Qual Quant
DOI 10.1007/s11135-017-0528-1

What determines the financial performance of microfinance institutions in Bangladesh? a panel data analysis

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Abstract While there is considerable expansion of microfinance institutions (MFIs) in the developing countries, there is a paucity of literature that examines the determinants of their Financial Performance (FP) among the Least Developed Countries (LDCs). This article seeks to investigate the determinants of FP of MFIs in Bangladesh over the period 2007–2013. Using two different measures of financial performance (portfolio yield and profit margin), the results indicate that the depth and breadth of social outreach can improve FP of MFIs. In particular, targeting women borrowers, increasing the average loan per borrower and increasing the number of active borrowers can contribute significantly to enhance the FP of MFIs. The results also show that, increasing savings and reducing operating expense can also contribute to increase MFIs's financial performance.

Keywords Microfinance institutions · Social outreach · Women borrowers · Financial performance · Bangladesh

1 Introduction

Microfinance is a blessing to the poor as it provides them with financial alternatives to facilitate access credits which would not otherwise be available to them (Nasrin et al. 2016). Through microcredit, the poor are able to set up productive activities that can

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Published online: 23 June 2017

generate financial output. It can thus act as an important vehicle to reduce poverty, particularly in the developing and LDCs. It has proven its effectiveness in increasing the socio-economic status of its clients in Bangladesh (Rahman and Khan 2013).

As a consequence, over the past 20 years, microfinance institutions (MFIs) have grown extensively and have contributed to improve the welfare of the poor. According to the report of the Microcredit Summit, as many as 3703 MFIs provide microcredit to 200 million people and out of this 60% belong to the poorest groups (Barry and Tacneng 2014), and around 82.3% are women (Maes and Reed 2012). It is also documented in the literature that as a consequence of women's involvement in micro-credit programme, they are able to live a decent life with more confidence (Rahman and Khan 2013; Khan and Rahman 2016). The major difference between MFIs and conventional banking lies in the fact that the former offers credit that includes collateral-free lending, group-based credit, progressive loan structure, immediate repayment arrangements, regular repayment schedules and collateral substitutes (Quayes 2012).

The evolution of MFIs has indeed created a social movement by which poor people, particularly women are able to make changes through income generation, which was previously inaccessible to them beyond their reach. Considering its success as a social movement, the microfinance industry addresses the issue of financial sustainability (Zeller 1998; Abdullah and Quayes 2016). However, a trade-off between sustainability and outreach to women and the poor has raised controversy over a paradigm shift in MFIs as sustainability on the basis of returns may adversely affect its prime mission of poverty alleviation. There are a vast number of MFIs that depend on donors for a steady flow of subsidies that receive funding on easy terms (Quayes 2012, 2015). Donor agencies subsidise MFIs so that they can extend credit to the poor to improve their social welfare. However, in recent years the aim of MFI's has broadened to financial sustainability and efficiency rather than reaching the poorest of the poor. Moreover, donor agencies also emphasise on the self-sufficiency of MFIs so that they can generate income from the outstanding loan portfolio to meet the cost of lending money and to minimise the cost to reduce the dependency on external subsidies provided by them. This idea has been criticised by researchers as it can hamper outreach and will render MFIs profit-driven. Researchers have termed this phenomenon as 'double-bottom line' or 'dual mission' that emphasises both financial sustainability and social outreach. It is still highly debated and unclear whether MFIs can attain both missions simultaneously (Gutierrez-Nieto et al. 2007; Abate et al. 2014; Mia and Chandran 2016).

To be viable financially, MFIs are required to focus on self-sufficiency. In doing so, the mission of MFIs drifts that requires further investigation. This study does not deal with this aspect so as to leave for future research. Given the importance of financial sustainability, this study seeks to investigate the determinants of Financial Performance (FP) of MFIs. Using a panel dataset of MFIs in Bangladesh, this study presents evidence to show that deepening and widening outreach can positively affect FP. In addition, this paper also attempts to examine other relevant determinants derived from literature.

Few studies have broached the impact of women borrowers (Abdullah and Quayes 2016; Janda et al. 2013) and social outreach (Quayes 2012, 2015; Ben Soltane 2012) on the FP of MFIs. While these accounts are rich, they have not taken into account the depth and breadth of social outreach in a single study. Moreover, studies on LDCs have not attemped to investigate other determinants of FP of MFIs. Furthermore, these studies have used the pooled datasets that comprise both developing countries and LDCs. Hence, this study contributes to the existing literature in two ways. Firstly, it seeks to unravel the relationship between social outreach (depth and breadth) and FP in an LDC. Secondly, it attempts to

identify the determinants of MFIs' FP. The large dataset, comprising 690 Bangladeshi MFIs, offers a methodologically sound opportunity to analyse the impact of social outreach on FP of MFIs of an LDC. This study considers depth (average loan per borrower and number of active women borrowers) and breadth (number of active borrowers and number of clients) of social outreach simultaneously as both are important indicators of social outreach.

The rest of the article is organised as follows. Section 2 reviews the relevant literature. Section 3 presents the description of data and variables used in the study. Section 4 describes the methodology, specification of the model, and also provides the empirical findings. Section 5 concludes the study and provides policy implications.

2 Literature review

Schreiner (2002) proposed a framework of outreach consisting of six elements: namely, cost, depth, breadth, length, scope and worth. These elements are related to social benefits of microfinance clients. *Cost* refer to the sum of monetary cost and transaction cost to clients. *Depth* refers to the level of poverty or other social indicators. While the direct measurement of depth is difficult, proxies, such as the percentage of women receiving credit, and their location and education have been used in the literature to measure the depth of outreach (Schreiner 2002; Mersland and Strøm 2008). *Breadth* is defined as the total number of clients receiving credit facilities. *Length* is the targeted time of the supply of microfinance. Scope is defined as the number of types of financial contracts supplied by the MFIs. Finally, *worth of outreach* to clients refers to the extent at which clients value the services. The above mentioned framework has been used to evaluate the performance of MFIs (Mersland and Strøm 2008). However, in this study we do not take into account the worth to clients, cost to clients, scope and length.

Targeting women can increase the FP of MFIs as repayment rate is higher when the clients are women (Hulme and Mosley 1996; Abdullah and Quayes 2016). It is also in line with the objective of MFIs to reach the poorest strata of the population to increase the outreach of MFIs. Armendáriz and Morduch (2010) found that women are more reliable and responsible borrowers than men as far as repayment is concerned. Studies also confirmed that more female participation in microfinance results in better repayment rates in Bangladesh (Hossain 1988; Sharma and Zeller 1997). For example, in Bangladesh, while 74% of men had no repayment problems, it is true for 81% of women (Hossain 1988).

A high repayment rate is crucial for both FP and the survival of MFIs. Janda et al. (2013) argued that to reduce the risks in loan activities, MFIs target women. The reasons are the empowerment of women and risk reduction. Women usually face challenges finding a job and running a business. Microfinance offers them opportunities to be empowered. Moreover, women are considered more trustworthy than men in terms of repayment which reduces the portfolio risks.

Using the data of Central Asia comprising 90 MFIs, Janda et al. (2013) found that FP of MFIs can improve when they target women borrowers. Therefore, more participation of women can improve the FP of MFIs. According to Miyashita (2000), targeting women to provide more credit is cost effective in Indonesia. Abdullah and Quayes (2016) deployed a pooled dataset comprising 92 countries and revealed that targeting women borrowers increases the FP of MFIs. They also argued that either MFIs charge a higher interest rate to women or higher participation of women increases the higher repayment rate. Both can

happen at the same time. In contrast, using cross section data of MFIs in Bangladesh, Mia (2014) argued that targeting women borrowers can decrease revenue generation meaning that lending more credit to women can reduce the FP of MFIs. The study considered the return on the asset as the dependent variable. Likewise, Bank Rakyat of Indonesia enjoys a near to perfect repayment rate over several years without giving any specific focus on women borrowers (Armendáriz and Morduch 2010).

The prime mission of MFIs is to improve the welfare of the poor. Literature has mainly used depth and breadth as two factors in social outreach (Mia and Chandran 2016). Outreach also measures the social benefits of microfinance (Barry and Tacneng 2014). Previous studies also claimed that smaller loans could reduce the profit margin as administrative costs do not necessarily decrease proportionately (Abdullah and Quayes 2016).

Although there is a debate between outreach and efficiency of MFIs, Hashemi and Rosenberg (2006) emphasised the importance of social outreach and considered it the main mission of MFIs. Using data of 702 MFIs in 82 countries, Quayes (2012) concluded that there is a positive and statistically significant relationship between increased depth of outreach and financial sustainability. In a study that consists of 764 MFIs from 87 countries, Quayes (2015) confirmed the positive relationship between the depth of outreach and FP. The study also yielded an interesting finding which showed that FP of MFIs in Asia and Africa is poor in terms of profit margin rate and return on asset.

Even though there is a controversy among researchers regarding the trade-off between profitability and social outreach of MFIs, Cull and Morduch (2007) illustrated that MFIs could maintain profitability and social outreach simultaneously provided that they do not extend credit to the absolute poor. While Makame and Murinde (2006) showed the empirical evidence of the trade-off, Paxton (2003) rejected the view of a trade-off between financial sustainability and outreach. In line with Quayes (2015), this study assumes that as the outreach is a policy goal that is predetermined, it will not be affected by the FP and hence FP is a function of outreach (depth and breadth).

Therefore, the effect of social outreach (depth and breadth) on the FP of MFIs is not conclusive. Different time periods, sample size bias and diversity in the socioeconomic conditions of the countries may be reasons for different findings. To formulate the appropriate and effective policies, it is important to investigate whether increased social outreach affect the FP of MFIs in Bangladesh. Moreover, the study also seeks to find out other determinants of FP.

3 Data and variables

3.1 Data

The study utilises the dataset collected from the Microcredit Regulatory Authority (MRA) of Bangladesh, the central body responsible to monitor and supervise the operation of MFIs in Bangladesh. This web-based platform provides excellent opportunities to acquire financial and social outreach data. It is not only a single source of data of MFIs in Bangladesh but is also a reliable source. Considering the availability of data, we have selected the study period from 2007 to 2013, and the number of MFIs were 690 (as of 2013). The availability of dataset inclined us to select the sample size. Furthermore, we

have taken into account the missing values, reporting errors and inconsistencies of the dataset. Finally, our dataset contains information over a period of seven years.

3.2 Variables

3.2.1 Dependent variables

The present study has two different measures to capture the FP of an MFI. The measures are yield on gross portfolio (YLD) and profit margin (PM). The portfolio yield has been used in the literature as a proxy for interest rate (Abdullah and Quayes 2016) and also used as a proxy of earnings performance (Janda et al. 2013). According to Abdullah and Quayes (2016), yields can be used as an excellent proxy for better repayment rate by women borrowers. PM has been used extensively in the literature as a measure of FP (Abdullah and Quayes 2016; Quayes and Hasan 2014).

As mentioned earlier, YLD not only indicates the repayment rate but also reflects the rate of interest charged for the loan products. PM reflects how much of the financial revenue is kept as net operating income. Here, financial revenue implies revenue from the loan portfolio and other financial assets. Hence, for the purpose of the study, YLD and PM are used to capture the FP of MFIs in Bangladesh.

3.2.2 Independent variable

The main independent variables of the study are the depth and breadth of social outreach. According to Conning (1999), outreach consists of depth and breadth. While the depth of outreach refers to providing credit facilities to the poorest strata of the population, breadth of outreach indicates the number of people receiving the credit facilities from the MFIs. According to Hoepner et al. (2011), there is a lack of appropriate indicators that truly capture the outreach of an MFI. Despite this, average loan size per borrower has been used in the literature as a proxy measure of the depth of social outreach (Kai 2009; Quayes 2012; Barry and Tacneng 2014; Mia and Chandran 2016). In addition, since women are vulnerable in the society, number of women borrowers can be a good proxy of depth of outreach (Bhatt and Tang 2001). The study uses two proxy indicators to measure the breadth of outreach: number of active borrower and number of clients. We follow the Awaworyi and Marr (2014) to select the variable active borrower. In line with the Barry and Tacneng (2014), we use the number of clients as a proxy of the breadth of outreach. The number of clients is measured by the total number of active borrowers and savers. Considering the importance of average savings in generating revenue and loan disbursement (Mia 2014), we include this variable in our model. Operating expense refers to the expenses related to operations, including all personnel expense, depreciation, amortization, and administrative expense over average total asset. We include this as higher operating cost may reduce FP. Additionally, we use the macroeconomic factors such as per capita Gross Domestic Product (GDP) and inflation as control variables since economic environment may have an impact on the FP of MFIs. As per capita GDP increases, it is likely that income of the people will also increase. It may affect the choice of the borrowers when seeking microcredit. Therefore, the number of clients may decline which in turn may reduce the FP of MFIs. Moreover, according to Imai et al. (2011) rising per capita GDP can improve the FP as it may offer higher repayment capacity. Regarding inflation, when the price of goods and services increase people may tend to avail microcredit more and

Table 1 Definition of dependent and independent variables

Variables	Definition	Measurement
PORTFOLIO YIELD (YLD)	Interest and fees on loan portfolio/loan portfolio, gross, average	Percentage
PROFIT MARGIN (PM)	Net operating income/financial revenue	Bangladesh Taka
WOMEN	Number of active women borrowers	Numbers
AVGLOAN	Average loan outstanding per borrowers	Bangladesh Taka
ACTBORROWER	Number of active borrowers	Numbers
CLIENTS	Total number of active borrowers and savers	Numbers
AVGS	Average savings per borrower	Bangladesh Taka
OPEX	Operating expense over average total asset	Bangladesh Taka
GDP	Per capita GDP	USD
INF	Sustained increase in the general level of prices of goods and services	Percentage

Source: Microcredit Regulatory Authority (2015) and World Bank (2017)

increase outreach. Hence, increased social outreach may improve financial performance of MFIs. Table 1 shows the variables chosen and the way they were measured in this study.

4 Methodology and empirical findings

We checked the dataset before choosing the appropriate analytical technique to be used for the analysis. Firstly, we deployed Ordinary Least Squares (OLS) regressions but detected the presence of heteroscedasticity problems. It is the standard practice in econometrics to use robust standard errors to remove heteroscedasticity. In particular, when the residuals are only heteroscedastic, robust standard errors can give efficient estimation of the coefficients. Secondly, we deployed diagnostic tests to check for serial auto correlation (Wooldridge 2010, 2002) to check the null hypothesis that there is serial correlation in the specification of the models. The results allowed us to reject the null hypothesis strongly at 1% level. Therefore, we attempted to estimate the standard error proposed by Driscoll and Kraay (1998) in order to obtain unbiased coefficients. In addition, we used the Driscoll and Kraay's standard errors to handle missing values. Consequently, we used the fixed effects and random effects methods (Hoechle 2007).

4.1 Empirical model

The focus of the study is to find out the different factors that can improve the FP of MFIs in Bangladesh. In this study, we consider both the components of outreach: depth and breadth of outreach along with other variables. The model can be specified by the following equation:

$$LNFP_{it} = \propto_0 + \propto_1 \text{LNWOMENB} + \propto_2 LNAVGLOAN_{it} + \propto_3 LNACTBORROWER_{it} + \propto_4 LNCLIENTS_{it} + \propto_5 LNAVGS_{it} + \propto_6 LNOPEX_{it} + \propto_7 LNGDP_t + \propto_8 INF_t + c_i + \varepsilon_{it} \quad (1)$$

where FP denotes the Financial Performance; *LNWOMENB* measures the number of active women borrowers in the form of the natural logarithm, *LNAVGLOAN* indicates the average loan balance per borrower which is used as a proxy of the depth of social outreach; *LNACTBORROWER* and *LNCLIENTS* both are the proxy measure of the breadth of outreach. While *LNAVGS* denotes the average savings per borrower which reflects the financial health of an MFI, *LNOPEX* represents the operating expense indicates the operations, including all personnel expense, depreciation, amortisation, and administrative expense over average total assets. *LNGDP* and *INF* represent the per capita GDP (in USD) and rate of inflation in the country respectively. We have used a natural logarithm for all variables except inflation to improve the goodness of fit and overcome the simultaneity bias (De Bandt and Davis 2000; Staikouras et al. 2008). $\propto_0$ is the intercept for Eq. 1. c_i and ε_{it} are the individual specific effect and an idiosyncratic error term respectively. The idiosyncratic error term ε_{it} is assumed uncorrelated with the explanatory variables of all past, current and future time periods of the same individual (Schmidheiny et al. 2011). i represents the individual MFIs ranging from i = 1 to N while t represents time period $t = 1,\ldots T$.

4.2 Empirical findings and discussions

Table 2 reports the descriptive statistics of the selected variables including the mean, standard deviation (*std.dev*), minimum (*min*) and maximum (*max*) values for the study period 2007–2013. It is evident from the descriptive statistics that most of the indicators show huge variation in their values. Regarding average savings, the sample consists of large and very small sized MFIs as the minimum, and maximum average savings are 103 (in Bangladesh Taka) and 34,582 (in Bangladesh Taka) respectively. The fluctuations in size of MFIs can also be seen as far as the number of clients and number of active borrowers is concerned. Percentage of mean operating expense over total asset (*Opex.*) ratio is 5.05 implying that on average the MFIs are minimising the operating cost to yield positive returns. In addition, the minimum (0.01) and the maximum value (0.9) showed that some MFIs are facing difficulties generating positive returns (See Table 2).

To detect the multicollinearity, the study calculates the pairwise correlation. Table 3 shows the pairwise correlation among independent variables. Multicollinearity can severely bias overall estimation of the regression models. The multicollinearity problem may arise if the correlations value exceed a certain limit that is 0.80 (Kennedy 2008). Table 3 shows multicollinearity between the number of clients and number of women borrowers and number of clients, the number of active borrowers and number of women borrowers. Other than these variables, all others show a low level of correlation (less than 0.80). To reduce the bias of the estimation, we have used the number of women borrowers, the number of clients and number of active borrowers in separate regression models.

Tables 4, 5 and 6 report the results of fixed effect and random effect model following the approach of Hoechle (2007). F-statistics and R^2 show a good fit for all of our models. Table 4 shows that a higher number of women borrowers results in better FP and statistically significant in all estimations at least at the 5% level. For example, a 1% increase in the number of women borrowers would result in a 0.01% increase in the yield of MFIs. It

Table 2 Descriptive statistics of dependent and independent variables

Variables	Obs.	Mean	SD	Min	Max
PORTFOLIO YIELD	3413	21.801	7.070	0.22	96.14
PROFIT MARGIN	3530	1.11e+08	1.07e+09	−6.20e+07	2.70e+10
WOMENB	3806	60,138.56	561,619.2	78	1.30e+07
ACTBORROWERS	3808	65,812.69	611,009.9	78	1.30e+07
CLIENTS	3321	157,002.8	1,457,404	458	3.00e+07
AVGLOAN	3792	7552.648	8592.02	1073	430,535
AVGSAV	3769	2234.22	1382.879	102.86	34,582
OPEX	3255	0.050	0.0505	0.01	0.9
GDP	3817	784.348	124.600	543.1	954.4
INF	3817	7.845	1.720	5.4	10.7

Source: Author's estimation

Table 3 Pairwise correlation between independent variables

Independent variables	Lnwomenb	Lnactborrowers	Lnclients	Lnavgloan	Lnavgs	Lnopex	GDP	Inf
lnwomen	1							
lnactborrowers	0.992	1						
lnclients	0.864	0.870	1					
lnavgloan	0.113	0.121	0.081	1				
lnavgs	0.045	0.046	0.018	0.657	1			
lnopex	0.014	0.011	−0.007	0.108	0.019	1		
GDP	−0.180	−0.179	−0.170	0.375	0.331	−0.027	1	
Inf	0.035	0.036	0.040	−0.034	−0.025	0.049	−0.043	1

Source: Author's estimation

may indicate that the MFIs charge a higher interest rate to women borrowers or repayment rates are higher when the clients are women. This finding is consistent with the previous literature (Abdullah and Quayes 2016; Janda et al. 2013). It may also suggest that as a consequence of the higher number of women borrowers, MFIs can generate sufficient financial revenue to cover their financial and operating expenses. However, we find that the higher the number of women borrowers, the higher the profit margin of an MFI suggesting that higher female participation contributes to increasing the FP. For example, a one percentage point change in women participation would result in a 0.97–0.98% change in profit margin. We notice that there is a significant and positive relationship with average loan per borrower with profit margin and portfolio yield. In particular, the result suggests that a 1% increase in avg loan can increase the portfolio yield by 0.06–0.07% and also can increase the profit margin by 1.16%. It is important to mention that the coefficient remains almost the same both in fixed effect and random effects model when the dependent variable is profit margin. Therefore, we can say that MFIs enjoy a higher yield and profit margin with an increase of depth of outreach.

Table 4 Effects of depth of social outreach (active women borrowers and average loan) and other variables on FP

Explanatory variables	LNYLD Fixed effects	LNYIELD Random effects	LNPM Fixed effects	LNPM Random effects
LNWOMEN	0.011** (0.003)	0.011*** (0.002)	0.981*** (0.004)	0.979*** (0.005)
LNAVGLOAN	0.062*** (0.013)	0.073*** (0.012)	1.158*** (0.028)	1.159*** (0.037)
LNAVGS	0.184*** (0.010)	0.187*** (0.021)	0.213*** (0.032)	0.213*** (0.028)
LNOPEX	0.100*** (0.010)	0.097*** (0.012)	−0.117*** (0.009)	−0.123*** (0.011)
LNGDP	−0.270*** (0.039)	−0.242*** (0.032)	−0.536*** (0.042)	−0.494*** (0.045)
INF	0.001 (0.002)	−0.001 (0.002)	0.004 (0.003)	0.001 (0.004)
_CONS	2.648*** (0.222)	2.367*** (0.173)	−0.866** (0.244)	−1.084*** (0.277)
N	3101	3101	3031	3031
F	268.796	566.114	1,622,232.511	55,482.827
R^2		0.130		0.934
Adjusted R^2		0.128		0.934
No of groups	726.000	726.000	725.000	725.000

Standard errors in parentheses

Source: Author's estimation

** $p < 0.05$, *** $p < 0.01$

The estimated coefficient for AVGS is positive for all the estimated models regardless of the dependent variables. AVGS has a positive sign and is statistically significant at the 1% level in both fixed effect and random effect models. This result demonstrates that as the size of the savings increases the yield and profit margin increases. The results from the panel estimation indicate that as the size of the savings increases, the yield and profit margin increases. Since the size of savings is one of the major sources of funds for MFIs, increases in savings help them to increase credit supply. Consequently, they are able to provide more credit to further borrowers so as to increase their revenue as well. Thus, an increase in savings leads to an increase in the FP of MFIs (through increased credit and revenue), which corroborates with the findings of Kenyan MFIs (Kurgat 2011).

Turning to the operating expense, there is a positive and significant relationship with portfolio yield and a negative relationship with a profit margin. It implies that a 1% increase in operating cost decreases the profit margin by 0.12–0.12%. This is not unusual as when an institution has to spend more on their operating expenses, the profit margin will be reduced. Likewise, our result suggests that a one percentage point increase in operating expense increases the yields by 0.09–1%. It also implies that if the operating expense increases, the MFIs charge higher prices to cover the cost.

Table 5 shows the results of the impact of breadth (number of active borrowers) and depth (average loan) on the FP of MFIs. The findings show that breadth of outreach has a positive coefficient in both the fixed effect and random effect model at 5% level of significance when yield is the dependent variable. It indicates that MFIs experience a

Table 5 Effects of breadth and depth of social outreach (active borrower and average loan) and other variables on FP

Explanatory variables	LNYLD Fixed effects	LNYLD Random effects	LNPM Fixed effects	LNPM Random effects
LNACBORROWER	0.009** (0.003)	0.008** (0.002)	1.014*** (0.003)	1.011*** (0.003)
LNAVGLOAN	0.064*** (0.013)	0.075*** (0.011)	1.082*** (0.015)	1.087*** (0.017)
LNAVGS	0.184*** (0.010)	0.187*** (0.022)	0.232*** (0.014)	0.234*** (0.020)
LNOPEX	0.101*** (0.010)	0.097*** (0.012)	−0.102*** (0.008)	−0.107*** (0.013)
LNGDP	−0.277*** (0.039)	−0.251*** (0.030)	−0.473*** (0.035)	−0.438*** (0.044)
INF	0.001 (0.002)	−0.001 (0.002)	0.003 (0.003)	−0.001 (0.004)
_CONS	2.703*** (0.225)	2.433*** (0.176)	−1.195*** (0.267)	−1.411*** (0.354)
N	3101	3101	3031	3031
F	162.665	851.138	12,679,834.281	2.297e+08
R^2		0.129		0.939
Adjusted R^2		0.127		0.938
No. of groups	726.000	726.000	725.000	725.000

Standard errors in parentheses

Source: Author's estimation

** $p < 0.05$, *** $p < 0.01$

higher yield with an increase in breadth of outreach. When profit margin is used as the dependent variable, it shows the positive and statistically significant association with breadth of outreach (number of active borrowers). In all estimations, the average loan per borrower (depth) shows a positive sign and is statistically significant regardless of the dependent variables. In particular, a 1% increase of average loan can increase the portfolio yield by 0.06–0.07% and also can rise the profit margin by 1.08–1.09%. Therefore, a higher number of active borrowers and increased average loan result in better FP. Other variables average savings, operating expense and GDP per capita remain significant as expected.

Table 6 presents the results of the effect of the breadth (number of clients) and depth of outreach (average loan) along with other variables on FP. The estimated coefficient for CLIENTS is positive for all the estimated models except for fixed and random effects where we used portfolio yield as the dependent variable. Depth of outreach shows a positive and significant association with both the dependent variables. All other explanatory variables such as AVGS and OPEX are positive and statistically significant in all estimations regardless of the dependent variables and models. The natural logarithm of GDP per capita also shows consistent results in all our estimations. Another macroeconomic variable, inflation, remains insignificant in all estimations regardless of the models. Hence, it can be said that both depth and breadth of social outreach play an important role in improving the FP of MFIs. Moreover, savings and operating expense show consistent results in all the estimations. Hence, we can conclude that increasing the average savings

Table 6 Effects of breadth and depth of social outreach (clients and average loan) and other variables on FP

Explanatory variables	LNYLD Fixed effects	LNYLD Random effects	LNPM Fixed effects	LNPM Random effects
LNCLIENTS	0.007 (0.004)	0.007 (0.004)	0.930*** (0.032)	0.927*** (0.043)
LNAVGLOAN	0.069*** (0.007)	0.065*** (0.010)	1.364*** (0.114)	1.307*** (0.128)
LNAVGS	0.202*** (0.011)	0.213*** (0.021)	0.284*** (0.054)	0.265** (0.084)
LNOPEX	0.096*** (0.009)	0.094*** (0.011)	−0.078*** (0.013)	−0.076** (0.022)
LNGDP	−0.371*** (0.046)	−0.349*** (0.019)	−1.346*** (0.261)	−1.163*** (0.234)
INF	0.002 (0.001)	0.000 (0.002)	0.004 (0.009)	0.002 (0.007)
_CONS	3.156*** (0.293)	2.979*** (0.265)	1.577 (1.484)	1.050 (1.380)
N	2710	2710	2650	2650
F	98,351.284	2584.683	107,538.953	35,164.837
R^2		0.151		0.768
Adjusted R^2		0.148		0.767
No. of groups	723.000	723.000	722.000	722.000

Standard errors in parentheses

Source: Author's estimation

** $p < 0.05$, *** $p < 0.01$

and decreasing the operating expense can contribute significantly to improving the FP of MFIs. The macroeconomic variable GDP per capita is negatively and significantly associated with both yield and profit margin. It suggests that economic growth decreases the FP of MFIs. While this finding is consistent with some literature (Janda et al. 2013; Janda and Svárovská 2012), it contradicts with the study conducted by Imai et al. (2011). This can be explained by the fact that as the poor people are the main target of MFIs, when per capita GDP increases the necessity of microcredit may decrease and consequently the number of clients decreases. This could have a negative impact on FP. Moreover, the above mentioned studies are not based on a single country or an LDC.

5 Conclusion

This study investigates the determinants of FP of MFIs in Bangladesh. In particular, it examines the effects of breadth and depth of social outreach on the FP of MFIs. In addition, it also attempts to see whether other factors such as average savings, operating expense, GDP and Inflation have any effect on the FP. We use two dependent variables to measure the FP: portfolio yield and profit margin. As an analytical method, we deploy fixed effect and random effect model in line with Hoechle (2007) which gives estimates by taking into account the heteroscedasticity and serial autocorrelation problems of panel data model. The analysis finds empirical evidence that outreach (depth) to women borrowers has a

positive effect on the two measures of FP. While the effect on profit margin is straightforward, the effect on yield either reflects that female borrowers have a higher repayment rate or the interest charged by the MFIs to women is higher or both. It can be explained by the fact that as a consequence of a rigid repayment schedule set by the MFIs which starts after the disbursement of the credit, women have to start repayment even before making any investment decisions (Abdullah and Quayes 2016). We also demonstrate that average loan per borrower (depth of outreach) is an important determining factor to improve the FP. The study also reveals that breadth of outreach (number of active borrowers) positively and significantly affects the portfolio yield and profit margin, while it did not show a statistically significant association with yield when we use number of clients as a proxy to measure breadth of outreach. In addition, average savings and operating expense are two important determining factors of FP. Furthermore, our analysis is based on an LDC with a large dataset consisting of 690 registered MFIs under the MRA, and hence the results can be generalized and replicated by other LDCs and developing countries.

The study has some policy implications. Firstly, in order to imporve the FP, MFIs should continue their focus on women borrowers. Secondly, as women are more productive in terms of increasing FP, MRA can monitor and supervise whether MFIs charge them higher interest rates than men. Thirdly, MFIs can encourage savings by providing incentives which may results in imporving the revenue generaiton and consequently facilitate the FP. In particular, it can help the MFIs to attain self-sustainability and reduce the dependence on donor agencies. Fourthly, as we can see higher operating cost can reduce FP, MFIs should improve the managerial efficiency to carry out the administrative works to minimize the costs. Finally, policy makers should take into account the positive correlation of breadth and depth of outreach with FP and encourage MFIs towards self-sustainability.

Future studies can use other measures (return on asset, operational self-sufficiency, financial self-sufficiency) as well as the measures used in this study which will provide a complete picture of the FP of MFIs. Moreover, for more accurate evidence of repayment rate, other studies can use portfolio at risk as the dependent variable.

Acknowledgements The authors would like to thank the editor and two anonymous reviewers for their constructive comments and invaluable suggestions. The first author especially thanks Mr. Mesbah Uddin for his suggestions. The first author also would like to thank University of Malaya for funding her doctoral studies through Bright Spark Program.

Compliance with ethical standards

Conflict of interest Authors declare that they have no conflict of interest.

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