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The Effects of Capital Structure on the Performance of Microfinance Institutions in Bangladesh

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Abstract: *The present study investigates the relationship between capital structure and the performance of microfinance institutions. Performance is measured in terms of outreach and default ratio. Capital structure is incorporated in the form of total debt, borrowings, deposits, and donated equity relative to total assets. Panel data of 38 MFIs operating in Bangladesh covering the fifteen-year period 2003-2017 were analyzed within the framework of fixed- and random-effects techniques. Most of the microfinance institutions are highly leveraged and most of these debts are in the forms of borrowings and deposits fund, suggesting a considerable dependence on leverage by MFIs for their operations. Highly leveraged microfinance institutions perform better because management of these firms take microcredit programs to greater number of borrowers and disburse loans cautiously to minimize default rates. MFIs, reliant on donors' equity, are less likely to minimize default ratio as they don't have obligations for repayment to donors.*

Keywords: *Microfinance, Capital structure, Outreach, Default rate, Donations, Bangladesh*

1. Introduction

Capital structure of an institution is basically a mix of debt and equity which a firm deems as appropriate to enhance its operations. Capital structure issue is one of the core financial decisions and it has become an increasingly prominent issue particularly for lending firms. Recent financial crisis required government to take bailout program and institutional restructuring program which addressed the funding structure of institutions. Optimal capital structure though not measurable within the existing framework of corporate finance, firms always try to set their optimal capital structure. For both financial and non-financial corporate enterprises, the issue of corporate governance has become rampant as separation of ownership and management control results in agency problem. In such circumstances, managers are more likely to pursue an objective function which is at variance with the firm or owners' objectives. For this reason, agency cost arises from divergence between ownership and control. If managers pursue their goal

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ahead of the firms, agency cost become higher and firm loses its value. Several techniques are available in corporate finance to curve this agency cost problem, where capital structure is considered as one of the fruitful ways to keep adequate control. Berger and Di Patti (2006) concludes that high leverage or high equity multiplier has the potential to minimize agency cost of outside equity and to enhance the firm value by encouraging managers to act more in the interest of firm's shareholders. Theoretically it is expected that firm's decision regarding capital structure has certain influence on a firm performance against the position held by Modigliani and Miller in their seminal work (Modigliani and Miller, 1958)

Few studies have been carried out with the issue of measuring the influence of capital structure on firm's performance and in many cases these studies were focused on developed economies with large and listed firms. Recognizing the potential of microfinance in the development process, Bogan (2008) examined the existing sources of funding for MFIs in accordance to geographic region. He has explored how changes in capital structure could facilitate future growth and improve the efficiency and financial sustainability of MFIs. Lislevand (2012) attempted to identify the effect of capital structure on overall financial performance of micro finance institutions (MFIs) based on 403 MFIs in 73 countries. Manawaduge et al., (2010) examined the implications of capital structure of corporate entities in an emerging market, Sri Lanka. Ismail and Possumah (2012) attempted to explore how changes and variety of source of fund in capital structure could improve Islamic microfinance institutions' efficiency and financial performance. Within sub-Saharan Africa, Kyereboah-Coleman (2007) is first who examined the impact of capital structure on the performance of MFIs.

Bangladesh is the birth place of microcredit programs in the world. The Palli Karma-Sahayak Foundation (PKSF) was established in late 1990 to meet the demand of fund for re-lending by the development partners (NGO-MFIs), and to coordinate the flow of funds for appropriate use. At present, mainly four types of institutions are involved in microfinance activities in Bangladesh; NGO-MFIs having licenses from Microcredit Regulatory Authority (MRA)**,** Commercial and Specialized banks**,** Government sponsored microfinance programs (e.g. through BRDB, cooperative societies and programs under different ministries). Though microfinance credit program started in mid-eighties in Bangladesh, microfinance activities received momentum after 1990s. A large number of microfinance institutions are providing collateral free credit to the marginalized people which has made microfinance credit attractive to them. Though more than thousand microfinance institutions are currently operating in Bangladesh, 10 large MFIs and Grameen Bank have market share of as much as 87% in terms of total savings mobilization and 81% in terms of total credit disbursement (Haque and Rashid

2002). As of the June 2014, 697 NGO-MFIs have taken license from microcredit regulatory authority. Formerly foreign donor driven MFIs have now increased their reliance on local fund providers. As of June 2014, foreign donors contributed only 2.14% of the total funding of NGO-MFIs. (MRA 2014)

Initially microfinance institutions were set up through state backed subsidized financing and were controlled by the state. With evolution, MFIs now get benefit from the introduction of mutual funds as part of shareholder structure and/or the connection of such organizations with capital markets. These evolution in funding have major implications on capital structure, operations, and associated performance of MFIs. According to corporate governance theory, more debt exerts more pressure on management to enhance efficiency and profitability as well as performance of firms to honor the debt obligations. Thus, it seems appropriate to explore how capital structure of microfinance institutions (MFIs) effects their performance. The rest of the paper is structured as follows: Section 2 presents literature review on the effects of capital structure on the performance of MFIs. Section 3 and section 4 describe research methods and empirical findings, respectively. Section 5 concludes the paper by highlighting the implications and limitations of the study.

2. Review of Research Literatures

2.1 Theoretical Underpinnings

Out of three major financial decisions, capital structure or financing decisions is the most critical one in corporate finance which is becoming more and more complex over the time with the existing and continuous debate and empirical findings. According to Ross et al. (2008), Managers should choose the capital structure that they believe will have the highest firm value because this capital structure will be most beneficial to the firm's stockholders. Glen and Pinto (1994) said that one of the important financial decisions confronting a firm is the choice between debt and equity. Every financial decision has direct or indirect consequence on the overall value of a firm. In spite of various developments in the finance theory, capital structure has been a subject of theoretical debate since the publication of Modigliani-Miller's (1958) article developed within the framework of perfect capital market (Chowdhury 2004). They argued that a firm cannot change the total value of its outstanding securities by changing the proportions of its capital structure in a perfect capital market: free of taxes, transaction cost and other frictions because investors could make or unmake any level of homemade leverage they desired by borrowing or lending on personal account. Though their proposition theoretically sounds good but it is only valid under perfect market conditions which are

hardly possible in real world. They extended this proposition in 1963 incorporating the effect of tax on value and cost of the capital of the firm (Modigliani and Miller, 1966). Their new proposition showed in the world of corporate tax, the value of the firm depends on the variation of the debt level and tax shield benefit on interest payments. In 1976, Miller brought forward the next version of irrelevance theory of capital structure. He reiterated that capital structure decisions of firms with both corporate and personal taxes circumstances are irrelevant (Miller, 1976). They stated that firms should use as much debt as possible in order to maximize their value to get interest tax shield benefit from usage of debt in capital structure. The more debt a firm can use, the more interest tax benefit a firm can realize.

Tradeoff model says that a firm's optimal debt-equity ratio is achieved at the point when the marginal present value of the tax on additional debt is equal to the increase in the present value of financial distress costs. Under Tradeoff theory, a firm's target leverage is driven by three competing forces: (i) taxes, (ii) costs of financial distress (bankruptcy costs), and (iii) agency costs. Both tax-based and agency-cost-based models belong to the static tradeoff models as supported by Kraus and Litzenberger (1973), Jensen and Meckling (1976), Miller (1977), Kim (1978), Jensen (1986), Harris and Raviv (1990), and Stulz (1990). Greater financial leverage has the possibility of affecting managers and reducing agency cost by threat of liquidation which causes personal losses to managers' salaries, reputation, perquisites etc. (see Grossman and Hart (1982); Williams (1987)), and also through pressure to generate cash flows to pay interest expenses (see Jensen (1986); Berger and Di Patti (2006)) showed that at some point where bankruptcy and distress become more likely, the agency costs of outside debt overwhelm the agency cost of outside equity, and therefore further increases in leverage lead to higher agency cost. Thus, a firm may issue debt only up to a point and if financial distress becomes a real possibility beyond that point, the firm may issue equity instead (Ross et al., 2008). A firm with very high level of gearing or debt, runs the risk of failure in the event of shortfall of cash. The influence of leverage on agency cost is anticipated to be non-monotonic. A firm with low degree of leverage can enhance the incentives provided to managers and reduce agency cost by increasing leverage. Therefore, at low levels of leverage, increases of leverage will produce positive incentives for managers and reduce agency costs (Jensen and Meckling, 1976)

The concluding line is that, choice of capital structure by a firm has consequences and effect on its performance. Financial academicians put much contribution in explaining the effect of different capital structure on firm value. The practical applications of the theories are not fully satisfying. Prescriptions for capital structure under either the trade-off model or the pecking order theory are blurred by comparison. For evaluating the

optimal debt–equity ratio, no formula is available. Determination of optimal debt ratio has no theoretical foundation, and firms require suitable mix of debt and equity by incorporating their unique characteristics, external environment where they operate, and other influential factors.

2.2 Empirical literatures

We went for searching previous research works on the same topic what we are pursuing but there have been a number of studies investigating into the determinants of capital structure of firms in different businesses such as, joint ventures (Boateng, 2004), manufacturing sector (Long and Malitz, 1985; Titman and Wessels, 1988), and electricity and utility companies (Miller and Modigliani, 1966). Works related to capital structure of MFIs are still few. Industrial and sectorial classification is an important variable in determining the capital structure of a particular firm. Some industries by practice use high debt equity ratio (Airlines, Shipping, and Housing) while some industries use low debt equity ratio (Consumer Staple, Retail Chain, and Toy) in their capital structure.

While studying effect of capital structure on performance of micro finance institutions in the global context we have come across a few studies in the international level. According to corporate governance theory by Berger and Di Patti (2006), leverage factor affects agency costs of firm and influences the performance of firm. Using the data of commercial banks in USA, they found that higher leverage or lower equity capital ratio is associated with higher profit. Hoque et al., (2011) investigated the impact of commercialization on capital structure, mission and performance of microfinance institutions. This study reveals that leverage decreases the relative level of outreach to the very poor. Bogan (2008) examined the existing sources of funding for MFIs in accordance to geographic region. He explored how changes in capital structure could facilitate future growth and improve the efficiency and financial sustainability of MFIs. Using data from more than three hundred MFIs, the authors tested the hypothesis that MFIs mature towards sustainability through a “life cycle” of institutional development. Their empirical evidence failed to support interpretations of the life cycle approach that focus on MFI age as the deciding factor in sustainability but concluded that increased use of grants by MFIs decreases operational self-sufficiency. Lafourcade et al., (2005) found that financial structure does not vary significantly by region within Africa, although it does vary by MFI type. Unregulated MFIs are mostly dependent on equity financing. NGOs and unregulated MFIs often face challenges in attracting funding from banks and other potential investors for their non-corporate ownership structures and unclear legal status. Because of their inability to mobilize savings, NGOs and unregulated MFIs are poorly leveraged. For cooperatives, deposits comprise a greater percentage of total

liabilities. Abor (2005) suggested that profitable firms use more short-term debt to finance their operation analyzing the data of capital structure and profitability of SMEs in Ghana. In addition to positive relationship between short term debt ratio and return on equity, a negative relationship between the ratio of long-term debt to total assets and ROE was also found in this study. Kyereboah-Coleman (2007) examined the impact of capital structure on the performance of microfinance institutions by using panel data covering the ten-year period 1995-2004. He analyzed the data within the framework of fixed and random-effects techniques and found that most of the microfinance institutions employ high leverage and finance their operations with long-term rather than short-term debt. Also, highly leveraged microfinance institutions perform better by reaching out to more clientele and scale economies. So they are better able to deal with moral hazard and adverse selection enhancing their ability to deal with risk.

From the above review, it is clear enough that agency cost and capital structure are two important research agenda for any financial institution. As banking sector is a major financial intermediary sector, most of the studies focused on banking sectors. Due to the presence of informational opaqueness, it raises larger concerns in the microfinance sub-sector, to study with capital structure. (Berger and Di Patti, 2006). The problem is compounded in this sub-sector where information asymmetry is rampant. The sector is regarded as a poverty reduction strategy for emerging economies like Bangladesh. But no research has been made on the issue of effect of capital structure on performance of MFIs of Bangladesh specifically. The present study has investigated the relationship between capital structure and the performance of selected MFIs in Bangladesh.

3. Research Methods

From theoretical understanding and reviewing empirical literatures, we can infer that capital structure has influence on performance of firms. To examine the effect of capital structure on performance of microfinance institutions, 38 MFIs of Bangladesh have been selected. These 38 MFIs have been selected based on the availability of data in Microfinance Information Exchange (MIX). Out of 38 MFIs, 36 MFIs are working as NGO while remaining 2 MFI are working as specialized bank and cooperative society respectively. The dataset includes MFIs of different sizes. Figure 1 and 2 demonstrates the histogram of cross sectional observations in term of assets size and loan portfolio size (Billion BDT). These figures demonstrate that assets size is less than BDT 35 billion and loan portfolio size is also less than BDT 35 billion in case of 90% observations, approximately. This sampling will not lead to biasedness because the MFIs we selected are spread over Bangladesh. MFIs are purposely selected because data of our chosen

variables are available only for these MFIs. A list of selected MFIs for our study has been provided in Appendix A.

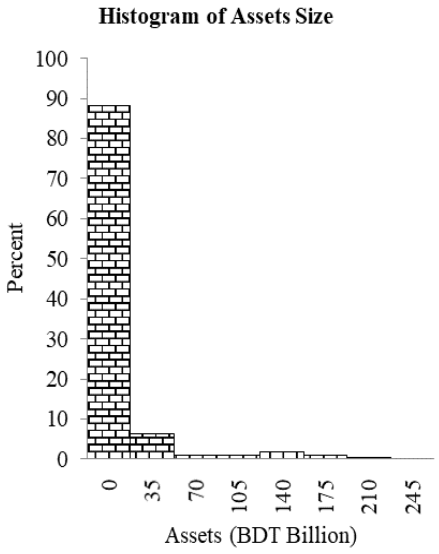

Figure 1: Frequency distribution of assets size

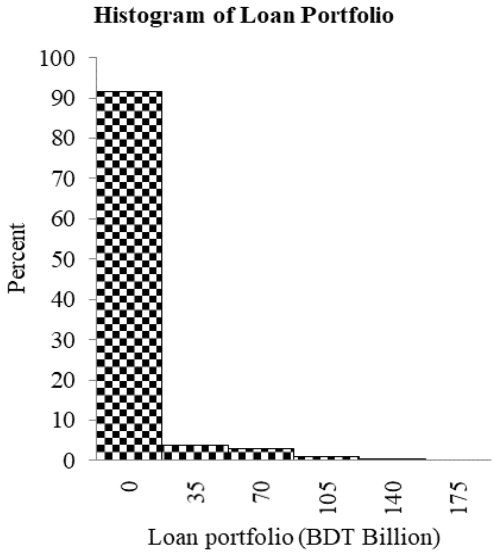

Figure 2: Frequency distribution of loan size

3.1 The data

The data are annual in nature from 2003 to 2017. The primary source of data to MIX is financial statements which have been submitted by these microfinance institutions to the Microfinance Information Exchange (MIX).

Dependent variables: Studies for measuring performance employ various measures to examine the predictions of various agency cost hypothesis. Some of the measures of performance which have been used over the years are mainly financial ratios. Studies on performance employ various measures to test the predictions of different agency cost hypothesis. Some of the measures of performance that have been used over the years include financial ratios (see Demstz and Lehn (1985); Gorton and Rosen (1995)), stock market return and their volatility (Saunders et al., 1990) and also, Tobin's q (see Himmelberg et al., (1999); Zhou, (2001)).

We would like to agrue that conventional financial performance indicators (i. e. ROA, ROE, Tobin's Q, and Stock Return) used in existing literatures cannot effectively

measure the performance of social-oriented MFIs. We have used data of outreach and default rate as the dependent variables. As both equity and profit are negative in case of few observations, we have not used ROE as performance indicators in estimating the models. Both outreach and default rates are essential variables that capture the success and sustainability of microfinance institutions (Aryeetey, 1995). Outreach proxied by the number of active borrowers served by MFIs can be recognized as a social performance indicator of MFIs.

Table I: Variable matrix

Objectives	Variable	Operational definition	Unit
Performance of MFIs	Outreach	Number of active borrowers of MFI	ln (Number of people)
	Default rate	Total amount of loans written off, net of recoveries divided by average gross loan portfolio	Percentage
Capital structure as well as financing pattern	Total debt	Total debt divided total assets of MFI	Percentage
	Borrowings	Total borrowings divided total assets	Percentage
	Deposits	Total deposits divided total assets	Percentage
	Donated equity	Total accumulated donated equity divided by total assets	Percentage
Other influencing factors	Firm size	Natural logarithm of total assets value	ln (BDT Million)
	Lending rate	Total financial revenue divided by average gross loan portfolio	Percentage
	Operating expense	Operating expense divided by average gross loan portfolio	Percentage
	Risk level	Portion of loans greater than 30 days past due divided by gross loan portfolio	Percentage

Source: Authors

Independent variables: Regarding the independent variables we have employed total debt, borrowings, deposits, and donated equity as a ratio of total assets. To make up for other omitted variables we have employed firm size, lending rate, operating expense, and risk level as control variables. Years of experience or age of MFI also has role in determining performance of MFIs but as we don't have the data of establishing year of MFIs, we assumed that age can be captured through asset size of MFI. It is expected that

the higher the number of years of experience, the larger the size of the MFI will be. We have not ignored the notion that there may be other performance deterministic variables of MFIs which have not been considered here.

3.2 Analytical framework

In carrying out the analysis, we will employ the basic panel data regression equation:

$$y_{it} = \alpha + \beta X + u^{it},\ i = 1,\ldots;N;\ t = 1 \ldots T \quad (1)$$

where i represents the cross-section dimension and t represents the time-series component. α is a scalar, β is a $Kx1$ vector and X_{it} is the itth observation on the K explanatory variables. In estimating a panel data model, most applications make use of a one-way error component model for the disturbances, with

$$u_{it} = \mu_i + v_{it} \quad (2)$$

where μ_i represents the unobservable individual-specific effect and v_{it} denotes the remainder of the disturbance.

3.3 Model specification

Following the econometric model by Miyajima et al., (2003) we estimate the following specific multiple regression models:

$$Performance_{it} = \alpha + \beta DebtR_{it} + \emptyset Control_{it} + u_{it} \quad (3)$$

$$Performance_{it} = \alpha + \beta Donated\ Equity_{it} + \emptyset Control_{it} + u_{it} \quad (4)$$

where $DebtR_{it}$ represents the debt ratio of firm i in time t, $Donated\ Equity_{it}$ represents the donated equity relative to assets of firm i in time t and $Control_{it}$ represents the control variables of firm i in time t. From equation 3 and 4, the following equations have been estimated.

Outreach fixed effect estimates

$$OUT_{it} = \alpha_0 + \alpha_1 TDR + \alpha_2 SZE + \alpha_3 INR + \alpha_4 EFF + \alpha_5 RSK \quad (5)$$

$$OUT_{it} = \alpha_0 + \alpha_1 BTA + \alpha_2 SZE + \alpha_3 INR + \alpha_4 EFF + \alpha_5 RSK \quad (6)$$

$$OUT_{it} = \alpha_0 + \alpha_1 DTA + \alpha_2 SZE + \alpha_3 INR + \alpha_4 EFF + \alpha_5 RSK \quad (7)$$

$$OUT_{it} = \alpha_0 + \alpha_1 DNTA + \alpha_2 SZE + \alpha_3 INR + \alpha_4 EFF + \alpha_5 RSK \quad (8)$$

Default rate random effect estimates

$$DEF_{it} = \alpha_0 + \alpha_1 TDR + \alpha_2 SZE + \alpha_3 INR + \alpha_4 EFF + \alpha_5 RSK \quad (9)$$

$$DEF_{it} = \alpha_0 + \alpha_1 BTA + \alpha_2 SZE + \alpha_3 INR + \alpha_4 EFF + \alpha_5 RSK \quad (10)$$

$$DEF_{it} = \alpha_0 + \alpha_1 DTA + \alpha_2 SZE + \alpha_3 INR + \alpha_4 EFF + \alpha_5 RSK \quad (11)$$

$$DEF_{it} = \alpha_0 + \alpha_1 DNTA + \alpha_2 SZE + \alpha_3 INR + \alpha_4 EFF + \alpha_5 RSK \quad (12)$$

where,

OUT_{it} is outreach measured by the natural log of active borrowers base for firm i at time t;
DEF_{it} is annual amount of defaults divided by the amount of loan disbursement of firm i in time t;
TDR_{it} is leverage measured by total debt divided total assets for firm i in time t;
BTA_{it} is borrowings measured by total borrowings divided total assets for firm i in time t;
DTA_{it} is deposits measured by total deposits divided total assets for firm i in time t;
$DNTA_{it}$ is donated equity measured by total donated equity divided by total assets for firm i in time t;
SZE_{it} measures the size of the firm and it is the natural log of asset base of firm i in time t;
INR_{it} is average lending rate of firm i in time t and it is measured by the financial revenue from loans divided average gross loan portfolio;
EXP_{it} is operating expense of firm i in time t and it is measured by operating expense divided by average gross loan portfolio;
RSK_{it} is risk of firm i in time t and it is measured by portion of loans greater than 30 days past due divided by gross loan portfolio;
U_{it} is the error term.

3.4 Expected signs of coefficients

Total debt, borrowings, deposits, and donated equities enable MFIs to channel more funds to greater number of borrowers so the expected sign of these funding sources with outreach is positive. Large sized firm can serve more customers with its resources so expected sign of asset size with outreach is positive. When borrowing cost is high, less number of borrowers will come to take credit from MFIs so expected sign of lending rate with outreach is negative.

Table II: Expected sign of coefficient of predictor variables

Variable	Expected sign with outreach	Expected sign with default rate
Total debt	Plus (+)	Minus (-)
Borrowings	Plus (+)	Minus (-)
Deposits	Plus (+)	Minus (-)
Donated equity	Plus (+)	Plus (+)
Firm size	Plus (+)	Plus (+)
Lending rate	Minus (-)	Plus (+)
Operating expense	Minus (-)	Minus (-)
Risk level	Minus (-)	Plus (+)

Source: Authors

Lower operating expenses reduces the cost of serving customers which will enable MFIs to serve more customers, therefore the expected sign of operating expense with outreach is negative. The risky a firm is, the lower its capability will be to serve clientele so risk influences the outreach negatively. Total debt, borrowings, and deposits compel management to put in measures to reduce default rates so the expected sign of these leverage factors with default rate is negative. Managers are less likely to reduce the probability of default, when the funding source of their loanable fund is donated equity.

Large sized firm serve more customers so there is will be more defaulters in such firm, expected sign of asset size with default rate is negative. The higher the borrowing cost, the higher the chance of failure of repayment by borrowers because more cash flows will be required to make loan payment. Positive sign of lending rate is thus expected with default rate. Efficient MFIs can better monitor the borrowers at lower cost and can reduce the probability of default; so the expected sign of operating expense with default rate is negative. The risky a firm is, the lower its capability to curve default, so expected sign of risk with default is positive.

3.5 Estimation dilemma and diagnostics

There exist a number of approaches for estimating any basic panel model. However, the most appropriate technique for estimating the basic model is dependent on the structure of the components of the error term (refer to equation 2) and also the correlation between the error term and the observed explanatory variables. In considering a situation where there are no firm specific and time effects, the basic pooled OLS is most appropriate because it ignores the panel nature of the data set, and treats observations as being serially uncorrelated for a given firm with homoscedastic errors across individuals and

time periods (Johnston and DiNardo, 1997). However, unobservable effects can be accommodated using one of two techniques. The basic question to address remains "is it fixed or random effect?" Thus, in order to reduce the number of parameters to be estimated, it is recommended to justify treating the individual fixed effects as being drawn from some distribution. The estimation of the parameters of this distribution is based on the assumption that the unobservable effects are included in the error term. Thus, the variance-covariance matrix of the resulting non-spherical errors is transformed to obtain consistent estimates of the standard errors. The random effects estimator under such circumstances is the most appropriate (Hsiao 1989). Otherwise, the fixed effects is appropriate by including a dummy variable for each firm, though it is less efficient.

3.6 Resolving the dilemma: a choice between random or fixed effects

$$H = [b^{GLS} - b^{w}]'[V(b^{w}) - V(b^{GLS})]^{-1}[b^{GLS} - b^{w}]$$

where b^{GLS} are the random effect parameter estimates and b^{w} are the fixed effect parameter estimates. In dealing with the situation, Hausman (1978) specification test has been carried out to make a choice between random or fixed effects. Hence, we carry out the Hausman specification test based on a contrast vector H and results are reported later (Table V). Reported Hausman test statistic suggests that fixed effect estimate is efficient for all models where 'outreach' and 'default rate' are dependent variables. As we failed to get random effect estimate appropriate either for 'outreach' or for 'default rate' variables based on the Hausman test statistic, we have not the provided the result from random effect estimates. The analysis applied panel data regression with clustered robust standard error to avoid potential heteroscedasticity problem.

4. Empirical Results

4.1 Descriptive statistics

Table III offers the descriptive statistics with respect to both dependent variables and regressors. Though we have not taken ROA, and ROE as dependent variables in models, we have reported the summary statistics of them to depict the financial performance of selected MFIs. While most of the microfinance institutions in Bangladesh are highly leveraged shown by the mean total debt ratio of about 0.80, debts in the forms of both borrowings and deposits, suggesting a considerable dependence on leverage by MFIs.

Dependence on borrowed funding is greater than the dependence on deposit funding. On an average 4.07% funding comes from equity provided by donators which is insignificant. The dependence of MFIs on donated equity is declining gradually in

Bangladesh. The standard deviation coupled with the minimum and maximum values of total debt ratio is an indication of a sector which is not very widely spread and relatively evenly distributed with regard to leverage levels. Minimum difference between mean and median value of total debt ratio confirms the fact that distribution of debt ratio is approximately normal. The institutions studied have enjoyed moderate performance recording mean values of 0.0713 for ROE. The standard deviation of 0.8578 with respect to ROE suggests that while a few firms are doing well, most of them are not. This findings is clearly evident from negative 972.54 percent and positive 284.42 percent representing minimum and maximum ROE respectively. Thus, it could be argued that though on the average these microfinance institutions are doing well in terms of ROE, the performance is rather widely dispersed suggesting that the overall mean performance could be driven by a few MFIs. Indeed, this story is not so good to explain in the case of ROA because mean ROA is only 3 percent. The standard deviation of 0.05 with respect to ROA suggests that deviation of return in terms of assets is much less than that of equity. The good amount of difference between ROE and ROA also indicates high dependency of MFIs on borrowed funds. Number of active borrowers represented by outreach is not widely scattered which can be understood by observing the low standard deviation of outreach.

Table III: Capital structure and performance of MFIs in Bangladesh: descriptive statistics

Variable	Observations	Mean	Median	Std dev.	Minimum	Maximum
ROA	205	0.0300	0.0323	0.0459	-0.2399	0.1623
ROE	205	0.0713	0.1629	0.8578	-9.7254	2.8442
OUT	205	12.2668	11.9565	1.7595	7.6723	15.8020
DEF	205	0.0063	0.0000	0.0138	-0.0097	0.0831
TDR	205	0.7994	0.8272	0.1296	0.4166	1.0201
BTA	205	0.3845	0.4227	0.1970	0.0000	0.7213
DTA	205	0.3389	0.3113	0.1273	0.1086	0.9271
DNTA	205	0.0407	0.0020	0.0813	0.0000	0.4970
SZE	205	21.6719	21.4197	1.8528	17.7082	26.1247
INR	205	0.2338	0.2314	0.0507	0.0016	0.7203
EXP	205	0.1473	0.1380	0.0736	0.0712	0.6978
RSK	205	0.0612	0.0447	0.0564	0.0000	0.3453

Source: Authors' estimates

The mean default ratio is less than 1 percent, which confirms the fact that microcredit lenders are very prudent for disbursing loan and for collecting repayment effectively. Minimum standard deviation in case of default ratio is a very good indicator that microfinance subsector is less prone to default problem in credit industry. The negative minimum value of default ratio has been appeared because we have considered loan loss ratio as proxy of default ratio which is adjusted ratio for default loan recovery. Average lending rate of MFIs has been found 23.38% which is inspiring as lending rate is gradually decreasing for the availability of cheap funding.

Table IV. Capital structure and performance of MFIs in Bangladesh: correlation matrix (both level and direction of relationship)

	ROA	ROE	OUT	DEF	TDR	BTA	DTA	DNTA	SZE	INR	EXP	RSK
ROA	1.000											
ROE	0.29***	1.000										
OUT	0.33***	0.11	1.000									
DEF	0.02	0.11	0.08	1.000								
TDR	-0.47***	-0.14**	-0.30***	-0.09	1.000							
BTA	-0.29***	-0.13	-0.42***	0.00	0.68***	1.000						
DTA	-0.01	0.05	0.35***	-0.10	-0.09	-0.70***	1.000					
DNTA	-0.01	0.00	-0.06	0.18**	-0.40***	-0.26***	-0.01	1.000				
SZE	0.32***	0.13	0.95***	0.06	-0.19***	-0.36***	0.34***	-0.18***	1.000			
INR	0.30***	0.09	0.15	0.02	-0.21***	-0.03	-0.07	0.00	0.11	1.000		
EXP	-0.47***	-0.19***	-0.33***	-0.05	0.18***	0.14**	-0.17**	0.11	-0.34***	0.26***	1.000	
RSK	-0.43***	-0.15**	-0.07	0.21***	0.01	-0.02	0.03	0.25***	-0.14	-0.30***	0.12	1.000

Notes: ROA is the return on assets measured by Net operating income (less of taxes)/average assets.; ROE is Net operating income (less of taxes)/average equity; OUT is the rate of outreach measured by the natural log of active borrowers base for firm on yearly basis; DEF is the default rate measured by Total amount of loans written off, net of recoveries/average gross loan portfolio; TDR is the total debt ratio (gearing/leverage) calculated by Total liabilities/Total assets; BTA is the borrowings ratio measured by total borrowings/total assets; DTA is the deposits ratio measured by total deposits/total assets; DNTA is donated equity measured by total donated equity divided by total assets; SZE is the natural log of asset base representing size; INR is the average lending rate measured by the financial revenue/gross loan portfolio; EXP is the operating expense measured by Operating expense/average gross loan portfolio; and RSK is the risk level measured by the portion of loans greater than 30 days past due/gross loan portfolio.

Double asterisks (**) indicate significance at 5% and Triple asterisks (***) indicate significance at 1% level.

Source: Authors' estimates

Average operating expense relative to loan portfolio has been estimated as 14.73% while average portion of loans which is 30 days past due has been estimated as 6.12%. I.v total 205 observations of 38 MFIs have been used in this study.

Pearson correlation matrix (See Table IV) shows both level and direction of relationship among the variables. We can see that the total debt ratio and borrowings are negatively correlated with the outreach as well as MFIs performance in terms of number of borrowers, which indicate that MFIs with high leverage are likely to have less number of active borrowers. MFIs which rely on deposits funds, are serving greater number of borrowers. Asset size has strong positive relationship with outreach of MFIs. Large sized MFIs can reach to greater number of borrowers.

The lower the operating expenses will be in relative to loan portfolio size, the higher the outreach can be achieved which is evident from negative relationship between operating cost and outreach. Higher operating expenses can reduce both ROA and ROE significantly. MFIs with lower operating expenses can maximize the size of the firm in terms of assets and help to serve borrowers at a lower interest rate which are evident from negative and positive relationship of operating cost to size and lending rate respectively. The table reveals the positive correlation between portfolio at risk and default ratio which is clearly reliable and expected in real world. The larger the portion of portfolio at risk, it becomes more exposed to default risk. There is significant positive correlation between default ratio and donated equity. As borrowings, and deposits both have very similar characteristics in terms of contributing MFIs to disburse more loans and MFIs have obligation to provide return to the fund providers in terms of interest rate; we put four separate models based on total debts, borrowings, deposits, and donated equity to avoid multicollinearity. All these capital structure variables has no multicollinearity problem with other control predictor variables namely size of firm, operating expenses, lending rate, and risk level. We have found no multicollinearity problem (the maximum level of pairwise correlation is 0.36) in our study so our regression models have excellent level of fitness and explanatory power. We also have conducted VIF test (See Appendix). VIF output confirms that models are free from multicollinearity problem.

4.2 Discussion of regression results

4.2.1 Outreach fixed effect estimates

The explanatory power of the predictors can be assessed with the help of R^2 which is above 76% in four separate models for outreach. It indicates that variation in number of borrowers of MFIs can be well explained with these models as R Square is quite good. Besides probability of F statistic of four models are less than 1% significance level, which testifies the excellent level of fitness of these models. Intercept of these

regression equations is significant in explaining variation of dependent variable. If we look at the P value we see that total debt ratio, borrowings, deposits, firm size, and portfolio at risk are the significant variables in four models of outreach to explain the variation in outreach. Except these variables, other predictor variables are not significant at 5% significance level. Leverage helps MFIs to enhance their borrowers' base which is evident from the positive coefficient of total debt ratio in outreach model. Leverage in the form of borrowings enables MFIs to serve more borrowers which is consistent with the study of Michaelas et al. (1999), but deposits, another form of leverage influence outreach negatively which is not supporting expected relationship between them. It can be explained that lenders of MFIs put pressure on MFIs to take credit program to greater number of borrowers while MFIs dependent on deposits fund for their loanable fund, don't feel enough importance to serve greater number of borrowers. The same conclusion can be drawn for the negative relationship between donors' equity and outreach. But statistical evidence does not support the relationship here. MFIs can extract premium from the credit advanced to the borrowers.

Moreover more outreach enables MFIs to diversify credit for different customers, and improve the debt service level which minimizes MFIs risk exposure. Size of the firm has positive relationship with outreach which can be observed from all four models. Large sized MFIs can serve more borrowers which in turn help in enhancing their outreach. More borrowers increase the loans portfolio size of MFIs which in turn enlarge the asset size of MFIs. So there is a bi-casualty relationship. To increase number of active borrowers, MFIs are likely to engage in disbursing loans to a big number of borrowers which can encourage adverse selection problem and make the portfolio risky. So there exist positive relationship with outreach and risk variable like portfolio at risk. Lending rate has negative relationship with outreach as well as borrowers' base which has testified the economic relationship. Low lending rate encourage greater number of people to become active borrowers in MFIs and the inverse is true. But this relationship has not been found statistically significant. Serving greater number of borrowers require higher operating cost so the positive coefficient can be justified but higher operating cost can reduce the likelihood of MFIs to serve borrowers efficiently, bi-casualty relationship exists between operating expenses and outreach. But this relationship is not statistically significant here.

4.2.2 Default rate fixed effect estimates

Test of probability statistic indicates the degree of fitness of regression model. As probability of F value of three regression models out of four separate models of default rate is more than 5% significant level, only fourth regression model's result has been considered as reliable and this model has about 5% explanatory power to explain the variation in default ratio by the variation in capital structure variables and

Table V: Capital structure and performance of MFIs in Bangladesh: regression results

Regressors	Dependent variable: outreach fixed effect estimates				Dependent variable: default rates fixed effect estimates			
	Model 1	Model 2	Model 3	Model 4	Model 1	Model 2	Model 3	Model 4
Total debt (TDR)	1.3718				-0.0322			
	(2.31)**				(-1.51)			
Borrowings (BTA)		0.7237 (2.42)**				-0.0190		
						(-1.95)*		
Deposits (DTA)			-0.4946				-0.0101	
			(-1.73)*				(-0.81)	
Donated Equity				-0.9280				0.0822
(DNTA)				(-0.88)				(2.24)**
Firm size (SZE)	0.3373	0.3440	0.3539	0.3256	-0.0001	-0.0002	-0.0006	0.0021
	(10.22)***	(8.49)***	(6.05)***	(7.94)***	(-0.13)	(-0.24)	(-0.69)	(1.62)
Lending rate (INR)	-0.0690	-0.1510	-0.2931	-0.2995	-0.0023	-0.0008	0.0037	0.0023
	(-0.18)	(-0.34)	(-0.51)	(-0.61)	(-0.16)	(-0.06)	(0.26)	(0.15)
Operating Exp.	0.1591	0.1905	0.2330	0.1954	-0.0081	-0.0086	-0.0110	-0.0047
(EXP)	(0.53)	(0.51)	(0.52)	(0.49)	(-0.80)	(-0.82)	(-0.97)	(-0.40)
Portfolio at Risk	1.3521	1.2253	1.2572	1.5685 (2.67)**	0.0287	0.0321	0.0256	0.0112
(RSK)	(2.47)**	(3.81)***	(3.46)***		(1.11)	(1.05)	(0.92)	(0.49)
Constant	3.7700	4.4647	4.7224	5.1929	0.0344	0.0182	.0221	-0.0444
	(4.03)***	(5.01)***	(4.05)***	(5.88)***	(1.21)	(0.82)	(1.02)	(-1.51)
R-squared (%)	76.88	82.93	89.57	86.93	2.67	0.80	2.89	4.68
No. of obs.	205	205	205	205	205	205	205	205
Test of probability	F(5,37)	F(5,37)	F(5,37)	F(5,37)	F(5,37)	F(5,37)	F(5,37)	F(5,37)
	= 31.18	= 25.80	= 15.72	= 14.88	= 0.91	= 1.67	= 0.56	= 3.14
	[0.0000]	[0.0000]	[0.0000]	[0.0000]	[0.4834]	[0.1663]	[0.7310]	[0.0184]
Hausman test	Chi^2 (5) =	Chi^2 (5) =	Chi^2 (5) =	Chi^2 (5) =	Chi^2 (5) =	Chi^2 (5) =	Chi^2 (5) =	Chi^2 (5) =
	125.87	120.28	113.80	123.99	12.40	15.69	10.39	13.28
	[0.0000]	[0.0000]	[0.0000]	[0.0000]	[0.0297]	[0.0078]	[0.0650]	[0.0209]

Notes: All regressions include a constant. T statistics are in parentheses for both outreach and default rates variables. *P*-values are computed using heteroscedasticity-robust standard errors clustered for MFIs and are presented in parentheses. P-values in square bracket; Single (*), double (**), and triple (***) asterisks represent statistical significance at the 10%, 5%, and 1% level, respectively.

Source: Authors' Estimate

other predictor control variables. If we look at the P value of individual predictor variables, we can assert that leverage in the form of borrowings and donors equity are significant at 10% and 5% significance level respectively. Dependence on borrowings can cause lower default in micro finance institutions lending. Lenders in highly levered MFIs induces management to employ measures and mechanisms to reduce annual credit default rate to make sure that MFIs will not lose their profitability and MFIs will not honor their obligations to lenders. (Kyereboah-Coleman 2007). Our findings is also consistent with the findings of Bos and Fetherston (1993), who assert that leverage encourages firms to ensure positive cash flow and profitability to enhance their capability to honor their leverage obligations. It is indeed possible, when MFIs' managers will take care of their loans portfolio with utmost care to minimize potential default. The positive influence of donated equity on default ratio can highlight the fact that when MFIs are largely dependent on donors' equity for their funding, they feel less worried about prudent disbursement of loans and collection loans repayment. As MFIs managers don't have obligations for repayment of donors' fund, they don't take care enough of their effective management of loans portfolio. For this reason, donors' have reduced the frequency and amount of donated equity to the MFIs and MFIs are now looking for alternative source of funding by reducing their reliance on foreign donors' equity funding.

Total leverage and leverage in the form of deposits can also reduce the degree of default ratio for the reason mentioned above. But these expected relationship have not been found significant in respective models. Large sized MFIs serve greater number of customers, so the likelihood of default is expected to high for them but this relationship has not been found statistically significant. Low lending rate can increase the likelihood of adverse selection problem which can induce potential default, in contrary high lending rate increases the burden of loan repayment which may invite moral hazard problem by raising the chance of default. Both positive and negative relationship have been found in our models but these relationships cannot be proved with statistical significance in this study. For reducing defaults in MFIs, operating expenses are expected to go up and high proportion of portfolio at risk signals that potential default will go up. These relationships support the expected relationships mentioned earlier.

5. Conclusions

As microfinance sub-sector has relatively lower contribution than tradition financing sectors, it has been neglected in study of association between capital structure and performance of incumbent MFIs. However, microfinance is growing robustly as a development tool not only for financing the low income people but also for making them

self-reliant by eradicating poverty. Association between capital structure and performance of MFIs is necessary to assess because of growing role of MFIs in changing the development picture of economy. Bangladesh is recognized as birth place of microfinance and this paper is an attempt to address the critical issue of effect of capital structure on performance of microfinance institutions operating in Bangladesh. This study thus explored this linkage using panel data of 38 MFIs from Bangladesh covering the fifteen-year period 2003-2017. The results show that most microfinance institutions are highly leveraged as 80 percent of their assets is financed through leverage and borrowings. Again, the regression results from established models point to the fact that highly leveraged microfinance institutions are performing better by serving greater number of borrowers and by reducing default rates consistent with other studies. Management of levered MFIs are more careful to better utilize their fund in a prudent way to curve the loan default rate.

The implication of our findings is that policymakers have to develop appropriate policies to enable MFIs to have access to low cost debt funding as it is essential to enhance their operations. In this regard microfinance regulatory authority can work with development partners (i.e., World Bank, New Development Bank) to design mechanisms to enable MFIs to get more debt funding at low cost. To reduce the asymmetric information problem, microcredit regulatory authority can launch a credit information bureau – central database which will help the MFIs to assess the loan applicants prudently. Donors can think for introducing regular supervision program to ensure the effective usage of their fund. Though the findings of this study do not help us to understand optimal capital structure issues for MFIs as MFIs use more debt relative to equity for financing their operations. The issues relating to capital structure still remain contentious and a puzzle. It would have been more appropriate to analyze all MFIs in Bangladesh, to include other performance variables, and to analyze the nonlinear relationship. Recognizing the limitations, we are of the opinion that this study could serve as a framework for further studies in this area like determinants of capital structure of microfinance sub-sector, relationship between capital structure of MFIs and board composition, and effect of capital structure on operational and financial sustainability of microfinance institutions.

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Appendix A. Lists of name of microfinance institutions selected in study

1. ASA Bangladesh
2. ASOD
3. BASTOB
4. BDS
5. BEES
6. BRAC Bangladesh
7. BURO Bangladesh
8. CBSDP
9. CDIP
10. CSS
11. CTS
12. Caritas BD
13. Coast Trust
14. DSK
15. ESDO
16. GJUS
17. Ghashful
18. Gram Unnayan
19. Grameen Bank
20. HEED
21. IDF
22. Jagorani Chakra
23. Muslim Aid
24. NOWZUWAN
25. POPI
26. PPSS
27. Padakhep Manabik
28. RDRS
29. RRF
30. SDC
31. SKS Foundation
32. Sajida
33. Shakti Foundation
34. Society for Social Services
35. TMSS Micro Credit
36. UDDIPAN
37. VERC
38. Wave

Appendix B. Diagnostic Test Results

i. Multicollinearity Test

Variables	VIF	1/VIF
EXP	1.38	0.7249
INR	1.37	0.7288
SZE	1.20	0.8318
RSK	1.17	0.8563
TDR	1.14	0.8753
Mean VIF	1.25	