

Impact of Microfinance on Household Income and Consumption in Bangladesh: Empirical Evidence from a Quasi-Experimental Survey

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ABSTRACT

This paper analyses the impact of microfinance programs on income and consumption of households in Bangladesh. Primary data on 439 households across 20 villages in 4 districts were collected using a quasi-experimental survey approach. The sample was designed so that member households of microfinance programs were compared with non-member households of similar characteristics. In our econometric analysis, economic wellbeing is proxied using measures of household income and consumption. The empirical results indicate that despite our survey design effort, microfinance members remain poorer than non-members. But participation in microfinance has positive impacts: one percent increase in the duration of microfinance membership is associated with an increase of income and consumption per adult equivalent by 0.19 and 0.16 percent, respectively. Also, an additional month of participation in microfinance is associated with the lower probability of being poor (using \$1.25 PPP per person per day) by 7 Percentage points.

Keywords: Microfinance, Households' wellbeing, Quasi-experimental survey, Impact, Bangladesh.

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1. Introduction

Microfinance includes the delivery of financial services to the poor. The core principle under the operation of microfinance is to provide loan to group of borrowers with peer monitoring to secure loan instead of relying on physical collateral like traditional financing usually used elsewhere in the finance industry (Nghiem, Coelli & Rao 2012). Rahman and Khan (2013), among many other studies, found significant effects of microfinance on socio-economic indicators of households in Bangladesh. Microfinance was also associated with the development of small businesses, which in turn, increased income and consumption of beneficiary (Chowdhury & Mukhopadhaya 2012).

Microfinance in Bangladesh has captured the attention of researchers throughout the world. Among the major microfinance institutions (MFIs) in Bangladesh the Grameen Bank, and the Bangladesh Rural Advancement Committee (BRAC) are the pioneers of microfinance service providers (Rahman 2010). Although the microfinance movement has developed rapidly in Bangladesh over the last three decades, there has been little research on the wider contribution of microfinance to the livelihood of its clients in Bangladesh. Moreover, there is no consensus in the microfinance literature that has attempted to control for selection bias; for example Pitt and Khandker (1998), Coleman (1999), Khandker (2005), Chemin (2008), and Morduch and Roodman (2009). A very few studies, including Imai and Azam (2012); Nawaz (2010); Amin, Shah and Becker (2010), have examined the contribution of microfinance in Bangladesh to show the extent of impact on economic condition based on secondary data, rather than putting emphasis on the extent of consequences of microfinance on the households. To the best of our knowledge, no previous studies in Bangladesh have researched the impact of microfinance on the member and non-member households' income and consumption using a quasi-experimental survey except one, Pitt and Khandker (1998), who only considered the

consumption of the households in their study. Therefore, to fill up this gap in the literature, this study examines the impacts of microfinance on income and consumption that lead to poverty alleviation in Bangladesh. The main objective of this paper is to examine the effects of microfinance on the economic welfare of member households using a quasi-experimental survey pioneered by Coleman (1999). This approach offers a reliable estimation of microfinance effects while it is less time and resource consuming than a randomised control survey.

The remaining of the paper is structured as follows: Section two presents a brief review of literature. Section three describes the conceptual framework, survey design, data sources and descriptive statistics. Section four specifies the econometric models, and results are discussed in Section five and Section six concludes.

2. Review of Literature

One of the major challenges in the study of microfinance is self-selection bias, which occurs due to two reasons: self-selection (voluntary participation in program) and non-random placement (selective placement in programs). Self-selection bias might arise frequently when participants of social interventions programs decide whether to participate on a voluntary basis. In most of the cases, self-selection will lead to biased results, as the respondents who choose to participate may have some unobserved characteristics that also affect the program outcomes. Existing literature adopted different strategies to deal with self-selection bias. For example, one of the most widely cited microfinance studies by Pitt and Khandker (1998) examined effects of the Grameen bank microfinance programs in Bangladesh. They used an exogenous eligibility criterion for microfinance participation (i.e., households own a half an acre or less) as an instrumental variable (IV) to address the self-selection issue. The remaining unobserved heterogeneity

was addressed by using a village fixed-effects estimator. The authors revealed that the consumption of microfinance members increased by 18 Bangladeshi Taka (BDT) for every 100 BDT of loans. Morduch and Roodman (2009) found that their choice of instrumental variable (own half an acre of land) was not strictly followed in practice. As a result, significant effects found by Pitt and Khandker (1998) was affected by this eligibility criterion. Subsequently, Islam and Choe (2013) and Khalily and Khaleque (2013) also used IV method to control for selection bias. But they used Generalised Method of Moments (GMM) estimator which would be better as it can control for unknown heteroskedasticity.

Coleman (1999)'s study was the first to apply quasi-experimental survey in microfinance study to control for self-selection and program placement bias. Quasi-experimental surveys are designed to ensure that the characteristics of control (non-member) and treatment (member) groups are similar. Coleman (1999) compared outcomes of households included in the program with those who were on the waiting list. Quasi-experimental surveys offer several advantages. First, they can control for endogeneity without imposing the large research costs associated with randomized control trials (RCTs). Second, the use of structural models can explain how microfinance affects the livelihoods of clients. Third, one can apply econometric methods such as fixed effects to control for any residual endogeneity. Finally, a quasi-experimental survey has the ability to address spill over effects, even in cross-section setting. Subsequently, Tedeschi (2008), Kaboski and Townsend (2011) and Nghiem, Coelli and Rao (2012) also used quasi-experimental survey to overcome the selection bias in their study. Nghiem, Coelli and Rao (2012) confounded problems of selection bias and non-random placement in assessing the impact of microfinance in Vietnam. They tried to control the bias at the survey stage by using quasi-experimental survey and the residual unobserved heterogeneity was controlled

by using village fixed effect model. Their results showed that participation in microfinance has a positive effect upon household welfare (proxied by income and consumption).

Another approach to address the self-selection bias is analysing panel data. One recent study in Bangladesh based on new household panel data by Imai and Azam (2012), who applied fixed-effects estimator and found a positive and significant impacts on both household income and consumption. We argue that in a relatively long panel data (1991/92 and 1998/99) effects of small loans from microfinance (if any) may be diluted. Similarly, the panel data study by Khandker and Samad (2014) found that microcredit programs have significant positive effects in raising the per capita income and consumption, household non-land assets and net worth.

By exploiting repeated cross-sectional study was available, Duong and Nghiem (2013) applied a quasi-panel data approach and revealed that microfinance contributes significantly to household consumption, income and poverty reduction. On the other hand, Morduch (1998) used the difference in difference (DID) technique. Imai and Azam (2012) used household fixed effects models and difference in difference and propensity score matching (DID-PSM) to control for sample selection or endogeneity in relation to participation in microfinance. Chemin (2008) also attempted to address the selection bias using propensity score matching (PSM).

The most recent approach to overcome the selection problem is the application of randomised control survey. Banerjee et al. (2013) applied this approach to slum dwellers in Hyderabad, India and found that access to microfinance create no significant effects to any development outcomes, including “health, education, and women’s empowerment”.

In short, the literature of microfinance is vast and we focus on reviewing key approaches to overcome the self-selection issues: instrumental variable, panel data, quasi-experimental survey and randomised control surveys. The findings of results varied in study and seem sensitive to choice of methods. Given the relative size of microfinance loans, we expect the effect of microfinance loans would be negligible.

After considering the relative strengths and weaknesses of each approach, we decide to apply a quasi-experimental survey approach in this study. In particular, we mitigate individual unobserved heterogeneity (self-selection) by selecting control (member) and treatment (non-member) households that have similar characteristics. We also used fixed effect model to control for unobserved heterogeneity at village level.

3. Methodology

3.1 Conceptual Framework

In this study, the conceptual framework is constructed mainly on models developed by Nghiem (2009), Zeller (1995), Scoones (1998), and AIMS (2001). Furthermore, the study uses the model of Marr (2002) and Schreiner (1997) to investigate the range, domains and cause and effect relationship. Particularly, the extent of analysis concentrates on personal and household levels assuming collective income. We can classify household resources into three categories namely financial, physical and human capital. This pool of resource comprises the household benefit and gifts which will be mobilised from external sources like social networks and microfinance. Households utilize their pool of resources for three kinds of activities such as production, consumption and investment (Figure-1). Production activities are categorized into activities generating income and activities generating goods and services for consumption of households. Consumption comprises activities to fulfil needs and requirements of food, healthcare,

education etc. Investment related items may be classified as real properties, physical stores of wealth, financial stocks and productive assets.

It can be seen from this model that, impacts of microfinance-access can be measured through the changes in livelihood strategies, resources, activities, and outcomes of member households. Key relationships in the conceptual framework (e.g. social networking and access to microfinance) are presented by two arrows, reflecting the self-selection of microfinance. One mechanism for self-selection is that unobserved characteristics such as business ability and risk attitude affect both the decision to participate in microfinance and outcomes of participation. This study aims to mitigate the effects of the self-selection bias by using a quasi-experimental survey approach.

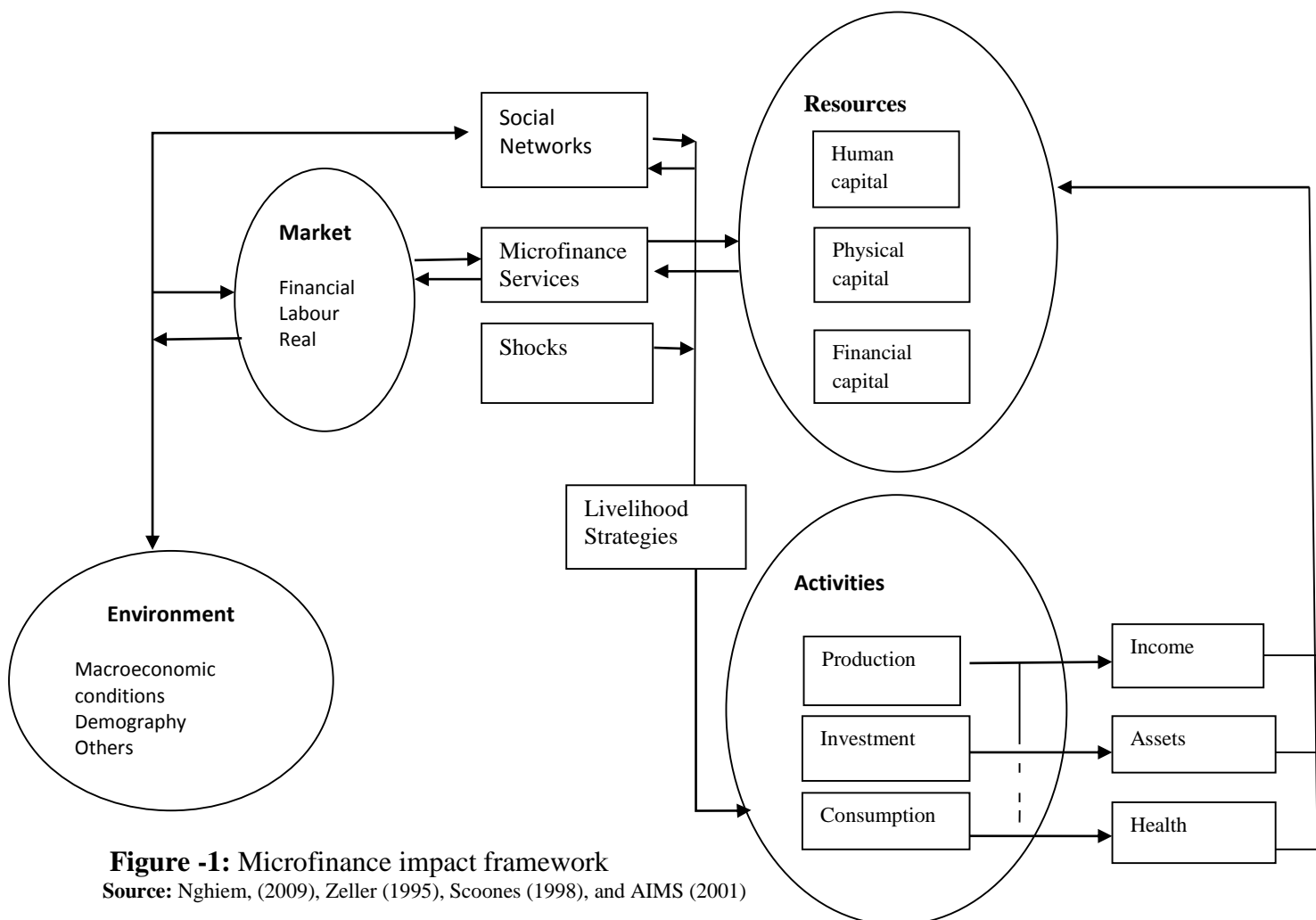


Figure -1: Microfinance impact framework
 Source: Nghiem, (2009), Zeller (1995), Scoones (1998), and AIMS (2001)

3.2 Survey Design and Data

The study was based on a two surveys with village leaders and households. The first survey includes semi-structured interviews with village leaders, local officials of union council and officials of microfinance institutions to reveal their perceptions on the impact of microfinance on the income and consumption behaviour on member and non-member households of microfinance.

The household survey followed Coleman (1999), whereby the control group consists of those eligible households who would be able to receive the microcredit related services when the programme expanded. Although there are various providers of microfinance services in Bangladesh, this study focus on examining the effects of three most popular programs: Grameen Bank, BRAC and DISA. The sample has been designed in such a way so that member households of microfinance programs can be compared to non-member households with similar characteristics. In Particular, we consult with opinions of village leaders and program officers to select key characteristics that similar in both groups: land ownership and wealth ranking. The survey has collected detail information on different factors. The information related to demography and socio-economic issues for all household members has been collected from four districts such as Comilla, Chandpur, Narayangonj and Narshingdi of Bangladesh. The village-level information has also been gathered in detail. Examples of such information include distance to nearest educational institutions, district council, health complex and market. It is noteworthy to mention that although majority of the household head is male, the respondents of the survey were particularly women engaged with the microfinance. The necessary information regarding the amount of credit disbursement, date of joining and nature of membership of the participants has been supplied by the member (generally women) of the selected microfinance institutions.

In the survey, member-households were sampled from a list of microfinance members in each village. For non-member households, the sample frame consist of households that own less than half an acre of land and was ranked as poor by village heads. It was planned to select 25 households per village, however some households could not be found or had no adult at home and hence could not be interviewed. Thus, the total number of households interviewed was 439, or about 22 households per village.

3.2.1 Choice of Variables

The impact of microfinance on household income and consumption will be identified by examining the relationship between the duration in microfinance and amount of loans received, after controlling for characteristics of households and villages.

Since the ultimate goal of microfinance is to improve the economic condition of the economically active poor, the impacts of microfinance should be measured by changes in the economic welfare of clients. The study measures economic wellbeing of the household by income and consumption. To take into account differences in the contribution to income and consumption across age and gender, we apply the OECD adult-equivalent scale, which measured as the total income/consumption of households divided by the squared root of household size (OECD, 2015).

Household characteristics include household size, ownership of land, dependency ratio, age, sex, religion, education, and occupation of the household head. The dependency ratio is calculated as the number of people outside the working age range divided by the number of people aged within working age of 14-60 years old (Nghiem, Coelli & Rao 2012). The households with high dependency ratio would have difficulties in improving their living standard. In addition, it is expected that households with more available labour would be able to generate more income, if other things remaining the

same. We also examined whether households encountered any shocks, which refer whether the household suffer from any financial shock because of severe illness, robbery, dead, fire, drought, flood, crop loss, lost job and business failure, in the last 12 months. Predominantly, shocks can reduce current income which forces the household to go for modest consumption, which may reduce the productivity, and hence, reduced future income (Tedeschi 2008). Thus, a shock dummy variable is recorded by asking households if they have experienced any kind of shock within the 12 months prior to the survey period.

It is assumed that households with more educated labour force have the ability to generate more income. In addition of taking the education level of household head, we also take the education level of other members in labour age which may affect household production.

Another variable the ownership of land by the household head, which indicates the capacity of household as most of the households surveyed were farmers. This is expected that household with more ownership of production land would generate higher output that ensure higher income.

The age, sex, occupation of the household head is selected as other important household characteristics that may affect welfare of the household. We reflect the life-cycle theory of income by adding a quadratic term of the age of the household head.

The choice of possible treatment variables include the amount of loans received and the number of months of membership in microfinance. One may argue that households also receive credit from other sources but money is fungible (i.e., one cannot recognise the contribution from microfinance loans and loans from other sources to household welfare), so total household loans should be used. This is a reasonable

argument but apart from credit MFIs provide other financial services such as savings and other development activities such as educational and health care, hence, using total loans will implicitly assume that there is no other effect from other integrated services. In addition, there are some practical difficulties in using loan volume. The outstanding loan does not reflect the progressive lending policy of MFIs (i.e., due to high demand for fund and limited resources of donors and/or governments). Meanwhile, the cumulative volume of loans was difficult to obtain because rural households often did not keep neat financial records of previous years.

Therefore, this study used the duration (i.e., number of months) that the member households belong to microfinance as a treatment variable since it is easier to collect and reflect the progressive nature of microfinance effects.

3.3 Descriptive Statistics

The descriptive statistics of the main variables, presented in Table 1, shows that the average age of the household head is 40 years and 26 per cent of household heads have secondary or higher level of education. The average household size is about 5 and the average number of working age household member is about 3.

Table 1 also shows that 98% of the households are headed by male and 12% households are from ethnic minority. Note that despite most of the household heads being male, members of microfinance in Bangladesh are female only.

It is also revealed from the analysis that 29% households face shocks in the last 12 months. The total number of microfinance member is 83% with an average 31 months of membership duration. The average total amount of loans received by the microfinance members is found to be BDT 52,387 while the outstanding loans stand at BDT 9,726.

The mean values of selected welfare indicators such as household income and household consumption are found to be BDT 208,762 and BDT 100,430 respectively. The figure related to poverty shows that the average poverty incidence is 29% based on international poverty indicator. The member of microfinance receive training from the MFIs is found to be 31%.

Table 1 Means and main Variables from the household survey (comparison)

Variables	Unit/ Description	Members N = 364		Non-members N = 75		t-test (p-value)
		Mean	Std.	Mean	Std.	
Age of household head	Years	40.21	7.87	39.83	9.19	0.00
Gender of household head	Male=1	0.98	0.13	0.97	0.16	0.00
Ethnic minority	Yes=1	0.12	0.33	0.13	0.34	0.00
Education level	Secondary or above=1	0.26	0.44	0.29	0.46	0.00
Occupation	Farmers or low skills=1	0.43	0.50	0.56	0.50	0.00
Type of employment	Full Time = 1	0.77	0.42	0.76	0.43	0.00
Household size	Persons	4.79	1.29	4.40	1.17	0.00
People in labour age	Persons	2.84	1.17	2.67	0.98	0.00
Shocks encountered	Yes=1	0.32	0.47	0.15	0.36	0.00
Ever borrowed loans	Yes=1	0.93	0.25	N/A	N/A	N/A
MF members	Yes =1	1.00	0.00	N/A	N/A	N/A
Duration in microfinance	Months	31.66	28.28	N/A	N/A	N/A
Total loans received	BDT	52,387	56,917	N/A	N/A	N/A
Received training	Yes=1	0.31	0.46	N/A	N/A	N/A
Outstanding loans	BDT	9,726	27,291	N/A	N/A	N/A
Total Household income	BDT/year	210,424	112,328	200,696	106,422	0.49
Income per adult equivalent	BDT/year	97,978	55,285	96,826	50,141	0.87
Total Household consumption	BDT/year	103,189	49,264	87,043	36,410	0.01
Consumption per adult equivalent	BDT/year	47,768	22,290	42,173	17,910	0.04
Poverty status	Income less than \$1.25 PP/person/day)	0.30	0.46	0.28	0.45	0.77

The sample means from Table 1 show that between the two groups (member and non-member) many household characteristics are significantly different but the magnitude of the differences are negligible. For example, the households heads surveyed are all approximately 40 years of age and live in a family of five with two people employed in the labour force.

Mean income and consumption suggests that non-member households are not significantly different from members regarding income but they enjoyed significantly higher consumption bundles. One possible explanation is that microfinance loans were used to smooth-out consumption in critical periods (e.g., facing financial shocks).

The means of the main household welfare indicators also suggests that, despite our survey design effort, most characteristics of members are significantly different from that of non-members but the magnitude of the different is negligible. For example, 98% of member households are headed by males whilst the respective number of non-member households is 97%. The most significant different is that 32% of member households encountered shocks in the past 12 months, which is more than double the 15% figure of non-members.

4 Econometric Specification

Based on Nghiem, Coelli and Rao (2012), the effect of microfinance on household income and consumption is specified as:

$$\ln Y_{ij} = \beta_0 + \beta_1 D_{ij} + \beta_2 T_{ij} + \beta_3 X_{ij} + \beta_4 V_j + \mu_{ij} \dots\dots\dots (1)$$

where:

Y_{ij} is the log of income or consumption of household i in village j ;

D_{ij} is the dummy variable that takes the value of one for members, zero otherwise;

T_{ij} is the duration (months) that household participated in MFIs;

X_{ij} is the vector of household characteristics;

V_j is the vector of village characteristics ;

μ_{ij} is the idiosyncratic error term; and

$\beta_1, \beta_2, \beta_3$ and β_4 are parameters to be estimated.

β_1 measures differences between members and non-members. Parameter β_2 measures the effects of microfinance upon its members while parameters β_3 and β_4 represent the relationship between selected households and village characteristics and the selected economic welfare indicator.

With the design of quasi-experimental survey, the member dummy variable can mitigate the self-selection issue because the characteristics between member and non-member households are similar. But it is possible that some unobserved characteristics at the village level still affect household outcomes. In particular, microfinance institutions may select operational site in a non-random member, and hence unobservable village characteristics (e.g., social cohesion or capital) that lead a village was selected to microfinance programs and have better outcomes than others. One way to address this issue is to apply a village fixed effects estimator (in cross-sectional setting, this can be done by using village dummies). The main disadvantage of this estimator is that any time-invariant characteristics of the villages (e.g., geographical location) will also be eliminated in the estimation. Thus, if microfinance programs in fact selected villages randomly then the village fixed-effect estimator will not be efficient despite it remain a consistent estimator. One way to determine the relevant estimator is the application of a Hausman specification test. Under the null hypothesis that villages were selected randomly, the village fixed-effects estimator and the ordinary least squares (OLS) estimator with time-

invariant village characteristics will produce similar point estimates but the standard errors of OLS estimator will be smaller, and hence it is preferred. If the null hypothesis is rejected, the OLS estimator is not consistent and village fixed-effect estimator is preferred.

5 Results and Discussion

The Hausman test results rejected the null hypothesis that there is no unobserved heterogeneity (the p-value of the test was 0.00 for income and consumption and 0.01 for the poverty equation), and thus, the fixed-effect estimator was preferred.

Table 2 shows that, after controlling for household characteristics and village fixed-effects, a member household is significantly more likely to be poorer. In particular, income per adult-equivalent of member households was lower by 45.6% ($e^{-0.61}-1$) while the figure for consumption is 36.2%. The probability of being poor, according to international poverty line of \$1.25 PPP/person/day of member households is also higher than that of non-member households by 23 percentage points. This result confirms that, after controlling for exogenous characteristics, microfinance institutions give more priority to serve the poor. Thus, our result confirms that the selection of member villages was less likely to be random and application of OLS would lead to bias estimates.

However, participation in microfinance programs creates significant improvement on livelihoods of the poor. In particular, the parameter of log of duration revealed that one percent increase in duration in microfinance was associated with 0.19 percent increase in income; 0.16 percent increase in consumption; and reduce the probability of being poor by 7 percentage points. The significance of consumption elasticity was at 1% while income effect was only significant at 10% level. This finding seems to confirm that microfinance loans could be used mainly to smooth out consumption rather than investment to increase income. Nevertheless, the consumption

smoothing could prevent households from falling to poverty during difficult periods. The result of poverty effects was significant at 5% level.

Table 2: Effects of Microfinance on Income and Consumption

Independent Variables	Log of income per adult-equivalent		Log of consumption per adult-equivalent		Poverty (\$1.25 PPP/person/day)	
	Coef.	SE	Coef.	SE	Coef.	SE
Member of MF (Yes =1)	-0.61**	0.30	-0.46***	0.13	0.23*	0.13
Log of MF duration	0.19*	0.10	0.16***	0.03	-0.07**	0.04
Sex of HH heads	0.69***	0.16	0.32**	0.13	-0.14	0.12
Log of age	0.23	0.25	0.13	0.15	-0.04	0.23
Minority Ethnics	-0.12	0.20	-0.02	0.08	-0.04	0.04
Education	-0.06	0.15	0.25***	0.07	0.05	0.09
Occupation	-0.09	0.11	0.00	0.08	-0.03	0.09
Type of Employment	0.13	0.12	0.04	0.04	-0.02	0.06
Dependency ratio	-0.35	0.28	-0.26**	0.13	0.32	0.23
Shocks in past 12 months (yes =1)	-0.15	0.22	-0.02	0.08	0.23**	0.09
Village==Vejergaon	0.85***	0.19	0.57***	0.09	-0.13	0.12
Village==East Behakor	0.92***	0.18	0.67***	0.06	-0.40***	0.11
Village==Jhaogara	0.41	0.25	0.17	0.18	-0.02	0.18
Village==Tipurdi	0.30	0.19	0.46***	0.08	-0.21**	0.09
Village==Balusair	-0.13	0.20	0.03	0.08	0.08	0.11
Village==Algi	0.38**	0.19	-0.21	0.38	-0.13	0.16
Village==Kandapara	0.31*	0.18	0.69***	0.07	0.00	0.19
Village==Sagordi	0.28	0.19	0.36***	0.10	0.20*	0.12
Village==Balapur	0.57**	0.26	0.08	0.10	-0.06	0.14
Village==Kalmakanda	0.29*	0.16	0.36***	0.04	0.02	0.13
Village==Foilakandi	0.23	0.18	0.18***	0.06	0.27	0.18
Village==Rishipara	0.23	0.31	0.29***	0.10	0.21*	0.12
Village==BalaKhal	0.42	0.26	0.28***	0.09	-0.09	0.11
Village==Karaish	-0.11	0.20	0.12***	0.05	0.43***	0.11
Village==Borkoit	0.64***	0.19	-0.06	0.08	-0.07	0.14
Village==Barera	0.74***	0.23	-0.41***	0.13	-0.22	0.14
Village==Jinglatali	0.65***	0.23	0.14*	0.08	-0.06	0.17
Village==Arjuntala	0.04	0.18	0.08	0.10	0.01	0.12
Village==Gorsar	0.33*	0.19	0.36***	0.09	0.18	0.14
Constant	9.64***	1.00	9.57***	0.60	0.43	0.98
R2	0.364		0.491		0.272	
N	439		439		439	

Note: The significance level of the estimates are: ***, **, and * represent 1, 5 and 10 per cent significant level, respectively. Here Majhipara is the reference village.

As expected, households with male heads are more likely to have higher income and consumption compared to female headed households, as female headed households are more likely to face adverse events such as death of spouse, divorce or separation. The education of the households indicates that higher education level was associated with significantly higher consumption bundle as expected. The sign of dependency ratio was also as expected but significant result was only found for consumption. The shocks encountered in the last twelve months have been considered as lower income and consumption but significant effects were found only for the probability of being poor.

6 Concluding Remarks

This study provides an empirical analysis of the impacts of microfinance on members of three microfinance programs in Bangladesh using a quasi-experimental survey. We found that member households are more likely to be poor than non-member households, reflecting the fact that microfinance institutions give more priority to serve the poor. Thus, if this non-random selection of program villages is ignored that could lead to bias estimates. We also found that access to microfinance was significantly associated with improvement in consumption, income and poverty status. But the effects on consumption were most significant, which could indicate that microfinance members use loans to smooth consumption rather than investing in petty business. We recommend that the government should take steps to improve favourable environments for petty business (e.g., better infrastructure, and training of business knowledge) to enhance the effectiveness of microfinance on income-generating activities.

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