit market. However, their responses were also discussed by other participants in the group and enumerated only after verification.

A structured questionnaire was used to collect data because of the type of information sought and also for reliability and possibility of replication. At the beginning of the session, the moderator clearly specified the objective of the FGD and the type of information to be sought. It was also made clear at the outset that the FGD will continue for about two hours. However, in several occasions, all issues were not possible to cover in two hours so that discussions had to discontinue. Groups were not kept beyond schedule because it was perceived that impatience of the participants may lead to

inaccurate answers. Therefore, all information could not be collected from many villages; there are 89 villages for which data are available for all variables used in the regression.

It is important to mention that more than one FGD were conducted in large villages because participants residing in one part of the village may not have the most accurate information about those residing in another part.

4. Results

This section presents OLS and endogeneity corrected results of the determinants of the moneylender interest rates. But first we present some descriptive statistics of the villages.

4.1 Descriptive statistics

Table 1 presents some descriptive statistics of the villages considered in this study. In the sample villages, on average 3.9 MFIs have loan operation. The minimum and maximum numbers of MFIs working in a village are one and nine respectively. Average number of big MFIs[7] is 3.6 with the minimum and maximum numbers being one and eight respectively. This indicates competition among the MFIs for clients even among the big ones. On average 33% of all households borrow from any MFI with a standard deviation of 19. The correlation between number of MFIs and percentage of client households is very high at 0.88.

Insert Table 1 here

In 32.7% of the villages, higher percentages of clients utilize MFI loans for any productive investment[8] than consumption, and agriculture has been the predominant sector for investment. Conversely, in only 10% of the villages the primary use of

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[7] These are Grameen Bank, BRAC, ASA, Proshika, BRDB, Bangladesh Agricultural Bank, RDRS, and Thengamara. The last two are big regional MFIs working only in the northern Bangladesh.

[8] This includes any type of investment that generates future steam of income both in the short and long run such as crop production, small business, buying power tiller, bullock (for ploughing) or cow, giving bribe to manage job for family members and so on.

moneylender loans was any productive investment. Productive investment is the highest in nearly 60% of the villages for the commercial bank loans.

In about 27% of the villages, poverty situation improved and in 17% of the villages it remained the same in last five years. In about 35% of the villages the situation deteriorated severely. The number of casual daily laborer in the agricultural sector increased in 71% of the villages and it decreased in only about 15% of the villages. Increasing incidences of females going out of home for work were reported in 56.7% of the villages, while it decreased only in 2.7% of the villages. However, the reason cannot be verified from data; it may be due to greater women empowerment or increased poverty. Average daily male and female wage rates (wage rates are averaged over three cropping seasons) are Taka 44 and 30 respectively.

The moneylender interest rates vary considerably with a mean of 103.33% and standard deviation of 59.06. The minimum and maximum interest rates are 10% and 240% respectively. These are the averages of annual moneylender interest rates in a village.

4.2 Determinants of moneylender interest rates

OLS estimation:

In this section, we report results from multivariate regression analysis. The dependent variable is the average annual moneylender interest rates. There may be variations in the interest rates within a village that we cannot exploit. The estimation equation is

$$InterML_i = \alpha + \beta MFI\_Cover_i + \mathbf{\gamma Z_i} + \varepsilon_i \qquad \text{--- (1)}$$

where $InterML_i$ is the average moneylender interest rate in village i, MFI_Cover_i is percentage of households borrowing from MFIs in village i (MFI coverage),[9] $\mathbf{Z_i}$ is a vector of other control variables, and ε_i is *i.i.d.* error term.

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[9] Since both variables are in percentage, β is interpreted as percentage points change in moneylender interest rates for one percentage point increase in MFI client households.

As mentioned above, the correlation between percentage of households borrowing from MFIs and the number of MFIs lending in a village is 0.88, therefore to avoid multicolinearity the latter variable is not included in $\mathbf{Z_i}$. The interest rate on MFI loans is also excluded. The reason is that MFIs charge the same interest rate to all borrowers, and there is also little variation in the interest rates among the MFIs.

Average daily male and female wage rates are used as proxy for current poverty situation in the village. Change in the incidence of poverty in last five years is also alternatively used to check robustness. Ghatak (1983, p. 32) finds that interest rates on informal loans depend on the poverty level. Average rural interest rates for different classes such as casual laborers, tenants and agricultural laborers varied between 36-84% per year in a relatively more prosperous district like Burdwan in West Bengal in India, while it averaged between 72-120% in a relatively poor district like Nadia.

We include percentage of cultivable land that grows one, two, and three crops a year as proxies for soil quality, and percentage of land irrigated using electricity as a proxy for adoption of modern agricultural production technology. The latter variable reflects the opportunity for productive investment in agriculture. Main use of both MFI and moneylender loans (1 = investment, 0 = consumption), on the other hand, capture realization of any such opportunity. Iqbal (1988) finds in the context of India that moneylender interest rates are influenced by a host of borrower and environmental characteristics. Borrower's profit potential as measured by farm size, soil quality and even farmer's education are important consideration for moneylenders. Farmers residing in areas characterized by the use and/or provision of new technology face lower interest rates.

The other controls in $\mathbf{Z_i}$ are several measures of village level infrastructure that include distance of the center of the village from the nearest bank, bazaar, bus stop, all weather (*pucca*) road, percentage of households with electricity connection, and number of shops in the village. It is argued that MFI program placement is not random (de Aghion and Morduch, 2005, p. 223). Village level infrastructure and other controls previously mentioned are intended to account for this non-randomness. A complete list of variables is provided in Appendix.

We estimate equation (1) by OLS with different combinations of the variables in $\mathbf{Z_i}$. To account for the village level heterogeneity, we report the White (1980) heteroskedasticity corrected standard errors. Results are reported in Table 2. Column 2 reports the results for the simple regression when $\mathbf{Z_i}$ is excluded from equation (1). The coefficient of MFI coverage is 1.1 and significant at any conventional level implying that one percentage point increase in MFI borrowers in a village increases the average moneylender interest rates by 1.1 percentage points. This variable alone can explain 14% variation in the moneylender interest rates. In columns 3, use of moneylender and MFI loans are included. Column 4 includes incidence of poverty. The magnitude and significance of MFI coverage remains the same in all specifications. However, it decreases to 0.85 with 5% level of significance if changes in poverty in last five years instead of male and female wage rates are used (column 5). The coefficients of both moneylender and MFI loan use enter negatively but are not significant. We also find that moneylender interest rates are higher in the villages where higher percentage of land irrigated using electricity.

Insert Table 2 here

Competition among the moneylenders can also influence interest rates in both directions. If the informal credit market is characterized by perfect competition, competition among moneylenders drives down interest rates. On the other hand, loss of economies of scale can result in higher interest rates. We do not have direct measure for such competition. Moneylending activities in the rural areas, to a large extent, are controlled by large landowners (Bell, 1990, p. 306; Hoff and Stiglitz, 1998, p. 488). Information on the number of moneylenders or large landowners in a village is not available. In rural Bangladesh, land market has become more polarized than in the past as the number of landless or marginal landholders is increasing (Rahman, and Manprasert, 2006, p. 54). Taslim and Ahmed (1992, p. 617) in their study villages in Bangladesh found a positive association between percentage of large landowners and tenants who are usually landless or marginal landowners. Information about the number of households owning no more than 10 decimal of land was collected by PRA and the follow-up survey

to select the TUP participants. We exploit this information to calculate percentage of households owning no more than 10 decimal of land, which is used as a proxy for number of moneylenders. The idea is that there are more large landowners and thus more moneylenders in the villages in which higher percentages of households are landless and marginal landowners. Results after controlling for competition among moneylenders, reported in columns 4a-5a, confirm robustness of previous results. The coefficient of competition is negative but significance is not robust to alternative measures of poverty. It is also found that moneylender interest rates are higher in the village located away from bazaar, the place of commercial activities in the rural areas.

The results are also robust to different combinations of control variables in $\mathbf{Z_i}$. Results do not also change if distance of high school from the center of the village, which can be a proxy for the general education level in the village, is included. The coefficient of this variable is negative but not significant (not reported).

To comprehend why moneylender interest rates are higher in the villages with higher MFI coverage, we include interaction of MFI coverage with use of MFI and moneylender loans, and percentage of land irrigated using electricity.

$$
\begin{aligned}
InterML_i = \alpha &+ \beta_1 MFI\_Cover_i + \beta_2 MFI\_Cover_i * UseML_i \\
&+ \beta_3 MFI\_Cover_i * UseMFL_i + \beta_4 MFI\_Cover_i * ElectIri_i + \mathbf{\gamma Z_i} + \varepsilon_i
\end{aligned}
\qquad \text{--- (2)}
$$

Results are reported in Table 3. This equation is estimated alternatively using current and past poverty situations, and also with and without competition among moneylenders. The coefficient of MFI coverage ranges between 1.1 and 1.4 and robustly significant as before. One important change in the results is that the coefficient of moneylender loan use is now robustly significant (and negative). This implies that if loans are utilized in productive purposes, moneylenders lower interest rates because of lower default risk by borrowers. The interaction of MFI coverage with moneylender loan use enters positively and is significant at 1% level. This result in conjunction with the previous result implies that although productive use of loan lowers moneylender interest rates, in the villages with large MFI coverage interest rates increase because of increased demand for fund. In addition to inadequate supply of loan, MFIs allow little or no flexibility in loan

disbursement so that seasonal working capital is difficult to finance by MFI loans. Repayment schedule is also very rigid as first installment is due immediately after loan disbursement so borrowers in many instances save a portion of loan for installment. As a consequence, more loans are demanded from moneylenders to sustain the project, which in turn raises moneylender interest rates.

Insert Table 3 here

Percentage of land irrigated using electricity is significantly positive as before, and its interaction with MFI coverage is negative and significant.

System of simultaneous equations estimation:

Higher moneylender interest rates can cause good borrowers to switch to MFIs, therefore OLS estimation may give rise to biased and inconsistent estimates in the presence of reverse causality. Finding appropriate instrument(s) is extremely difficult. Number of MFIs delivering loan in a village could be a potential candidate but it is also very likely that MFIs chose to operate in villages where moneylenders charged higher interest rates. Therefore, this variable will not be an exogenous instrument. Changes in the incidence of females going out for work in last five years are also related to MFI coverage because increased number of females going out for work than before indicates less restrictions on them to join MFIs. It can also be an outcome of their past participation in MFIs. However, the F-statistics from the regression of MFI coverage on changes in females going out for work (three dummies are i) increased considerably, ii) increased marginally and iii) remained the same)) is very low suggesting that these instruments are weak which can potentially lead to more biased estimates (Stock, Wright and Yogo, 2002).

To address the problem, we estimate a system of the following two equations by 3SLS:

$$InterML_i = \alpha_1 + \beta_1 MFI\_Cover_i + \delta \mathbf{W_{1i}} + \eta_i \qquad \text{--- (3)}$$

$$MFI\_Cover_i = \alpha_2 + \beta_2 InterML_i + \psi \mathbf{W_{2i}} + \varphi_i \qquad \text{--- (4)}$$

where the $\mathbf{W_{1i}}$ vector includes use of both MFI and moneylender loans, village level infrastructure, percentage of land irrigated using electricity, percentage of land that grows

one, two and three crops a year, and current poverty situation (and also the interaction terms in equation (2). These are the same variables included in equations (1) and (2).

The MFI coverage is increasing with the number of MFIs working in a village even with overlapping of membership. Other determinants of MFI coverage are difficult to figure out because of scant empirical evidence.[10] MFIs state their goal as to serve the poor and have some explicit criteria of selecting the participants (such that owning less that 50 decimal of land) but they do not disclose their criteria of selecting a location or community. It is now official that MFIs in Bangladesh failed to reach the extreme poor within a chosen community. Recognizing this problem BRAC has devised its CFPR/TUP program specifically tailored to serve the extreme poor. Amin, Rai and Topa (2003) and Rahman and Razzaque (2000) also confirm that MFIs do not always target the extreme poor.

Gauri and Fruttero (2003) investigate the determinants of selecting a location by MFIs in Bangladesh. They find that MFIs expand credit programs in areas where they are not present, and they are not concerned whether other MFIs were already operating in a given area. They also find that poverty, community level well-being or landlessness were not significant for credit program expansion. This supports the opportunistic account of MFI behavior in which MFIs spread out to new locations because donors use coverage as an indicator of MFI efforts. They estimate a fixed effect model that accounts for the geographical or physical infrastructure but it is these fixed effects that might also be relevant to choose a location.

Ravallion and Wodon (2000) find that geographic placement of Grameen Bank branches appears to be influenced by the potential gains from switching to rural nonfarm activities by the poor. Patterns of use of the MFI loans also give an indication about MFI coverage. More loan use in a particular sector indicates higher marginal product in that sector, and it is therefore likely that MFIs will expand credit programs in those villages having better opportunity to invest in those sectors. If the opportunistic account of MFI behavior is correct, MFIs will expand program where profitability of investment by borrowers is higher so that they can achieve high recovery rate. Nearly half of all loans

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[10] Zaman (1997, p, 237-239) documents individual and household level characteristics that determines participation in BRAC's credit program such as ratio of earners to members, age and sex of the households head, and landownership. The village level data used in this paper cannot exploit this information.

disbursed by BRAC are utilized in certain agricultural activities such as crop production, irrigation, poultry and livestock rearing, fisheries, and food processing. Rural trading is the other important sector with 41.7% of all loans being utilized (Husain et al., 1998, p. 30). It is expected that loans of other MFIs are also utilized in similar patterns. Profitability of many of these activities requires access to electricity and other infrastructural development. It has also been found that 69% of BRAC borrowers live in villages that have medium level infrastructural development (Husain et al., 1998, p. 30).

Hence, many of the variables that influence moneylender interest rates also influence MFI coverage. The variables included in the $\mathbf{W_{2i}}$ vector are village level infrastructure, percentage of land irrigated using electricity, percentage of land that grows one, two and three crops a year, and changes in the incidence of poverty in last five years. Current poverty (within a community or village) does not determine current level of participation in MFIs because current level of participation is a cumulative process with many old members who joined previously; rather it is the past incidences of poverty that determines current level of participation. Therefore, we include changes in the incidence of poverty in last five years in equation (4), while we include in equation (3) male and female wage rates which are proxies for current poverty. This is also necessary to satisfy the exclusion restrictions so that the system is not under-identified. We include changes in the incidence of females going out for work in last five years as additional instruments for MFI coverage in equation (3). For robustness check, competition among moneylenders (percentage of households owning no more than 10 decimal of land) is included in both equations.

Insert Table 4 here

Results for 3SLS estimation of the system are reported in Table 4.[11] It is evident that the results do not meaningfully change from those estimated by OLS. Column 2a reports results for equation (3) without the interaction terms. The coefficients of MFI coverage and percentage of land irrigated with electricity enter positively and

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[11] The results do not meaningfully change if changes in the incidence of females going out for work are not used as additional instruments.

significantly. The interaction terms are included in column 3a. This is our preferred specification as it corrects for endogeneity and incorporates interaction effects of MFI coverage with other relevant factors. As in OLS estimation, use of moneylender loan enters negatively and significantly, and its interaction with MFI coverage positively and significantly. This reconfirms our previous result that moneylenders charge higher interest rates if loans are used in productive purposes in the villages where higher percentage of households borrow from MFIs.

There is one important change in the results. Percentage of land under irrigation using electricity and its interaction with MFI coverage become insignificant. The reason is probably that the MFI borrowers are usually tenants and marginal landowners who are not able to take advantage of modern irrigation facilities because of diseconomies of scale. In column 4a, competition among moneylenders is included as a robustness check. Results do not differ from those in column 3a. We find that competition drives down and higher distance from bazaar increases moneylender interest rates.

The coefficient of MFI coverage is uniformly larger than that in comparable OLS regressions ranging from 1.2 to 1.9, and its significance level ranges from 5% to 10% level. In equation (4), moneylender interest rates predict MFI coverage (columns 3b and 4b). Results are also robust to different combinations of variables in the two equations (not reported).

However, these results are based on village level data that lack information in the individual borrower level. Moneylenders may charge different interest rates to different borrowers in the same village based on individual borrower characteristics and loan size. It is worth mentioning that there may be possible multi-level sample selection bias in the household data (Iqbal, 1988). For example, X number of total households are surveyed out of which $X_1 < X$ are found to be borrowers, and only $X_2 < X_1$ borrow from moneylenders. If the analysis is restricted to the X_2 borrowers only, the results suffer from two sources of selection bias. If borrowing households are not randomly selected from the overall sample, which may not be unlikely, OLS regression does not distinguish between the behavioral function relating the interest rate to its determinants and the sample selection function relating the probability of borrowing to its determinants. Heckman (1979) correction can be employed to account for this, but there is another level

of sample selection bias. If moneylender clients are not randomly selected from the sample of borrowers, which may not again be unlikely, a similar statistical problem occurs. Village level data can avoid this econometric difficulty but at a cost. Nonetheless, it would be more informative to investigate using household data with duly addressing the econometric issues.

5. Concluding remarks

This paper explores the impact of the MFI program expansion on the moneylender interest rates in the rural Bangladesh. It is found that moneylender interest rates go up with the percentage of households borrowing from MFIs. Productive investment of loan lowers moneylender interest rates. But MFI program expansion increases moneylender interest rates in the villages in which more loans are invested in productive economic activities. As loans are utilized in productive purposes, the likelihood of repayment increases so that moneylenders are able to charge lower interest rates. But if the overall demand for fund goes up as indicated by higher percentages borrowing from MFIs, and if MFI loan is inadequate or seasonal working capital is unavailable from MFIs, and repayment schedule is tight, borrowers will resort to moneylenders for additional fund to sustain their projects. Increased demand for fund will drive up moneylender interest rates. It is also found that competition among moneylenders lowers, and distance from place of commercial activities increases moneylender interest rates. Results are robust to correction for endogeneity.

The results are potentially important for the policymakers. Borrowers can make more productive investments if MFIs meet their demand for loan by allowing more flexibility in loan disbursement and repayment schedule. Borrower projects will also be more profitable if MFIs expand their program of loan-only to loan-plus.[12] In that case, moral hazard problem faced by moneylenders will be greatly reduced. Active presence of the moneylenders is not necessarily harmful and can even be beneficial if increasing competition between formal and informal lenders increases borrowers' access to funds at competitive interest rates.

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[12] BRAC follows loan-plus approach, where loans are accompanied by various forms of assistance for the borrowers such as skill development training, provision of higher quality inputs and technical assistance as well as marketing for finished products.

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Tables

Table 1: Descriptive statistics of the villages

Number of MFI working in the village	3.9 (1.4)* (Min = 1, Max = 9)
Number of big MFI working in the village	3.6 (1.3)* (Min = 1, Max = 8)
Number of households in the village	548.3 (426.5)* (Min = 59, Max =2600)
Number of households in the village with MFI membership	179.7 (148.0)* (Min = 6, Max = 775)
% of households in the village with MFI membership	33 (19)* (Min = 1, Max = 96)
Moneylender interest rate (annual %)	103.33 (59.06)* (Min = 10 Max = 240)
Daily male wage rate (in Taka)	44.37 (8.26)*
Daily female wage rate (in Taka)	30.09 (6.88)*
Main use of MFI loan in productive investment	32.7% (48)
Main use of Moneylender loan in productive investment	10.0% (13)
Main use of Bank loan in productive investment	59.7% (80)
In the last 5 years	
Poverty incidence in the village	
Increased considerably	34.6% (53)
Increased marginally	21.6% (33)
Remained the same	17.0% (26)
Decreased	26.8% (41)
Female going out of village for work	
Increased considerably	21.6% (32)
Increased marginally	35.1% (52)
Remained the same	40.5% (60)
Decreased	2.7% (4)
Agricultural day laborer	
Increased considerably	33.5% (52)
Increased marginally	37.4% (58)
Remained the same	13.5% (21)
Decreased	15.5% (24)
Households living on agricultural	
Increased considerably	10.5% (16)
Increased marginally	9.9% (15)
Remained the same	55.3% (84)
Decreased	24.3% (37)
Female day laborer	
Increased considerably	30.7% (47)
Increased marginally	42.5% (65)
Remained the same	22.9% (35)
Decreased	3.9% (6)

Figures in the parentheses are the number of villages except with asterisk (*).
* Figures in the parentheses are standard deviations;

Table 2: OLS regression: Log of moneylender interest rate (*InterML*) is the dependent variable)

Explanatory variables	(2)	(3)	(4)	(5)	(4a)	(5a)
MFI_cover	1.109***	1.092***	1.006***	0.850**	1.153***	0.982**
	(0.241)	(0.256)	(0.298)	(0.361)	(0.276)	(0.336)
UseML		-23.389	-24.158	-11.090	-30.095	-18.325
		(26.208)	(32.151)	(26.104)	(34.607)	(28.704)
UseMFL		-14.273	-9.371	-11.819	-3.586	-6.373
		(12.591)	(16.457)	(15.506)	(15.862)	(14.914)
Shop			0.056	0.043	0.051	0.040
			(0.082)	(0.087)	(0.090)	(0.095)
DisBank			0.203	0.711	0.043	0.722
			(2.227)	(1.501)	(2.123)	(1.516)
DisBazaar			7.060	6.392	9.177*	7.810*
			(4.807)	(4.438)	(4.727)	(4.352)
DisBus			0.639	-0.762	0.627	-0.750
			(1.519)	(1.216)	(1.592)	(1.289)
DisRoad			-2.529	-3.489	-1.987	-3.005
			(3.545)	(3.304)	(3.439)	(3.286)
Electr			27.885	-20.148	12.342	-30.802
			(40.803)	(48.448)	(41.552)	(47.429)
ElectIri			0.454**	0.376**	0.530***	0.436**
			(0.183)	(0.172)	(0.179)	(0.176)
Crop1			-0.686	-0.173	-0.614	-0.128
			(1.331)	(1.207)	(1.327)	(1.210)
Crop2			-0.709	-0.263	-0.722	-0.290
			(1.097)	(1.069)	(1.129)	(1.093)
Crop3			-0.638	0.158	-0.589	0.188
			(1.245)	(1.220)	(1.282)	(1.247)
MaleWage			0.144		-0.101	
			(1.451)		(1.428)	
FemWage			1.124		1.226	
			(1.620)		(1.586)	
PovCon				-39.784**		-33.940**
				(16.631)		(16.088)
PovSli				8.424		11.591
				(15.251)		(14.397)
PovSam				-1.758		-0.920
				(21.884)		(21.174)
Landcon_10					-217.36*	-183.520
					(110.584)	(111.091)
R-square	0.144	0.172	0.310	0.329	0.354	0.358
Sample size	106	106	89	94	89	94

Figures in the parentheses are White (1980) corrected robust standard errors. All regressions include a constant. *** Significant at the 1% level, ** Significant at the 5% level, * Significant at the 10% level.

Table 3: OLS regression: Log of moneylender interest rate (*InterML*) is the dependent variable)

Explanatory variables	(2)	(3)	(4)	(5)	(6)
MFI_cover	1.398*** (0.353)	1.196*** (0.313)	1.185*** (0.322)	1.061*** (0.300)	1.085*** (0.307)
UseML	-182.270*** (44.691)	-169.746*** (45.534)	-207.682*** (43.276)	-194.407*** (46.286)	-197.799*** (44.437)
UseMFL	-16.857 (30.681)	-35.661 (29.656)	-18.703 (28.170)	-35.884 (27.011)	-30.276 (26.473)
MFI_cover UseML*	4.768*** (0.961)	4.408*** (0.924)	5.411*** (1.009)	4.951*** (0.953)	5.308*** (1.029)
MFI_cover UseMFL*	-0.014 (0.664)	0.462 (0.696)	0.287 (0.599)	0.692 (0.601)	0.576 (0.620)
Shop	0.121 (0.087)	0.160* (0.090)	0.107 (0.097)	0.149 (0.101)	0.154 (0.104)
DisBank	-0.394 (2.118)	0.167 (1.417)	-0.622 (1.974)	0.118 (1.435)	-0.662 (1.973)
DisBazaar	7.926 (4.920)	8.483** (4.397)	10.024** (4.771)	9.874** (4.313)	11.144** (4.657)
DisBus	0.953 (1.428)	-1.108 (1.348)	1.360 (1.351)	-0.893 (1.320)	-0.087 (1.444)
DisRoad	-1.830 (3.378)	-2.101 (2.916)	-1.762 (3.183)	-2.256 (2.878)	-1.267 (2.872)
Electr	51.631 (40.690)	9.988 (47.336)	30.751 (38.538)	-2.278 (44.017)	13.631 (41.795)
ElectIri	0.969*** (0.284)	1.182*** (0.300)	0.817*** (0.265)	1.066*** (0.280)	1.046*** (0.282)
MFI_cover ElectIri*	-0.016** (0.007)	-0.021*** (0.006)	-0.008 (0.007)	-0.015*** (0.006)	-0.014** (0.007)
Crop1	-0.695 (1.379)	-0.073 (1.202)	-0.555 (1.364)	0.002 (1.213)	-0.208 (1.399)
Crop2	-0.701 (1.154)	-0.267 (1.092)	-0.708 (1.174)	-0.277 (1.121)	-0.448 (1.253)
Crop3	-0.569 (1.292)	0.340 (1.225)	-0.591 (1.312)	0.337 (1.255)	-0.103 (1.363)
MaleWage	0.589 (1.292)		0.563 (1.190)		0.117 (1.199)
FemWage	0.027 (1.488)		0.312 (1.363)		-0.244 (1.430)
PovCon		-43.346*** (15.562)		-36.288** (15.447)	-32.519* (17.897)
PovSli		9.980 (14.142)		14.796 (13.669)	15.509 (14.371)
PovSam		-20.074 (20.680)		-16.634 (19.602)	-12.472 (19.350)
Landcon_10			-269.987*** (88.669)	-224.771** (92.642)	-235.068** (90.007)
R-square	0.408	0.449	0.464	0.486	0.514
Sample size	89	94	89	94	89

Figures in the parentheses are White (1980) corrected robust standard errors. All regressions include a constant. *** Significant at the 1% level, ** Significant at the 5% level, * Significant at the 10% level.

Table 4: System estimation (Equation (3): *InterML* is the dependent variable; Equation (4): *MFI_cover* is the dependent variable)

Explanatory variables	(2a)	(2b)	(3a)	(3b)	(4a)	(4b)
	Equation (3)	**Equation (4)**	**Equation (3)**	**Equation (4)**	**Equation (3)**	**Equation (4)**
MFI_cover	1.212** (0.595)		1.872* (0.982)		1.689* (0.959)	
InterML		-0.002 (0.147)		0.241*** (0.082)		0.255*** (0.070)
MFIno		3.407** (1.497)		2.032 (1.340)		1.760 (1.357)
UseML	-24.058 (20.425)		-106.198** (45.559)		-117.422*** (42.489)	
UseMFL	-9.851 (12.915)		-29.519 (23.094)		-29.230 (22.180)	
MFI_cover *UseML*			2.775** (1.293)		3.059** (1.201)	
MFI_cover *UseMFL*			0.491 (0.681)		0.686 (0.691)	
Shop	0.063 (0.116)	-0.027 (0.042)	0.104 (0.113)	-0.024 (0.041)	0.083 (0.107)	-0.020 (0.041)
DisBank	0.283 (2.052)	-0.265 (0.718)	-0.111 (1.881)	-0.155 (0.712)	-0.496 (1.780)	.0069458 .7019841
DisBazaar	7.275** (3.685)	-0.534 (1.595)	7.990** (3.551)	-1.946 (1.363)	10.937*** (3.383)	-3.032*** (1.402)
DisBus	0.424 (1.718)	0.749 (0.561)	-0.139 (1.696)	0.444 (0.550)	0.449 (1.615)	0.262 (0.544)
DisRoad	-1.826 (4.241)	-1.762 (1.549)	0.730 (4.131)	-0.919 (1.415)	0.788 (3.907)	-1.055 (1.375)
Electr	25.892 (55.261)	5.804 (19.742)	48.335 (51.401)	-6.588 (19.416)	21.604 (49.040)	-0.739 (19.185)
ElectIri	0.431** (0.194)	0.129 (0.100)	0.517 (0.425)	0.013 (0.077)	0.431 (0.415)	-0.034 (0.076)
MFI_cover *ElectIri*			-0.007 (0.012)		-0.0003 (0.012)	
Crop1	-0.700 (0.672)	0.171 (0.244)	-0.870 (0.627)	0.350 (0.238)	-0.695 (0.597)	0.309 (0.234)
Crop2	-0.672 (0.518)	-0.146 (0.205)	-0.583 (0.475)	0.077 (0.189)	-0.629 (0.449)	0.116 (0.185)
Crop3	-0.589 (0.624)	-0.128 (0.227)	-0.504 (0.592)	0.089 (0.215)	-0.534 (0.559)	0.101 (0.211)
MaleWage	0.126 (1.127)		0.272 (0.866)		0.267 (0.789)	
FemWage	1.176 (1.288)		0.271 (1.007)		0.457 (0.938)	
PovCon		-10.263 (7.982)		-5.285 (5.405)		-4.384 (4.813)
PovSli		2.548 (6.033)		1.181 (4.636)		1.524 (4.490)
PovSam		-17.873*** (6.014)		-12.495** (4.863)		-10.392** (4.658)
Landcon_10					-330.837*** (91.209)	88.202** (32.415)
Sample size	89	89	89	89	89	89

Figures in the parentheses are standard errors. All regressions include a constant. *** Significant at the 1% level, ** Significant at the 5% level, * Significant at the 10% level.

Appendix

List of variables

Variable Name	Notation
Average moneylender interest rate (log)	*InterML*
Percentage of households borrowing from MFI (log)	*MFI_cover*
Number of MFIs delivering loan in the village	*MFIno*
Main use of moneylenders loan (1 = investment, 0 = otherwise)	*UseML*
Main use of MFI loan (1 = investment, 0 = consumption)	*UseMFL*
Number of shops in the village	*Shop*
Distance from the nearest Bank	*DisBank*
Distance from the nearest Bazaar	*DisBazaar*
Distance from the nearest Bus stop	*DisBus*
Distance from the nearest all weather (pucca) road	*DisRoad*
Percentage of houses with electricity connection	*Electr*
Percentage of land irrigated with electricity	*ElectIri*
Percentage of land with one crop	*Crop1*
Percentage of land with two crops	*Crop2*
Percentage of land with three crops	*Crop3*
Average daily male wage rate (in Taka)	*MaleWage*
Average daily female wage rate (in Taka)	*FemWage*
In last 5 years incidence of poverty in the village has	
Increased considerably	*PovCon*
Increased slightly	*PovSli*
Remained the same	*PovSam*
Percentage of households owning no more than 10 decimal of land	*Landcon_10*