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Bangladesh's Achievement in Poverty Reduction: The Role of Microfinance Revisited

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Abstract

Using long panel survey data collected three times between the years 1991/92 and 2010/11, this paper examines the role of microfinance in poverty reduction in rural Bangladesh. More specifically, in assessing the impact of microfinance on poverty, this paper makes a distinction between the effects of current participation in microfinance programs and those of past participation, and between the effects of continuous participation in microfinance programs and those of irregular participation. Findings suggest that there is a greater decrease in poverty levels for participants in microfinance programs than for non-participants, and for female participants more than for male participants. Additionally, continuous borrowers fare better than irregular borrowers. Overall, microfinance participation, which is found to be cost-effective for borrowers, has contributed to about one-seventh of the total reduction in moderate poverty and one-eleventh of the total reduction in extreme poverty in rural Bangladesh. Finally, this paper recommends the expansion of microfinance funded growth-oriented activities in the non-farm sector, in particular manufacturing and processing activities, so as to reap larger benefits from microfinance.

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1. Introduction

Over the last twenty-five years, poverty in Bangladesh has been steadily decreasing. For example, during the period 1991-2010, moderate poverty dropped by 25 percentage points (from 57 percent to 32 percent), and extreme poverty by 23 percentage points (from 41 percent to 18 percent) (World Bank 2013). The corresponding decreases in rural areas, where more than 70 percent of the country's 150 million people live, were similar – 24 percentage points and 23 percentage points, respectively. While part of this decline in poverty is due to an economic growth of more than 6 percent per year over the last decade (World Bank 2013), there are other factors contributing to poverty reduction. One such factor is microfinance growth – the topic of this paper. In Bangladesh, there has been a remarkable growth in the coverage of microfinance institutions (MFIs) and their members over the last two decades, and it can be hypothesized that the scale of operation of microfinance has had some effect on the economy. This paper attempts to answer the question: has microfinance contributed to poverty reduction and if so, to what extent can the recent poverty reduction in Bangladesh be attributed to it?

In this context, it is worthwhile to note that the role of microfinance is not beyond controversy in the development community. There are two strands of thinking about the beneficial role of microfinance. The first strand of studies are based on non-experimental research methods, and many of them make the observation that microfinance promotes social, human, and economic development in a number of ways (e.g., Dunford 2006; Hossain 1988; Shaw 2004; Panjaitan-Drioadisuryo and Cloud 1999; Chemin 2008; Khandker 1998; 2005; McIntosh 2008; Pitt and Khandker 1996; 1998; Pitt et al. 1999; Kevane and Wydick 2001; Imai, Arun, and Annim 2010; Boonperm, Haughton, and Khandker 2009; Kaboski and Townsend 2005; 2012; Islam and Maitra 2012). For example, a recent study which used the so-called Townsend Thai dataset of 960 panel households

expanding over a seven-year period (1997-2003), estimates fixed-effects with instrumental variables regression so as to give an estimate of the impact of Thailand's "Million Baht Village Fund" program (Kaboski and Townsend 2005). This study finds that the village funds have increased consumption, agricultural investment, and income growth from business and labor but have decreased asset growth. The study also finds that the program had a positive impact on wages, which is a general equilibrium effect. Another study, using panel data from 1997 to 2005, finds that medium-term participants benefit more from microfinance than short-term participants (Islam 2011). Using a long panel survey (1991/92 to 2010/11), a study by Khandker and Samad (2014a) also finds that households who remained with microfinance programs without taking a break fared better than irregular participants. The positive impacts of microfinance were also confirmed in a macro study using cross-country data, (Imai et al. 2012).

Findings from the second strand of studies, based on randomized control trials (RCTs), are mixed. Notable among them are six randomized evaluations of microfinance programs from different countries reported in a recent issue of the American Economic Journal, which we will go over briefly. Banerjee et al. (2015), in a study of fifty-two randomly selected neighborhoods in Hyderabad, India, finds that while expenditure on durable goods increased due to microcredit, overall consumption did not. The same study also finds that investment in small business and profits in preexisting businesses increased because of microcredit but no changes are found in health, education, or the empowerment of women. Using data from an RCT study carried out between 2003 and 2006 in the rural areas of two provinces of Ethiopia, Tarozzi, Desai, and Johnson (2015) examined the impact of microcredit on different outcomes, such as income, labor supply, education, and the empowerment of women. However, they did not find any impact on most of the outcomes of interest. Another randomized study in Mongolia found that group-based microfinance has a positive influence on female entrepreneurship and food consumption but none on

employment hours or income (Attanasio et al. 2015). Through a randomized evaluation of microcredit intervention in rural Morocco in 2006, Crépon et al. (2015) finds that while the uptake in the program areas was low (13 percent) there was a significant increase in investment in self-employment activities among microcredit borrowers as well as a gain in profit. However, this study also finds a reduction in income from casual labor. In a randomized study of sixteen thousand households carried out by the largest microlender in Mexico and Latin America (Compartamos Banco), Angelucci, Karlan, and Zinman (2015) attempt to assess the effects that microfinance at the community level has on a wide range of outcomes, specifically entrepreneurship, income, labor supply, expenditures, social status, and subjective well-being. This study also examines the distribution of microcredit benefits. However, it does not find any "transformative" effects on the outcomes or observe any heterogeneity in the benefits. The last study, reported in the special issue of American Economic Journal, is a randomized study on an MFI in Bosnia and Herzegovina by Augsburg et al. (2015). The study finds evidence of higher self-employment, business assets, and profit for microfinance borrowers, while reporting a drop in wage employment, consumption, and savings. While a number of other randomized studies find the positive effects of microfinance (Coleman 1999; 2006; Karlan and Zinman 2010; McKenzie and Woodruff 2008; de Mel, McKenzie, and Woodruff 2008), others do not (see Karlan and Zinman 2011, for example).

In addition to the disparity in findings on microfinance impacts, there is an ongoing debate on the findings and methodology of perhaps the most referenced study on microfinance impacts - "The Impact of Group-Based Credit on Poor Households in Bangladesh: Does the Gender of Participants Matter?" by Pitt and Khandker (1998). In a sequence of papers and postings, David Roodman, questioned Pitt and Khandker's findings on various grounds (replicability, methodology, and the findings themselves) (Roodman 2012; 2011; Roodman and Morduch 2011). In a 2012 paper, Mark Pitt and Shahidur R.

Khandker showed that Roodman's claim that the findings of their 1998 study could not be replicated, was based on flawed techniques, the corrections of which replicate their previous findings quite well (Pitt and Khandker 2012). The authors also addressed the question (raised by Roodman) of the validity of the exclusion restrictions of the instruments used in their previous study and showed that the results reported held up extremely well in their new analysis of 2012. In another recent paper, Mark Pitt addressed the claims made in Roodman and Morduch (2014), which sought to refute the findings of Pitt and Khandker (1998) (Pitt 2014). Roodman and Morduch (2014) claimed that the findings of Pitt and Khandker (1998) are not robust against deviations from normality of the second-stage errors and that this non-normality is an important source of bias in Pitt and Khandker's study. In his response, Pitt (2014) showed that Roodman and Morduch's claim is based on a "flawed econometric understanding and a lack of due diligence in formulating and interpreting statistical models". While such debates are not conclusive, they may shed more light on the techniques and methodologies (especially randomized versus non-randomized impact methods) adopted when estimating the impact of microfinance. This study, while using data from the same households, does not contribute to the debate as it uses a different methodology from the one used in the cross-sectional analysis of the 1991/92 data. More specifically, this study uses the fixed-effects method, which has the advantage of panel data, while the 1991/92 data used the instrumental-variable technique, which was at the heart of the debate.[1]

Microfinance is also under attack for its high interest rates (for example, the nominal on-lending rate of Grameen Bank in Bangladesh is 20 percent, which is 7 percent

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[1] This study can also serve as an example as to where non-experimental techniques may be more suitable than randomized implementation. Randomized implementation is suitable for assessing short-term impacts because of the difficulty in ensuring internal validity for a long period, for example, some of the people who are supposed to be in a treatment group may leave the program, some people who were supposed to be in the control may adopt the program, and so on. This study, using data points covering twenty years, gives us a unique opportunity to assess the long-term impact of microcredit. Also, in Bangladesh almost all of the existing microcredit interventions are non-randomized in nature, and so, evaluating them as they are requires a non-experimental design.

higher than the commercial bank rate), as this goes against the spirit of its stated mission of poverty alleviation.[2] Using anecdotal evidence, many critics cite the high interest rates on microfinance and the inadequate benefits relative to the cost of borrowing as reasons for rising indebtedness among borrowers. They contend that if microfinance programs were really helpful, borrowers should not have become increasingly indebted. However, this may not be quite true as a recent study found that microfinance may be cost-effective for borrowers even with high interest rates (such as 32 percent), and as such, continued participation in microfinance programs may not necessarily cause the borrowers to become over-indebted (Khandker, Samad, and Ali 2013).[3] In this paper we investigate whether microfinance has indeed helped reduce poverty and if it has, how much poverty reduction can be credited to microfinance. While this issue has been addressed in existing studies on microfinance, our paper makes an important contribution by exploiting the long panel data. Firstly, the long panel data allows us to examine the differential impacts of past participation and current participation. This issue can be explored because the long panel data contains information on the program participation status of the same households for three data points between 1991 and 2011. Second, using the long panel data we can also explore the differential impacts of continuous participation and irregular participation in microfinance. Some households remain program participants for successive years, while others drop out and sometimes rejoin the programs; this variability in program participation may affect the benefits that the program has. These sorts of exploration are possible only with panel data expanding over a long period, such as the kind that has been analyzed in this paper.

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[2] While the interest rates of microfinance institutions (MFIs) are higher than those of formal lenders, they are much lower than informal lending rates (Faruqee and Khalily 2011a).
[3] This study finds that the rate of returns on microfinance-supported activities is higher than the average interest rate charged by MFIs.

2. The panel data and its characteristics

The data analyzed in this paper were derived from a long panel survey covering more than twenty years. The 1991/92 cross-sectional survey was studied to determine the role of microfinance in the social and economic advancement of the poor. Jointly carried out by the World Bank and the Bangladesh Institute of Development Studies (BIDS), this first round of surveys covered 1,769 households randomly selected from 87 villages (72 program and 15 control) in 29 upazilas.[4] The second round of surveys, conducted in 1998/99 again with the help of BIDS, included 1,638 of these 1,769 households. Since 131 of the households could not be traced, the attrition rate was 7.4 percent. In all, the second round of surveys covered 2,599 households. Of the households surveyed, 2,226 were from the original villages and 373 were from new ones. Among the 2,226 households, 1,947 were made up of the 1,638 households available from the first round, which had then split up to form new households between the survey years, and 279 were newly sampled households. The third round of surveys, conducted between March and September 2010/11 with support from the Institute of Microfinance (InM), reached 2,342 of the 2,599 second round households, with an attrition rate of about 10 percent. In all, during the third round of surveys 3,082 households were interviewed, including 740 households that had split up to form new households between the survey years.

The overall attrition rate from 1991/92 to 2010/11 is 14.7 percent or less than one percent a year. However, what is important is not the extent of attrition but whether it is non-random. To estimate the determinants of attrition, a probit regression was run using the first round (1991/92) data with an attrition dummy (1 for households that were lost, and 0 otherwise) as the dependent variable, and the outcome variable (for example, income, expenditure, or school enrollment) and household- and village-level exogenous

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[4] An *upazila* is an administrative unit at the rural sub-district level that consists of a number of villages.

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characteristics as the explanatory variables. This was done separately for the nine outcome variables. The results of the regressions (not reported) show that attrition is positively correlated with households with less land or non-land assets, an absence of adult males or females, and those in villages with poor road conditions - a proxy for infrastructure. That is, attrition is more likely to occur among households with low socioeconomic status and in less developed villages. These findings are consistent with other studies on household attrition (Alderman et al. 2000; Fitzgerald, Gottschalk, and Moffitt 1998; Thomas, Frankenberg, and Smith 1999; Ziliak and Kniesner 1998). For example, out of the Michigan Panel Study of Income Dynamics (PSID), Fitzgerald, Gottschalk, and Moffitt (1998) found that households with lower earnings, lower educational levels, and propensity for marriage were more prone to attrition. Overall, these variables explain only 7–10 percent of the probability of household attrition, which implies that up to 93 percent of the attrition cannot be explained by the explanatory variables and may be random. We also performed the Wald joint significance test to determine whether the explanatory variables were jointly equal to zero; the results are reported in the appendix (Table A1). The resulting Chi-squared statistics indicate that these variables jointly differ from zero at the highest level of significance (the p-value is 0.000). This implies that these variables are significant predictors of attrition; that is, attrition may not be random.

We also performed the test suggested by Becketti et al. (1988) to determine whether attrition is random. This test involved regressing the outcome variable on household- and community-level exogenous variables, the attrition dummy, and the interactions of the attrition dummy and the other explanatory variables. A joint significance test of the attrition dummy and the interaction variables was then performed to determine whether the coefficients of the explanatory variables varied significantly between the households that were lost and those that were resurveyed. If so, we could then reject the null hypotheses that

attrition is random. From the results, we see that at the 5 percent level, the randomness of attrition is rejected for all outcomes (Appendix, Table A2).

If not accounted for, this non-randomness of attrition would introduce attrition bias in the estimated impacts. Attrition bias can be addressed in a number of ways, such as by estimating a selection model, which depends on finding suitable instruments (Heckman 1979); using inverse probability weights, which relies on auxiliary variables related to both attrition and the outcome variables (Fitzgerald, Gottschalk, and Moffitt 1998); and using non-parametric techniques (Das, Toepoel, and van Soest 2011). We used the method that uses inverse probability weight since it is simple to implement and does not require the strong conditions that the selection model does. The rationale behind the calculation of inverse probability weights is that it gives more weight to households who were subsequently lost than to those with similar initial characteristics that are more likely to remain in the panel. Details on the implementation of this procedure can be found in Baluch and Quisumbing (2011). We calculated such inverse probability weights for all outcomes and then used them in all estimations of this study.

In addition to attrition, households were also subject to split-offs over time. In most cases, household members had grown up, married, and left their households to form new households after the initial survey. Thus, households surveyed in the first round may have spawned one or more new households by the time the subsequent surveys were conducted. In our analysis, we have treated these households as separate units related by their same initial (first-round) characteristics.[5]

The analysis in this study is based on the 1,509 households from the 1991/92 survey that are common in all three survey rounds. Obviously, there were larger numbers of

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[5] This approach differs from Khandker (2005), which analyzed the two-point panel data (consisting of 1991/92 and 1998/99 surveys) by aggregating the split-off households at the second round after testing to make sure such households could be aggregated without incurring bias in the estimation process. In this study, we treated the spawned households as separate units and thus did not have to perform such tests.

households in 1998/99 (1,758) and in 2010/11 (2,322) because households split up. Overall, household membership in microfinance programs grew steadily during the twenty-year period, rising from 26.3 percent in 1991/92 to 48.6 percent in 1998/99, and then to 68.5 percent in 2010/11 (Table 1). Among the four largest programs - Grameen Bank, BRAC, Bangladesh Rural Development Board (BRDB), and the Association for Social Advancement (ASA) - Grameen Bank saw the largest increase in membership from 8.7 percent in 1991/92 to 15.1 percent in 1998/99, and to 27.4 percent in 2010/11. BRDB, a government program, experienced a loss in membership owing to a reorganization that occurred between the second and third survey rounds. Over the twenty-year period, many other programs were developed and these are now serving rural communities in a large capacity. In 2010/11, these programs covered a combined total of nearly one-third of rural households, which exceeded Grameen Bank's coverage.

3. Microfinance growth and development

Microfinance operations, which started predominantly with the Grameen Bank and BRAC in the 1980s, grew considerably in scale and scope over the subsequent decades. This growth was particularly significant in the 1990s when, due to the entry of other non-governmental MFIs (for example, the ASA), increased donor funds, and the formation of Palli Karma Sahayak Foundation (PKSF), new branches were established across the country, disbursements were intensified, and service portfolios were expanded.[6] In such a favorable environment, microfinance operations expanded tremendously in Bangladesh. In this subsection, we examine the growth of various indicators of microfinance outreach over the last fifteen years.

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[6] Established by the government of Bangladesh in 1994, PKSF is a wholesale agency that lends government and donor-funded money to its partner organizations (POs) for on-lending as microfinance disbursements. By March 2010, PKSF had lent Tk. 88.5 billion to over 250 POs who in turn disbursed approximately Tk. 525 billion to around 10 million microfinance members.

Figure 1 shows the growth pattern of microfinance members. MFI membership grew from about eight million in 1996 to over thirty-four million in 2010. Membership grew steadily by more than 10 percent up until 2008 when growth stagnated; this was mostly due to a decline in the membership of non-Grameen MFIs. Similarly, the number of MFI borrowers also grew at a rapid pace up until 2008 when the number began to slow down; this may be an indication of a certain degree of market saturation (Khandker and Samad 2014a).[7]

With a constant growth in membership, loan disbursement of the MFIs also grew at a steady pace from about Tk. 32 billion in 1997 to approximately Tk. 372 billion in 2010 (Figure 2). However, like MFI membership, loan disbursement also experienced negative growth between 2009 and 2010.

Figure 3 shows that the net savings increased steadily from about Tk. 8 billion in 1996 to Tk. 161 billion in 2010. Interestingly, the savings grew between 2009 and 2010 despite a decline in membership. Figure 4 shows that unlike net savings, which grew monotonically between 1996 and 2010, savings as a percentage of loans outstanding showed some fluctuation - it dropped from nearly 50 percent in 1996 to around 40 percent in 1998 before jumping to around 64 percent in 2004, and then falling again to 45 percent over the next four years. The savings attained its highest value of 69 percent in 2009. However, overall, savings as a percentage of loans outstanding experienced an overall growth of 20 percentage points over the fourteen-year period. All of these statistics point to a phenomenal growth in the microfinance portfolio over the last two decades.

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[7] Membership does not necessarily imply borrowing. Microfinance programs have members who have savings-only accounts with the program. In addition, new members have to wait some time before they can borrow. Both types can count as non-borrowing members at any given time. Overall however, borrowers constitute a large majority of the members.

4. Borrowers' profile

Using the survey data, this section discusses the change in program participation and loan size over the last twenty years. This section also discusses which of the borrowers dropped out of the program, and which ones continued to participate.

Figure 5 presents the breakdown of the 1,509 households (that are common in all three panel years) from 1991/92 to 2010/11 by program participation status. In 1991/92, 26.3 percent of the 1,509 households were microfinance program participants and 73.7 percent were non-participants. By 1998/99, 10.6 percent of participants had switched to being non-participants (this corresponds to 2.8 percent of the whole sample), while 35.8 percent of non-participants had switched to being participants (this corresponds to 26.4 percent of the whole sample). Similar transitions continued between 1998/99 and 2010/11. These developments show that the majority of program participants remained with the program for a number of years, while a good proportion of non-participants switched to microfinance programs over a period of time, resulting in a continuous growth in membership.

Table 2 presents the distribution of microfinance borrowing amounts by program. The table shows that household borrowing increased significantly between 1991/92 and 2010/11. The total amount borrowed increased from Tk. 9,252 in 1991/92 to Tk. 17,006 in 2010/11, implying a simple growth of more than 4 percent annually over the twenty-year period.

A very high growth in household borrowing took place among the programs that were relatively new ("Other programs" in Table 2) compared to the pioneer programs such as Grameen Bank. In particular, between 1998/99 and 2010/11 the average household borrowing from these programs increased by 132 percent, implying a growth rate of nearly 11 percent per year. Unlike what happened with other programs, the average loan portfolio

per borrower declined for Grameen Bank. The highest growth in household borrowing occurred among BRAC members, perhaps as a result of a larger number of small and medium enterprise (SME) loans, which are considerably larger in size when compared to other microloan types.[8]

How did the activities supported by microfinance change over time? This may be important from a policy perspective because microfinance institutions can become self-sustaining only when the borrowers do well, that is, choose the right activities to invest their microloans in. Undertaking activities that generate enough profit to repay the loan amount is key to the success of all microfinance schemes. Table 3 shows the distribution of the purposes of borrowing from microfinance.[9]

The purposes of borrowing can be grouped into three broad categories: farm sector activities, non-farm sector activities, and personal. Among the farm sector activities, agricultural input purchase was the most dominant category in 1998/99 (11.8 percent), followed closely by miscellaneous agricultural purchases (11.3 percent), and the purchase and improvement of agricultural land (4.4 percent).[10] Within the non-farm sector, trading was by far the most dominant activity in 1998/99 (27.5 percent), followed by milch cow or cow fattening (10.7 percent), manufacturing (6.7 percent), transport (4.9 percent), and the service sector (2 percent).[11] Households are engaged in a wide range of trading activities, such as operating grocery or variety stores; trading livestock, poultry, fruits, and vegetables; selling goods as hawkers; and trading ready-made garments. Within the "personal" category,

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[8] SME loans are usually large (generally over Tk. 100,000) and are disbursed more by BRAC than by other MFIs.

[9] The borrowing purposes in the 1991/92 data are not grouped in the same way as they are in the 1998/99 and 2010/11 data. So the 1991/92 data were not used to prepare this table.

[10] The miscellaneous category, labeled as "Other agricultural expenses" in Table 3, includes items such as purchase or repair of agricultural equipment, purchase of fishing nets or other fishing equipment, other fishing inputs, inputs for livestock farming, poultry, sericulture, and so on.

[11] Milch cow and cow fattening activities are included in the non-farm category (as opposed to in the farm sector) because unlike farm activities where the livestock is raised for a longer period, milch cow and cow fattening are short-term activities. These activities are done mostly to sell milk or fatten a cow for the exclusive purpose of selling it later.

building or the improvement of housing structures ranks the highest (6.9 percent), followed by consumption (6.1 percent), miscellaneous small expenditure items (3.9 percent), and repayment of other loans (3.8 percent). Overall in 1998/99, farm sector activities account for 27.5 percent of the total borrowing, non-farm sector activities account for 51.8 percent of total borrowing, and personal activities account for 20.7 percent. By 2010/11, the share of farm and non-farm sector activities rose to 39.8 percent and 56.5 percent, respectively, while that of the personal category decreased substantially (from 20.7 percent to 3.7 percent). Within farm sector expenditure, miscellaneous agricultural expenses accounted for the largest growth between 1998/99 and 2010/11, while the share of other agricultural items went down. Within the non-farm sector expenditure, the share of trading (the most dominant activity) remained the same while that of the transport sector and milch cows went up. The shares of all of the personal expenditure items went down in 2010/11. That means that over time borrowing households invested more in income generating activities and spent less on personal items, which is good for the sustainability of both the borrowers and the MFI lenders.

5. Growth in household income, expenditure, and poverty

Before estimating the microfinance effects on the outcomes of particular interests, it is worthwhile investigating how the outcomes vary by program participation status and between years. Table 4 reports the growth of income and expenditure and the reduction in poverty from 1991/92 to 2010/11.[12] Real per capita income increased by 5.2 percent per year for program participants, compared to 6.2 percent for non-participants. However, the differences in per capita income for participants and non-participants were not statistically

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[12] For the sake of comparability, this analysis is restricted to the households that were microfinance-eligible (poor) in 1991/92 (both participants and non-participants). These households had landholding assets less than fifty decimals. Since after 1991/92 the landholding eligibility criterion was not enforced by MFI lenders, only 1991/92 households fulfilling the criterion were considered.

significant in any year. In a similar manner, the average annual growth in per capita expenditure over the twenty-year period was higher for non-participants (4.5 percent) than for participants (3.7 percent). While moderate poverty steadily decreased for both participants and non-participants over time, the difference between the two groups is not significant in any one year. On the other hand, the incidence of extreme poverty for participants was around 7 percentage points less than that for non-participants in 2010/11; this difference is statistically significant, although it differed a little between the two groups in the earlier survey years. For program participants, extreme poverty was reduced by 2.9 percentage points per year, compared to a 2.7 percentage point decrease for non-participants. The key question is whether program participation plays a causal role in determining income and consumption growth, and thus a reduction of poverty among participants. We will explore this issue further below.

6. Improvement of asset ownership and indebtedness

Table 4 also reports household ownership of non-land assets and indebtedness. For the participants, the value of non-land assets increased from Tk. 18,273 in 1991/92 to Tk. 62,596 in 2010/11, suggesting 12 percent growth in real value per year. In comparison, over the same period, the non-land assets of non-participants grew from Tk. 12,831 to Tk. 68,293, with growth of more than 21 percent per year. By contrast, debt in absolute value has been higher for participants than for non-participants. As a result, the debt-asset ratios are higher for program participants than for non-participants in each year. This means that microfinance participants are more indebted than non-participants, a finding that is consistent with assertions by the critics of microfinance schemes. We will later look at whether microfinance has a causal role in either reducing or increasing the debt-asset ratio.

7. Assessing microfinance participation impacts using long panel data

The descriptive findings reported in earlier sections give a snapshot of the outcomes for microfinance participants and non-participants in the three survey periods. Such findings do not establish causality between the outcomes and microfinance participation. In this section we attempt to find out if and how the changes in the outcomes can be attributed to microfinance participation. The impacts of microfinance have been assessed in the past using earlier data points (1991/92 and 1998/99) from the same panel surveys that we are examining in this study – in both cross-sectional analysis (Khandker 1998; Pitt and Khandker 1996; 1998; Pitt, Khandker, McKernan, and Latif 1999) and panel analysis (Khandker 2005). The previous studies used the amount of borrowing as a measure of intervention, while this study uses the binary participation variable (whether borrowed from microcredit or not) as the intervention. More importantly, this study is interested in exploiting the advantage of the long panel, rather than just assessing simple participation impacts. More specifically, we attempt to address two issues related to the long-term panel: a) whether current participation in the microfinance programs differs from the past participation, and b) whether the continuity in microfinance program participation is significant for household outcomes.[13] We will now examine these two issues in detail.

a) Roles of current and past participation:

In this scenario, we assume that microfinance participation may have differential impacts over time – that is, the effects of current participation may be distinct from those of past participation. Participation impacts may vary by time for different reasons. For example,

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[13] Khandker (2005) distinguished the program effects by current versus past amount of borrowing rather than current versus past participation. Note that variations in participation status are noticeably lower than those of the amount of borrowing. Nonetheless, we are interested in estimating the average impact of participation rather the marginal impact of borrowing. This is what makes this paper different from that of Khandker (2005) and Pitt and Khandker (1998), which estimated the marginal return to borrowing.

during the initial years participants may choose conservative income generation activities. As time goes on, participants may gather knowledge and experience in carrying out business activities and may have accumulated assets, allowing for some risk-taking behavior with new loans. Additionally, the local market conditions that dictate investments in certain activities may change over time. If past participation has an impact on current household outcomes this may be indicative of the lingering effects of microfinance participation. On the other hand, if it is only current participation that has an impact on the outcomes, credit effects may be short-term. In order to assess the time-varying impacts of microfinance participation we can write the outcome equation as:

$$Y_{it} = X_{it}\beta_c + X_{i(t-1)}\beta_p + C_{ift}\delta_{fc} + C_{if(t-1)}\delta_{fp} + C_{imt}\delta_{mc} + C_{im(t-1)}\delta_{mp} + \eta_{it} + \mu_i + \varepsilon_{it} \qquad (1)$$

Here, Y_{it} is the outcome variable of household i (such as income or non-land asset) conditional on microfinance participation by males (C_{imt}) or females (C_{ift}); X_{it} is a vector of household (such as the sex, age, and education of the household head, the landholding, and so on) and village characteristics (such as the availability of infrastructure and the prices of consumer goods); subscript t refers to the survey round (1991/92, 1998/99, or 2010/11); β is a vector of unknown parameters of X variables to be estimated; δ_m and δ_f measure the effects of microfinance participation; c and p refer to current and past credits, respectively; η_{it} is an unobserved household- or village-level determinant of the outcome that is time-varying; μ_i is an unobserved household- or village-level determinant of the outcome that is time-invariant; and ε_{it} is a non-systematic error.[14] So this model assumes that even if a household withdrew from microfinance programs, say, after 1991/92, it can still benefit in 1998/99 provided that $\delta_p > 0$ in 1998/99. Moreover, if the same household continued to

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[14] Participation here refers to any borrowing within the preceding five years of the survey interviews.

participate in 1998/99 it will also benefit from its current participation provided that $\delta_c > 0$ in 1998/99.[15]

Equation (1) has two unobserved determinants of the outcome – one is time-invariant (μ_i) and the other time-varying (η_{it}). The household fixed-effects (FE) estimation technique can eliminate the time-invariant parameter of unobserved characteristics (μ_i) by transforming equation (1) in the following way:

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\begin{aligned}
Y_{it} - \overline{Y}_{it} = & (X_{it} - \overline{X}_{it})\beta_c + (X_{i(t-1)} - \overline{X}_{i(t-1)})\beta_p + (C_{ift} - \overline{C}_{ift})\delta_{fc} + (C_{if(t-1)} - \overline{C}_{if(t-1)})\delta_{fp} \\
& + (C_{imt} - \overline{C}_{imt})\delta_{mc} + (C_{im(t-1)} - \overline{C}_{im(t-1)})\delta_{mp} + (\eta_{it} - \overline{\eta}_i) + (\mu_i - \overline{\mu}) + (\varepsilon_{it} - \overline{\varepsilon}_i)
\end{aligned}
\tag{2}
$$

where the bar variables $\overline{Y}_i$, $\overline{X}_i$, $\overline{C}_{if}$, for example, are average values for each household.[16] Since μ is a constant, $\mu_i = \overline{\mu}$, and its effect is therefore eliminated. However, since $\eta_{it} \neq \overline{\eta}_i$, its effect (which is unobserved) cannot be eliminated, and thus OLS estimation of equation (2) will be biased. One of the ways to control for the effects of time-varying unobserved characteristics is to estimate fixed-effects with instrumental variable method (FE-IV). However, suitable instruments are difficult to find. A suitable instrument is one that will affect microfinance participation directly but will affect the outcomes only indirectly through microfinance participation. Pitt and Khandker (1998) used the exogenous program eligibility criterion to create instruments in the cross-sectional analysis of the 1991/92 data. However, over time such criterion was no longer used by the MFIs for lending purposes and thus it may not be a suitable instrument for panel data ranging from 1991/92 to

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[15] Since the member households covered in the 1991/92 survey started microfinance participation in the late 1980s or early 1990s, their past participation (variables $C_{if(t-1)}$ and $C_{im(t-1)}$) in 1991/92 can be considered 0. However, other past characteristics (vector $X_{i(t-1)}$) are not known for 1991/92 because it is the first survey round, and so 1991/92 observations cannot be used in the estimation of this model.
[16] The transformation of equations such as this to implement FE is what is called *demeaning variables*. Here the means for each variable for each household are subtracted from the variables. In the next step the differenced equation is estimated using OLS.

2010/11.[17] An alternative way to resolve time-varying heterogeneity is to estimate fixed-effects with propensity score-weight (p-weighted FE). The p-weighted FE works on the assumption that a major source of time-varying heterogeneity is the variation in the initial (baseline) characteristics between participants and non-participants, and implementing p-weighted regression controls for such variation.[18] It is implemented by creating a weight variable from the propensity score (which is the predicted probability of participating in microfinance programs based on a participation equation in terms of X variables observed in the initial year of 1991/92), and using that weight in FE estimations of the panel data.[19] We use p-weighted FE in all of our estimations.

b) Roles of continuous and irregular participation:

In this scenario, we make a distinction between members who have been continuous participants in the microfinance programs since 1991/92 and those who have been irregular or short-term participants (that is, were non-members in at least one survey round). Distinguishing membership in this way may be important for assessing how program benefits accumulate. The activities funded through microfinance are small, so are their returns, and with such small returns a certain minimum stay with the programs may be necessary for the benefits to accumulate and make a difference. In this study, we define continuous (or long-term) and irregular (or short-term) participation in the following way: A

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[17] The exogenous program eligibility criterion used in Pitt and Khandker (1998) was based on the eligibility of households to participate in microfinance programs (whether a household has a land asset of fifty decimals or less) in a village that has microfinance programs. Starting from the mid-1990s, as the number of MFIs increased, so did the competition among them, and they relaxed and eventually ceased to apply the eligibility criterion in order to attract new members. Nevertheless, we tried this instrument in an FE-IV estimation model, however we found that the exogeneity of the credit participation variables (C_{imt} and C_{ift}) cannot be rejected for the majority of the outcomes, implying that the instrument may not be valid.

[18] The relationship between the initial characteristics and time-varying heterogeneity has been established in the literature (Heckman 1981; Chamberlain 1984; Arulampalam, Booth, and Taylor 2000).

[19] Propensity score weight is defined by following: pw=1/p for participants, and pw=1/(1-p) for non-participants, where p is the propensity score, and pw is the propensity score weight. It is possible to obtain efficient estimates of average treatment effect using weight created from propensity score this way (Hirano, Imbens and Ridder 2003).

household is considered a continuous participant in a given year if it has participated every year from 1991/92 up to and including the year of the observation. On the other hand, a household is considered a short-term or irregular participant if it has participated in at least one year but not in all years between 1991/92 and the year of the observation. These definitions are applied for each survey round. With these new definitions, a household's status as a continuous or short-term participant can vary from year to year. To accommodate continuous and irregular participation we can write the outcome equation as:

$$Y_{it} = X_{it}\beta + C_{ifct}\delta_{fc} + C_{ifnt}\delta_{fn} + C_{imct}\delta_{mc} + C_{imnt}\delta_{mn} + \eta_{it} + \mu_i + \varepsilon_{it} \qquad (3)$$

Here, the subscripts c and i refer to continuous and irregular participation in microfinance programs, respectively, and all other variables are as defined for equation (1). So, according to this model, a household was a continuous participant in 1998/99, for example, if it participated in microfinance programs in both 1991/92 and 1998/99, and was an irregular or short-term participant in 1998/99 if it participated in just one of the two years. A continuous participant in 1998/99 can become an irregular participant in 2010/11 if it stops participating in 2010/11. So, to become a continuous participant in a given year, a household must have participated in all survey years since 1991/92 up to that year.[20] Therefore, the excluded category is the group who did not participate in any of the survey years. Similar to equation (1), equation (3) is implemented using p-weighted FE.

8. Results on current and past participation

Table 5 presents findings based on equation (1) – impacts of current and past participation in microfinance programs on household outcomes. The outcomes of interest are income,

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[20] For 1991/92, all member households are considered irregular or short-term since they started participating in the microfinance programs around that time.

expenditure, poverty (both moderate and extreme), non-land asset, and debt-asset ratio. The R square fits well for most of the outcomes, ranging from 0.138 to 0.491. Here the effect of past participation measures the lingering effect of participation on current outcomes, while the effect of current participation measures any additional effect, if any, of participation on current outcomes. Neither the past participation nor the current participation (by either males or females) has any impact on household income.[21] In the case of expenditure, however, women's past participation has a statistically significant positive effect – women's past participation increases per capita expenditure by 5.5 percent, while their current participation does not have any such effect. Like household income, moderate poverty does not seem to be affected by program participation. However, extreme poverty seems to decrease as a result of women's current participation (with a statistical significance at 10 percent level).

The trend is somewhat different in the case of non-land assets and debt-asset ratios, where current borrowing seems to play a greater role than past borrowing. Men's current borrowing increases a household's non-land assets by 23 percent while women's current borrowing increases it by 9.9 percent. Similarly, the current borrowing of both men and women lowers household indebtedness. More specifically, the current borrowing of men and women lowers the debt-to-asset ratio by 9.8 percentage points and 17 percentage points, respectively. Summing up the findings, we can say that microfinance reduces poverty without making borrowers over-indebted relative to the assets accumulated in the process, and there are differential impacts of past and current participation in microfinance programs. We can also conclude that microfinance participation matters more for women than for men.

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[21] This does not mean microfinance participation does not affect any type of income. For example, it may affect non-farm income and still may not have a significant effect on total income. Moreover, participation may take different forms - such as continuous versus non-continuous - which may have differential effects that may not be captured by an average measure of participation.

9. Results on continuous and irregular participation

Table 6 presents findings based on the impact of continuous and irregular participation in microfinance programs on household outcomes. Men's participation does not seem to be significant once we make a distinction between continuous and irregular participation. However, for women participants, continuity benefits the participants more than irregularity for most of the outcomes considered. Continuous participation by women in microfinance programs increases household per capita income by 2.5 percent and per capita expenditure by 8.2 percent, and lowers moderate and extreme poverty by 7.2 percentage points and 3.1 percentage points, respectively. Only household non-land assets seem to increase as a result of the irregular or short-term microfinance participation of women. Surprisingly, continuous participation of women does not matter for household non-land assets. On the other hand, both the short-term and long-term participation of women lowers the household debt-asset ratio, with the effect slightly higher for continuous participation. The findings of this section confirm our assumption that, given the small scale of microloan-financed activities, participants have to stay longer with the programs to accumulate measurable benefits.

10. Average treatment effect of microfinance

We now calculate the average treatment effects (ATE) of microfinance participation by gender over the twenty year period between 1991/92 and 2010/11. This is done by point estimates for linear combinations of the coefficients of continuous and irregular borrowing reported in Table 6 and the results are presented in Table 7. As the findings show, male participation does not have an impact on any of the outcomes of interest, while female participation has a positive impact on most of them. Female participation increases per capita total expenditure by 8.2 percent, and lowers moderate and extreme poverty by 5.6 and

3.2 percentage points, respectively. Female participation also lowers the debt-to-non-land asset ratio by about 17 percentage points.

For comparison purposes, in Table 7 we also report the direct impacts of male and female participation based on p-weighted FE estimation. Unlike the point estimates derived from the linear combinations of continuous and irregular participation, direct estimates show statistically significant impacts of male participation on extreme poverty, non-land assets, and debt-to-non-land assets. As per the direct estimates, male participation lowers extreme poverty by 5.1 percentage points, which is higher than the poverty reduction resulting from female participation. Both male and female participation increases a household's non-land assets in direct estimates, with the effects of male participation (0.236) being higher than the effects of female participation (0.211). Finally, male participation reduces the debt-to-non-land asset ratio by 8.5 percentage points, while female participation lowers it by about 17 percentage points, which is the same as the reduction based on point estimates.

11. Poverty reduction in Bangladesh due to microfinance

How much poverty reduction is possible based on the estimates of microfinance participation? From the findings of Table 7 we see that female participation in microfinance can lower moderate poverty and extreme poverty by 5.5 and 3.2 percentage points, respectively, based on point estimates. These figures can be used to estimate the aggregate poverty reduction in rural Bangladesh that can be attributed to microfinance. We use the following formula to assess the role of microfinance (women's borrowing to be more specific) in poverty reduction in rural Bangladesh: C = A/B, where:

C = Microcredit contribution to total poverty reduction in rural Bangladesh (%),

A = Number of rural population lifted out of poverty due to microcredit intervention over a twenty-year period,

B = Number of the total rural population lifted out of poverty over a twenty-year period.

Calculation of A:

Microfinance programs in rural Bangladesh had about 27.5 million borrowers in 2010 (MRA 2010; Grameen Bank 2010). Among them over 90 percent were women, that is, about 25 million members were women, representing the same number of households. However, because of the phenomenon of overlapping (households borrowing from multiple microcredit lenders), this figure includes multiple counting, and the actual number of beneficiary households is thus less. A recent study estimates the rate of household overlapping as 43 percent in 2010 (Faruqee and Khalily 2011b), which puts the number of unique beneficiary households for women borrowers at 14.3 million. So, at a 5.5 percent poverty reduction rate, around 0.8 million households or about 3.4 million people within the rural population were lifted out of poverty due to microfinance intervention during the twenty-year study period (assuming an average household size of 4.3 people). In other words, A = 3.4 million.

Calculation of B:

In 2010, the rural population of Bangladesh was 105 million (based on the national population of 150 million and a 70 percent rural population), and the actual poverty reduction in rural Bangladesh during the 1991/92 to 2010/11 period was 23.6 percentage points for moderate poverty and 22.7 percentage points for extreme poverty (GOB 2014-15). This implies that 24.8 million (=0.236*105) people moved out of poverty. That is, B = 24.8.

Calculation of C:

$$C = A/B = 3.4/24.8 = 0.137 \approx 13.7\%.$$

Accordingly, microfinance intervention accounts for about 13.7 percent of the total moderate poverty reduction in rural Bangladesh. Similarly, using the regression coefficient for extreme poverty (0.032) and the total reduction of extreme poverty in rural Bangladesh (22.7 percentage points), the contribution of microfinance to total extreme poverty reduction is about 8.8 percent.[22]

12. Cost-effectiveness of microfinance borrowing

One of the basic objectives for carrying out an impact evaluation exercise is to assess the cost-effectiveness of intervention programs. In this case it entails calculating the average returns to program participation, which is then compared with the average cost of program participation. As a minimum, the estimates of average yearly returns from income-generation activities are to be compared with the average cost of borrowing per year.[23] A recent study on rural growth in the farm and non-farm sectors in Bangladesh, which uses the same data as the present study, finds that rural non-farm enterprises, which have the most support from microfinance lending in rural Bangladesh, have an average rate of return ranging from 40 to 54 percent (Khandker and Samad 2014b). The question then is how much it costs to borrow from MFIs in Bangladesh. A study calculates that the average yearly cost of borrowing from MFIs in Bangladesh is as high as 32 percent per year (Faruqee and

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[22] If we use the figures from direct estimates (p-weighted FE estimates from Table 7), the contribution of microfinance to aggregate poverty reduction would be 7.3 percent for moderate poverty and 8.8 percent for extreme poverty. These figures, while impressive, may still underestimate the poverty reducing effects of microcredit as they do not take into account the spillover effects of microcredit benefits. With our data it is difficult to estimate spillover effects because by 2010 almost all villages in Bangladesh were under microcredit operation.

[23] This is of course a lower bound estimate of the microfinance benefits, as other benefits (for example, impacts on outcomes such as expenditure, and assets) are not considered here.

Khaliliy 2011a). That means that the average returns from program participation are adequate enough to pay off the cost of borrowing.

13. Conclusion

This paper examines the role of microfinance in poverty reduction in rural Bangladesh using long panel survey data collected three times over a period of twenty years between 1991/92 and 2010/11. The paper also examined the cost-effectiveness of microfinance. Microfinance growth has been phenomenal in rural Bangladesh in recent times. Membership grew from 8 million to 34 million during 1996-2010 (23 percent yearly growth), loan disbursement from about Tk. 32 billion to Tk. 372 billion during the same period (about 80 percent yearly growth), savings from Tk. 8 billion in 1996 to Tk. 161 billion in 2010 (137 percent yearly growth), and savings as a percentage from 50 percent in 1996 to 69 percent in 2009 (2.9 percent yearly growth). Survey data suggests that loan sizes increased from Tk. 9,252 in 1991/92 to Tk. 17,006 in 2010/11, implying a 4 percent annual growth. More than two-thirds of loans issued during the survey period were received by women. Among the activities financed through microfinance, the farm sector constituted 39.8 percent, the non-farm sector 56.5 percent, and other miscellaneous purposes 3.7 percent in 2010/11. Trading has been the most dominant activity in the non-farm sector.

Survey data suggests that while poverty decreased across the board during the twenty-year period, it decreased more for microfinance participants than for non-participants. For example, extreme poverty decreased by 58.9 percentage points for participants between 1991/92 and 2010/11 and by 55.4 percentage points for non-participants during the same period. Fixed-effects estimates that control for various exogenous characteristics at the household- and community-level, show that household welfare outcomes improved as a result of microfinance borrowing. Findings show that

women participants were better able to improve their welfare than participants who were men . For example, moderate and extreme poverty decreased by 5.6 percentage points and 3.2 percentage points, respectively, as a result of participation by women in microfinance, whereas participation by men had no such effects on poverty. However, participation by both men and women, in particular their current participation, has been found to increase non-land assets and lower the debt-to-asset ratio. Moreover, continuous borrowers seem to have fared better than irregular borrowers in the long run. For example, continuous participation by women increases per capita expenditure by 8.2 percent, while irregular participation b does not have any effect on expenditure. Furthermore, the findings suggest that microfinance intervention accounts for about a 13.7 percent reduction in moderate poverty and an 8.8 percent reduction in extreme poverty in rural Bangladesh. Given that the average return on activities financed through microfinance (40 to 54 percent) is higher than the cost of borrowing (32 percent), microfinance borrowing is also cost-effective.

Our findings suggest that the effects of microfinance programs on poverty-reduction are still significant after twenty years of operation. However, it seems that for the most part, activities supported by microfinance have not been greatly diversified over time. While non-farm activities constituted about 52 percent of the microfinance portfolio in 1998/99, they only increased to 57 percent in 2010/11. Moreover, within the non-farm sector trading remained the most important activity during this twelve-year period, while the share of manufacturing and processing activities in fact shrank. So, in order to stimulate structural change in the rural economy, microfinance activities should expand to allow for more growth-oriented activities in the non-farm sector, in particular, more manufacturing and processing activities.

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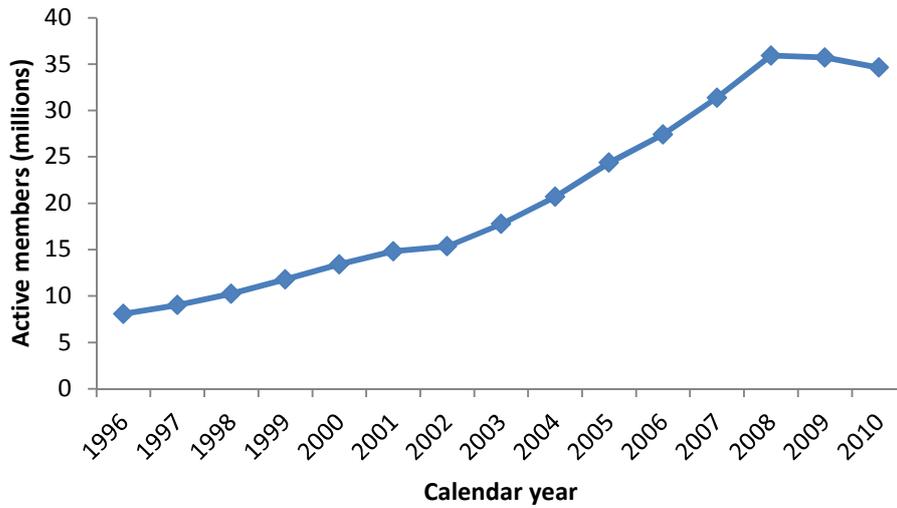
Figures

Figure 1. Trend of microfinance members in Bangladesh

Source: CDF (1996-2007); InM & CDF (2008-2010); Grameen Bank (2010).
Note: Findings reported in this figure are provisional.

Figure 2.Trend of loan disbursed by the MFIs in Bangladesh

Source: CDF (1996-2007); InM & CDF (2008-2010); Grameen Bank (2010).
Note: Findings reported in this figure are provisional.
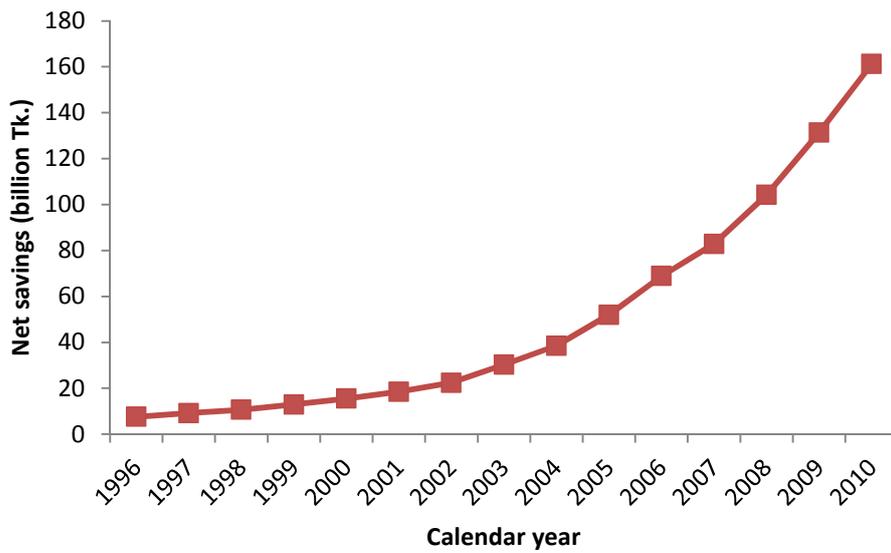
Figure 3. Trend of savings mobilized by the MFIs in Bangladesh

Source: CDF (1996-2007); InM & CDF (2008-2010); Grameen Bank (2010).
Note: Findings reported in this figure are provisional.
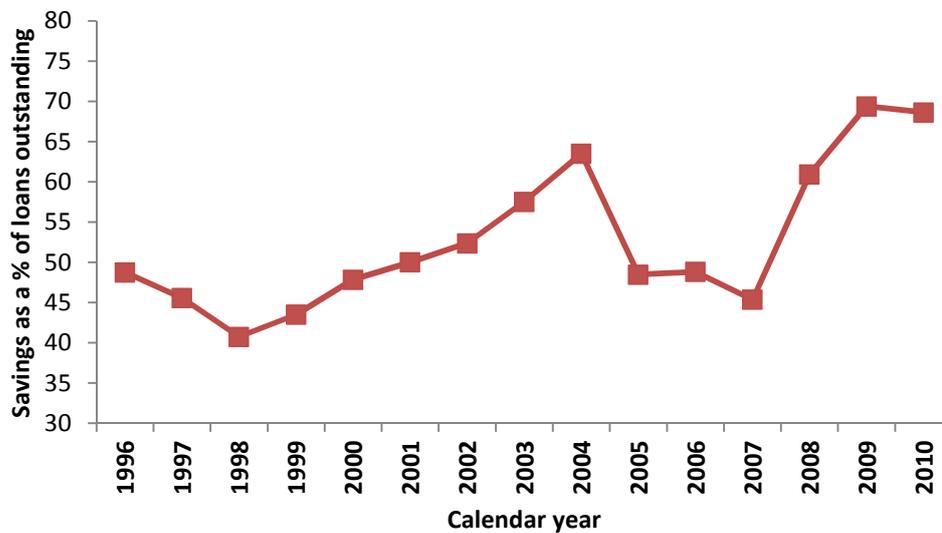
Figure 4. Savings as a % of loans outstanding by MFIs in Bangladesh

Source: CDF (1996-2007); InM & CDF (2008-2010); Grameen Bank (2010).
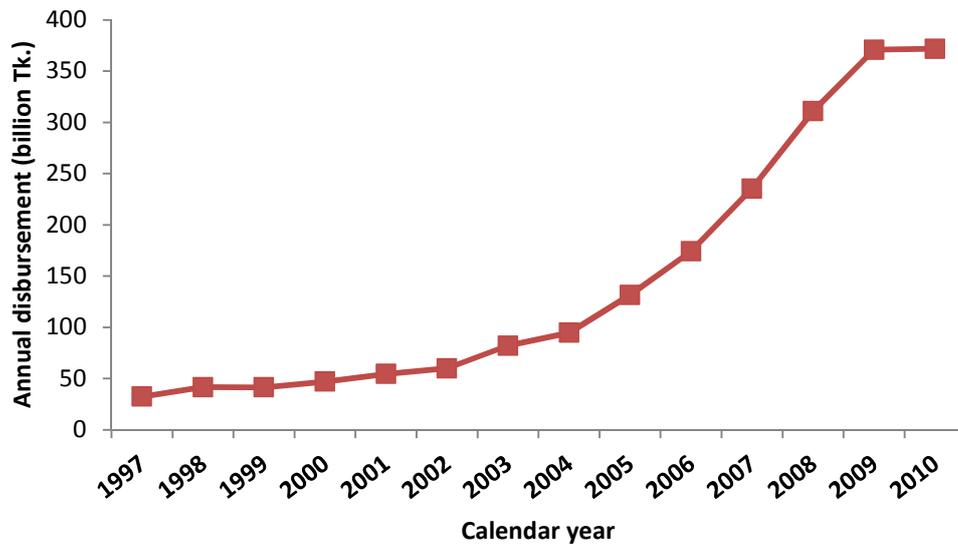*Note:* Findings reported in this figure are provisional.

Figure 5. Transition of participation status over time: 1991-2010/11

Source: World Bank-BIDS surveys 1991/92 and 1998/99; and World Bank-InM survey 2011.
Note: Boxes at each level (survey year) show the breakdown of participants or non-participants from the previous year (represented by the parent box year). Clear boxes represent participants and shaded boxes non-participants.

Tables

Table 1. Microfinance program participation rates among households: 1991/92-2010/11

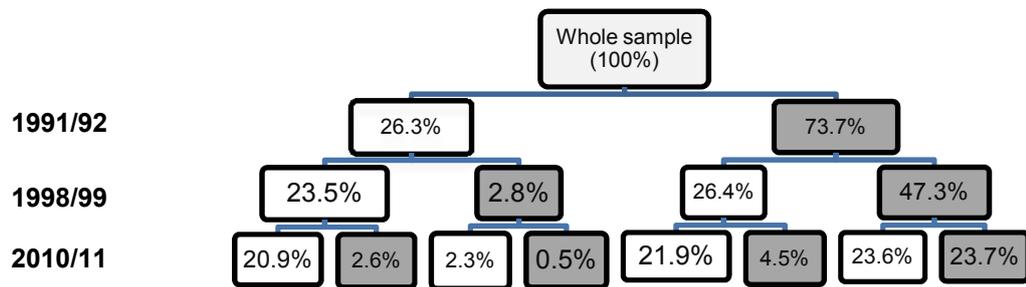| Survey year	GB	BRAC	BRDB	ASA	Other programs (one or multiple)	Any program	Non-participant
1991/92 (N=1,509)	8.7 (8.6)	11.2 (9.0)	6.4 (5.8)	0 (0)	0 (0)	26.3 (23.3)	73.7
1998/98 (N=1,758)	15.1 (13.6)	16.2 (10.1)	8.3 (4.4)	4.1 (3.6)	14.9 (11.4)	48.6 (38.0)	51.4
2010/11 (N=2,322)	27.4 (21.7)	20.9 (12.3)	4.7 (1.3)	23.8 (19.3)	32.9 (28.2)	68.5 (56.2)	31.5

Note: The sample is restricted to 1,509 panel households from 1991/92 survey that are common to all three surveys. The sample size is higher in 1998/99 and 2011 because of household split-offs. Figures in parentheses are percentages of borrowers. The sum of the figures across columns for 1998/99 and 2010/11 exceeds 100 percent because of household participation in multiple programs.
Source: World Bank-BIDS surveys 1991/92 and 1998/99; World Bank-InM survey 2010/2011.

Table 2. Household cumulative borrowing from microfinance programs over time: 1991/92-2010/11

Survey year	GB loans	BRAC loans	BRDB loans	ASA loans	Loans from other programs	Aggregate loans from all programs
1991/92 (N=769)	16,289.4	5,276.7	6,453.9	0	0	9,252.3
1998/99 (N=1,099)	25,938.4	6,377.1	6,552.4	6,346.8	4,680.2	13,262.1
2010/11 (N=1,770)	11,597.6	13,452.3	2,501.3	7,760.1	10,849.5	17,005.6

Note: Findings are restricted to microfinance participants. Loans are CPI-adjusted (1991/92=100). Loans are cumulative for 5 years preceding the survey rounds. Figures in parentheses are sample sizes.
Source: World Bank-BIDS surveys 1991/92 and 1998/99; World Bank-InM survey 2010/11.

Table 3. Distribution of purposes of microfinance loans (%): 1998/99-2010/11

Loan purpose	1998/99	2010/11
Farm sector activities	27.5	39.8
Agricultural input purchase	11.8	6.8
Purchase or improvement of agricultural land	4.4	4.1
Other agricultural expenses	11.3	28.9
Non-farm sector activities	51.8	56.5
Transport business	4.9	7.8
Trading	27.5	27.4
Milch cow and cow fattening activities	10.7	15.3
Manufacturing	6.7	2.9
Service sector	2.0	3.1
Personal	20.7	3.7
Consumption	6.1	0.2
Building or improvement of a house	6.9	2.4
Repayment of other loans	3.8	0.1
Other personal expenses	3.9	1.0

Note: Loan purpose is excluded from 1991/92 survey because its distribution category is different from that of the 1998/99 and 2010/11 survey rounds.
Source: World Bank-BIDS survey 1998/99; World Bank-InM survey 2010/11.

Table 4. Household outcomes by microfinance participation status for the three survey years

Outcome variable	1991/92		1998/99		2010/11	
	Participants (N = 769)	Non-participants (N = 483)	Participants (N = 1,014)	Non-participants (N = 420)	Participants (N = 1,554)	Non-participants (N = 334)
Per capita income (Tk./month)	521.8	495.6	502.7	523.1	1,091.3	1,119.4
	t = 0.74		t = -0.86		t = -0.30	
Per capita expenditure (Tk./month)	327.3	318.6	440.0	436.9	571.6	604.0
	t = 1.04		t = 0.17		t = -1.72	
Moderate poverty (%)	86.3	87.6	60.6	58.2	32.9	34.6
	t = -0.67		t = 0.88		t = -0.62	
Extreme poverty (%)	75.1	78.5	43.6	46.5	16.2	23.1
	t = -1.38		t = -1.05		t = -3.19	
Non-land asset (Tk.)	18,273.0	12,830.7	20,089.2	25,415.2	62,595.9	68,294.3
	t = 3.73		t = -2.46		t = -0.76	
Debt-to-non-land asset ratio (%)	24.2	19.4	28.8	6.7	33.7	19.5
	t = 1.41		t = 9.04		t = 2.17	

Note: Monetary figures are CPI-adjusted (1991/92=100). The analysis is restricted to the 1991/92 microfinance-eligible households (i.e., those who participated and those who were eligible but did not participate in microfinance programs in 1991/92).
Sources: World Bank–BIDS surveys 1991/92 and 1998/99; World Bank–InM survey 2010/2011.

Table 5. Impacts of current and past participation in microfinance programs on household outcomes (Propensity score-weighted HH FE) (NHH = 1,509)

Participation variables	Log per capita total income (Tk./month)	Log per capita total expenditure (Tk./month)	Moderate poverty	Extreme poverty	Log non-land asset (Tk.)	Debt to non-land asset ratio
Current male participation	0.015	0.035	0.008	-0.011	0.231**	-0.098**
	(0.16)	(0.95)	(0.23)	(-0.33)	(3.36)	(-3.16)
Past male participation	-0.114	-0.022	0.028	0.042	-0.148	0.047
	(-1.44)	(-0.50)	(0.61)	(1.20)	(-1.17)	(1.55)
Current female participation	-0.007	-0.022	0.005	-0.033*	0.099*	-0.170**
	(-0.18)	(-0.98)	(0.19)	(-1.67)	(1.96)	(-7.68)
Past female participation	-0.012	0.055**	-0.015	-0.024	-0.076	0.030
	(-0.21)	(2.94)	(-0.59)	(-1.09)	(-1.13)	(1.28)
R^2	0.138	0.288	0.191	0.224	0.491	0.196

Note: Figures in parentheses are t-statistics based on robust standard errors clustered at village level. * and ** refer to
a statistical significance level of 10 percent and 5 percent (or less), respectively. Loans refers to the cumulative amount borrowed from all microfinance sources leading up to the survey year. Regressions include more control variables at the household (age, sex, education of head, and log of land asset) and village level (village price of consumer goods, male and female wage, infrastructure such as availability of electricity and schools, and proportion of village land irrigated).
Sources: World Bank–BIDS surveys 1991/92 and 1998/99; World Bank–InM survey 2010/2011.

Table 6. Impacts of continuous and irregular participation in microfinance programs on household outcomes (Propensity score-weighted HH FE) (NHH = 1,509)

Participation variables	Log per capita total income (Tk./month)	Log per capita total expenditure (Tk./month)	Moderate poverty	Extreme poverty	Log non-land asset (Tk.)	Debt to non-asset ratio
Continuous male participation	0.084	0.029	-0.082	-0.002	-0.086	-0.044
	(0.70)	(0.46)	(-1.17)	(-0.03)	(-0.70)	(-0.78)
Irregular male participation	-0.049	0.029	-0.041	0.017	0.031	-0.016
	(-0.75)	(0.74)	(-1.04)	(0.48)	(0.42)	(-0.58)
Continuous female participation	0.025*	0.082**	-0.071**	-0.031**	-0.115	-0.087**
	(1.78)	(2.66)	(-2.02)	(-2.43)	(-1.45)	(-2.90)
Irregular female participation	-0.044	0.001	0.016	-0.001	0.133**	-0.080**
	(-1.21)	(0.04)	(0.78)	(-1.03)	(3.41)	(-5.52)
R^2	0.120	0.377	0.302	0.332	0.449	0.155

Note: Same as in Table 5.

Sources: World Bank–BIDS surveys 1991/92 and 1998/99; World Bank–InM survey 2010/2011.

Table 7. Aggregate effects of microfinance borrowing (NHH = 1,509)

Explanatory variables	Log per capita total income (Tk./month)	Log per capita total expenditure (Tk./month)	Moderate poverty	Extreme poverty	Log non-land asset (Tk.)	Debt to non-asset ratio
Point estimates for linear combinations of the coefficients from Table 6						
Male participation	0.035	0.058	-0.120	0.016	-0.056	-0.060
	(0.21)	(0.63)	(-1.23)	(0.17)	(-0.32)	(-0.85)
Female participation	-0.018	0.082**	-0.056*	-0.032**	0.018	-0.166**
	(-0.25)	(2.17)	(-1.66)	(-1.99)	(0.18)	(-4.41)
Propensity score-weighted HH FE						
Male participation	0.016	-0.014	0.0003	-0.051*	0.236**	-0.085**
	(0.28)	(-0.76)	(0.01)	(-1.82)	(4.82)	(-4.36)
Female participation	0.025	0.049**	-0.029**	-0.034**	0.211**	-0.167**
	(0.77)	(2.09)	(-2.14)	(-2.11)	(5.45)	(-9.91)
R^2	0.120	0.376	0.300	0.333	0.454	0.189

Sources: World Bank–BIDS surveys 1991/92 and 1998/99; World Bank–InM survey 2010/2011.

Appendix

Table A1. Joint significance test for the explanatory variables in the attrition equation (NHH=1,769)

Test statistics	Log per capita total income (Tk./month)	Log per capita total expenditure (Tk./month)	Moderate poverty	Extreme poverty	Log non-land asset (Tk.)	Log net-worth (Tk.)
$\chi^2(24)$	108.50	109.30	89.60	88.27	88.86	98.92
p-value	0.000	0.000	0.000	0.000	0.000	0.000

Note: For each outcome (income, expenditure, etc.), attrition is estimated with a probit regression using the 1991/92 sample where explanatory variables include all household and community-level exogenous variables and the outcome variable itself. Then a joint significance test is run for all explanatory variables.
Source: WB-BIDS surveys 1991/92 and 1998/99; WB-InM survey 2010/11.

Table A2. Joint significance test for attrition and attrition-interacted explanatory variables in outcome equations (NHH=1,769)

Test statistics	Log per capita total income (Tk./month)	Log per capita total expenditure (Tk./month)	Moderate poverty	Extreme poverty	Log non-land asset (Tk.)	Log net-worth (Tk.)
F(24,86)	3.17	4.74	6.98	3.30	2.43	4.43
p-value	0.000	0.000	0.000	0.000	0.001	0.000

Note: Outcome variable is regressed on attrition dummy, all exogenous variables, and interactions of attrition and the exogenous variables in the 1991/92 sample. Then a joint significance test is run for the attrition variable, and for the interaction of the attrition and exogenous variables.
Source: WB-BIDS surveys 1991/92 and 1998/99; WB-InM survey 2010/11.

Abstract (in Japanese)

要約

本稿では、1991 年から 2011 年の間に 3 次にわたり収集されたパネルデータを使用し、バングラデシュにおいてマイクロファイナンスが貧困削減に果たした役割について検証している。具体的には、マイクロファイナンスの現在の利用と過去の利用、継続的な利用と不定期な利用を区別し、それぞれの利用パターンの貧困削減への効果について分析している。主な結果は以下の通りである。まず、マイクロファイナンス利用者の方が、非利用者に比べて貧困状況が改善している度合いが大きかった。また、男性の利用者よりも、女性の利用者に対する効果の方が大きいことが明らかとなった。加えて、継続的にマイクロファイナンスを利用している人の方が、不定期に利用している人よりも貧困状況が改善していることもわかった。全体的には、マイクロファイナンスの利用は費用対効果が良く、Moderate Poverty 削減の 7 分の 1、Extreme Poverty の 11 分の 1 に寄与していることが示された。最後に、マイクロファイナンスの効果をより高めるためには、製造業や加工業など、非農業部門での活動についても、マイクロファイナンスを活用して拡大していくことを提言している。

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