Impact of Cottage Micro Small and Medium Enterprise Financing on Bank Performance: Evidence from Emerging Economy

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ABSTRACT

This paper aims to assess the impact of Cottage, Micro, Small and Medium Enterprises (CMSMEs) financing on bank performance estimated with NIM (net interest margin) ratio followed by ROE (return on equity) and ROA (return on assets) ratio considering ten commercial banks (both private and state-owned bank) of Bangladesh being a participant of emerging economy covering from the year 2011 to the year 2020. Adopting Pooled OLS, Fixed Effect (FE), Random Effect (RE) and Generalized Least Square (GLS) technique enables the estimation of coefficients corresponding to the explanatory variables of the models constructed with bank specific as well as macroeconomic control variables along with the CMSME financing factors affecting banks' profitability. We also use diagnostic tests like the test of heteroskedasticity, multicollinearity, omitted variable, and autocorrelation to ensure our models are accurate. From this paper it will be cleared that the growth of CMSME financing can lead to higher profitability of commercial banks, higher employment rate in CMSME sector other than any other sector. According to the estimated findings of the models, almost all CMSMSE determinants along with a few control variables including bank size, GDP growth and inflation largely account for the variations in profitability ratio of banks that adhere to the management techniques mandated by Bangladesh Bank, providing a useful contribution to the existing literature by elucidating the importance of these bank specific and macroeconomic factors comprising the whole metrics.

Keywords: CMSME Financing, Profitability, Commercial Banks, Return on Equity, Inflation
JEL Classifications: C22, C23, C26

1. INTRODUCTION

Cottage, Micro, Small and Medium Enterprises (CMSME) are still rule over the world economy as it is a source of employment, remarkable contribution to the GDP growth, commence of innovation and create stirring for other economic activities. In bank loan portfolio, CMSME loan play a crucial role nowadays because it is the way of boosting bank profitability as funds are used to finance the working capital and collection of modern technical equipment, which is probable by the availability of funds. CMSME sector is gradually increasing day by day. CMSME finance refers specifically to loans made to cottage, micro, small and medium-sized companies. Growth of cottage, micro, small and medium-sized enterprises (CMSMEs) is crucial to lowering unemployment and increasing GDP. Yet the largest gains come from breaking into

new markets, reducing poverty, narrowing income gaps, fostering equality, and giving women more agency. Businesses, especially small and medium-sized ones, are crucial to the economic development of nations like Bangladesh. Additionally, this industry and its sectors play a crucial role by providing alternatives to imports. The CMSME non-performing loan is lower than any other types of non-performing loan. CMSME with huge amount of loans of commercial banks are used to finance the production of new technology and that might be the reason of momentous bonding between CMSME loan and profitability, for this profit of the firm will grow up. CMSMEs are considered as an essential tool for neoteric employment propagation, poverty palliation, and fast industrialization (Ahmed, 2018). CMSMEs are also considered as propeller of economy growth and major mover of economy all over the word. The prime objective of this paper is to assess the

impact of CMSME financing on the commercial banks' profitability in Bangladesh. The impact of several deterministic factors of profitability is also examined, along with their relative magnitudes.

Hasan (2019) mentioned in his research the adaptation and implementation of some variables suggested by Mathew (2009) such as sales growth, return on investment, profit margin and asset turnover of 41 CMSMEs financed by banks to evaluate the impact of CMSME profitability. This paper found that giving loan in CMSME's industry bank create positive impact on their profitability as well as increased employment and development of the country. On the study Uddin and Bose (2013) shows that CMSME financing is most significant for improving bank profitability by conducting a survey based on 200 questions in Khulna city of Bangladesh. This study also identifies those factors that have negative impact on CMSMEs profitability. The study suggest that government should take proper steps for helping CMSMEs industry to grow and motivate the CMSME's for adopting modern technology for improving their operating efficiency and gaining global competencies. Rahman et al. (2016) states in their research that bank size, ownership play an important role on CMSME financing. The study results show that having collateral is not beneficial to CMSME financing to reduce the default rate of the CMSME loans. This paper suggest that Bangladesh bank should give advice the commercial banks on it and help to remove the financing constraints for the start-up business. Ullah et al. (2018) conduct a research paper which focused on the management skills that have great impact on CMSME financing. In this study, writers analyse how proficient management may increase the bottom line of cottage, micro, small and medium-sized businesses. All the factors were shown to have a substantial impact on CMSME lending, and data was obtained from Ten private commercial banks located in Bangladesh covering the years 2012-2017 for this study. Islam et al. (2014) trio conducted a study contrasting conventional and Islamic banking's role in funding cottage, micro, small and medium-sized enterprises (CMSMEs) in Bangladesh. This paper explored that CMSME as a potential sector of investment in banking industry and also find out that a large portion of CMSME loans is cover by the conventional bank. Nowadays Islamic banks are also investing in CMSME sector to develop the economy in halal way. Bosri (2016) conducted research and shows the present scenario a challenge of CMSMEs. This paper also showed that the present banking sector are concentrated to industrial loans rather than CMSME loans. Though its recovery rate and contribution to GDP is high but this sector faces many obstacles in case of receiving loan, high information gap, less skilled borrower etc. are mentioned as main obstacles. This study is very helpful for financial institutions because on the basis of this report they can make their decision on making loan in this sector. Hasan and Jamil (2014) conduct a research paper in which they showed that CMSMEs financing has tremendous prospect if they invest in technology-based CMSMEs industry. Ahmed and Bown (2016) states in their paper that the financing methods of commercial banks in CMSMEs sector should be changed. Due to challenging market CMSMEs are now vital customer for commercial banks so, banks should adopt holistic approach (attempt to change typical culture and tradition) and focus in a new lens beyond the tradition. Chowdhury et al. (2013)

conducted an analysis on 100 CMSMEs units by using simple random technique, they conducted the analysis based on Some questionnaires and develop the response and stated that CMSMEs has significant impact on poverty reduction and GDP growth. But for the initial funding set up they need to wait for a long time which is a major obstacle. Some other findings lack of financing collateral requirement, government assistance. So, they recommended for venture capital, HDR, syndicated scheme, special CMSME development fund, training session and specialisation. Anwar (2013) examined in his study that CMSMEs financing has higher impact on bank performance of Indonesia than any other types of loan as well as bank profitability and interest rate margin. This study also implies that small size banks are efficiently operate CMSMEs compared to the large banks. Islam and Rahman (2016) shows commercial banks unwillingness to grant loans to CMSMEs sector as there is high supervision cost and high interest rate risk. They also estimate the number of assumes and that are 79754 of which 6.4% on medium and 93.6% are small. They also show the credit product available now in our country.

Financing in CMSMEs can bring the development in the CMSMEs sector as well as social and economic development of a country by contributing in employment, income generation and accelerate the progress of urban and rural areas in a significant way. This statement is stated by Hallberg (2000), Olutunla (2001), Williams (2006) in their publication. Aziz and Siddique (2016) have evaluated the role of Bangladesh bank in promoting CMSMEs financing in our country. From their study, it is realised that Bangladesh bank is taking numerous steps on CMSMEs financing and development of this sector. Industrial lending, target based lending, CMSMEs cluster development, regulatory improvement, development of women entrepreneurship etc. are some steps taken by Bangladesh bank for that purpose. Bangladesh bank provide low-cost funding and guidelines. They also stated that desired outcome is expected low and hope that those steps will accelerate the growth of CMSMEs financing. Korean banks' efficiency and employment rates were shown to be impacted by CMSMEs' access to funding and credit guarantee by Liang and Gao (2017). South Korea has seen remarkable economic growth in recent years, with 87.5% of the nation's workforce now employed, and all Korean businesses accounting for 99.9% of the country's total profitability. According to Rabbani and Suleiman (2005), research a big portion of CMSMEs want to finance from bank further working capital needs and the percentage is 59.6 but there is a shocking reality that 50.53% CMSMEs are failed to avail this financing need they had no access on institutional financing. Olutunla and Obamuyi (2008) demonstrate in their research that CMSMEs profitability and bank loans, profitability and bank size, profitability and interest rate are dependent on each other in Nigeria. This study also stated that government should relax their restriction which blight the banks more credit facilities for CMSMEs. The government also should impose a rule on all over the banking industry that every bank has to provide minimum credit allocation to CMSMEs. Qamruzzaman and Jiango (2019) said that there may be a want for well-dependent CMSME finance, however this is not sufficient to maximize the potentiality of this area authorities can take steps on the way to inspire the bank to convey contemporary-day methods with the aid of using ensuring

Table 1: A review of the factors influencing the study's empirical findings

Variables	Notations	Coefficient expected sign	Source of data
NIM, ROE, ROA (dependent variables) Independent variables ($\sum X$)	NIM, ROE, ROA		Annual report
X^2=CMSME loan to total loan	CMSMELTL	+ (positive)	Annual report
X^3=CMSME loan to total asset	CMSMELTA	+ (positive)	Annual report
X^4=CMSME sales	CMSMES	+ (positive)	Annual report
X^5=Bank size	In TA	+ (positive)	Annual report
X^6=GDP growth rate	GDP Growth	+ (positive)	Annual report
X^7=Inflation rate	Inflation	− (negative)	Annual report
X^8=Interest rate spread	Int. rate spread	− (negative)	Annual report

Source: Authors' estimations. NIM: Net interest margin, ROE: Return on equity, ROA: Return on assets

its cost-effectiveness. Zaman and Islam (2011) have performed a observe on CMSME improvement in our country. They have examined the position of CMSMEs, their modern status, get entry to finance, and different issues within side the CMSME sector. It shows that CMSMEs contribute 85% of commercial employment. They said that precedence has to take delivery of fastening entrepreneurship, beginning a brand-new business, and strengthening cross-sectional business. According to Bhattacharya and Chowdhury (2003), Bangladesh Bank has taken numerous steps and carried out new guidelines to enhance the CMSME condition. The new rule is justified from the viewpoint of reducing the credit score chance exposures of the banks with a more degree of classified loan. However, to classify big loans as volatile loans (with the aid of using the brand-new criterion) is not always reasonable. Furthermore, this style of production coverage is not suitable for boosting the volume of credit to the CMSME sector. In fact, demand-aspect issues have been now no longer taken into consideration below each directed lending (earlier than 1990) and deregulated lending (after 1990) regimes; as a result, useful resource allocation worsened. In their study "Bank-CMSMEs relationship and banks risk-adjusted profitability: 2001-2005," Fredrikson and Moro (2014) surveyed 4285 businesses. According to their research, a financial institution's overall performance accounts for the vast majority of the variance in its risk-adjusted profitability. That is why it is so important for financial institutions to charge different amounts for different services based on the level of risk associated with each customer. Banks can maximize their capacity to charge a fee that reflects the volatility of the mortgage to the customer by preserving at least some of the additional revenue that results from factoring in that risk. The authors Racheal and Uju (2018) analyzed the function of commercial banks in Nigeria in relation to CMSMEs. They tested three research hypotheses by using Chi-square. The have a look at determined that small and medium length commercial enterprise come across hassle within side the procurement of loans from business banks additionally industrial banks have contributed immensely to the improvement of CMSMEs via their loans and advances.

Few studies have been undertaken in Bangladesh on the effect of cottage, micro, small and medium-sized enterprise (CMSME) financing on the profitability of banks, and even fewer have included both private and state-owned commercial banks as well as the full range of variables that impact CMSME financing. This research will fill this void by evaluating the impact of cottage, micro, small and medium-sized enterprises (CMSMEs) on the profitability of banks, including private commercial and state-owned commercial banks that have been operating in Bangladesh for a very long time, and by attempting to provide all of the variables that have an impact on CMSMEs financing profitability all at once.

1.1. Hypothesis Development

So, depending on the literature gaps, following hypotheses are constructed to divulge the impact of CMSME financing along with other bank specific as well as macroeconomic factors on commercial banks' performance estimated with profitability ratios.

- H_1: There is a significant relationship between CMSME financing and NIM ratio of banks
- H_2: There is a significant relationship between CMSME financing and ROE of banks
- H_3: There is a significant relationship between CMSME financing and ROA of banks.

The next segments of this paper consist of Data with Methods, Empirical Discussions and Conclusions with policy recommendations.

2. THE DATA AND MODEL CONSTRUCTION

This is an explanatory research revealing the impact of CMSME financing on banks profitability with Return on Asset (ROA), Return on Equity (ROE) and Net Interest Margin (NIM) for the last 10 years from the year 2011 to the year 2020 of the 10 commercial banks (both private commercial bank and state owned commercial bank) of Bangladesh such as Bank Asia Limited, Agrani Bank Limited, Eastern Bank, Jumuna Bank, Mutual trust Bank, Sonali Bank, National Credit and Commerce Bank, City Bank, Brac Bank and Prime Bank Ltd. So, the total sample size is 100.

Three profitability indicators are to be taken as dependent variables or explained variables. The variables are Return on Asset (ROA), Return on Equity (ROE), and Net Interest Margin (NIM). ROA indicates how efficiently banks utilize their asset portfolio in generating profits. ROE demonstrates the efficient use of banks' common equity capital. The after-tax net profit of the sample banks is to be considered as the return to calculate the ROA and ROE. Higher NIM dictates higher profitability of the banks. This study's research objective is to examine how bank profits are affected by providing loans to cottage, micro, small and medium-sized businesses. The independent variable of this paper is to be CMSME Loan, CMSME Sales, Business Size, Total Assets, Total Loan all are the core and independent variables as bank specific factor and Interest Rate Spread, Inflation and GDP Growth as macroeconomic factors. This statistical tool that will be used for the assessment

of profitable relationship among different variables taking to the research are Multiple Regression Analysis, Diagnostic Test.

Following regression models have been constructed:

$$NIM_{it} = \alpha_i + \sum_{k=1}^{7} \beta_{it} X_{itk} + u_{it} \qquad (1)$$

$$NIM_{it} = \alpha_i + \sum_{k=1}^{7} \beta_{it} X_{itk} + u_{it} \qquad (2)$$

$$NIM_{it} = \alpha + \sum_{k=1}^{7} \beta_{it} X_{itk} + \varepsilon_{it} + u_{it} \qquad (3)$$

$$ROE_{it} = \alpha_{it} + \sum_{k=1}^{7} \beta_{it} X_{itk} + u_{it} \qquad (4)$$

$$ROE_{it} = \alpha_i + \sum_{k=1}^{7} \beta_{it} X_{itk} + u_{it} \qquad (5)$$

$$ROE_{it} = \alpha + \sum_{k=1}^{7} \beta_{it} X_{itk} + \varepsilon_{it} + u_{it} \qquad (6)$$

$$ROA_{it} = \alpha_{it} + \sum_{k=1}^{7} \beta_{it} X_{itk} + u_{it} \qquad (7)$$

$$ROA_{it} = \alpha_i + \sum_{k=1}^{7} \beta_{it} X_{itk} + u_{it} \qquad (8)$$

$$ROA_{it} = \alpha + \sum_{k=1}^{7} \beta_{it} X_{itk} + \varepsilon_{it} + u_{it} \qquad (9)$$

Here, α_{it}, α_i, α = Constant for Pooled OLS, Fixed Effect, and Random Effect method respectively.

$\sum X$ = all independent variables demonstrating CMSME financing factors along with other bank-specific-and macroeconomic factors adopted in the model. β = coefficient of the explanatory variable; u_{it} = error term of the model or error term within the entity; ε_{it} = error term between the entity;

These models will be estimated using the Ordinary Least Square (OLS) Method, Fixed Effect Method (FE), Random Effect Method (RE) and the Generalized Least Square (GLS) Method. For estimating the coefficients of equation no. 01, 04 and 07, OLS and GLS will be adopted followed by equation no. 02, 05 and 08 would be estimated by FE method. The rest of the three equations including equation number 03, 06 and 09 would be estimated with Random effect method as mentioned in earlier page.

Following table 1 incorporates the summary of the variables considered in the models:

3. EMPIRICAL RESULTS

The summary statistics of all variables (dependent variables, bank specific variables and macro-economic variables) included in the aforesaid model in the methodology part is given below in table 2:

This table shows the comprehensive statistical measure such as mean, standard deviation, range gaps (measured by maximum value and minimum value) of all variables (dependent variables, bank specific variables and macro-economic variables) of model. Overall, the data's summary statistics appear good, with low standard deviation numbers and narrow range gaps. In this part, the mean variable of ROE is 0.1152 and the SD is 0.050162 where minimum is 0.009900 and maximum is 0.2539. Again, here, the mean variable of ROA is 0.010140 and the SD deviation is 0.006434 where minimum is 0.00600 and maximum is 0.049200. In the NIM section the std is higher compare to ROA but a lot less that ROE. And min is a bit higher than ROA. The maximum and the minimum has a huge difference. Mean of CMSMELTL ratio is 0.12463, standard deviation is 0.119894566, the minimum and maximum value is 0.002030602 and 0.51333051 respectively. After that mean of CMSMELTA ratio is 0.08246, standard deviation is 0.079619767, the minimum and maximum value is 0.000957861 and 0.355079937 respectively. In macroeconomic factors lnTA. GDP Growth, Inflation and Int. rate spread present good. In the whole is shows that except some variables like CMSMES and GDP Growth all std. is lower than usual.

The impact of CMSME banking on bank profitability was estimated using a variety of methods with sample size (N) 100 and Net Interest Margin (NIM) as a dependent variable, including the Pooled OLS (standing for ordinary least square), Fixed effect, Random effect, and Generalized least square (GLS), with results shown in the table 3. The results from the estimators show that, after controlling for other factors, some of them have a substantial effect on explaining the variance of the NIM ratio, which is used to assess banks' profitability. With the Pooled OLS approach, we find statistical significance at the 1% level for the CMSME Loan to Total Loan ratio, and at the 5% level for the CMSME Loan to Total Asset ratio and GDP Growth. GDP Growth and Inflation are found statistically significant at 5% level of significance both under fixed effect method and random effect method. The ratio of CMSME Loans to Total Loans is the sole explanatory variable shown to be statistically significant at the 1% level of significance using the generalized least squares (GLS) method.

The Chi-square value of 10.85 for the random effect and 6.25 for the GLS method reveal that they are not jointly significance of all components included within the model in explaining variations in profitability as assessed by the NIM ratio of banks. Commercial bank profitability, as measured by the proxy variable NIM ratio, is jointly affected by all independent variables, including bank-specific factors such as CMSME loan to total loans and CMSME loan to total assets, CMSME sales, and bank size (log of total assets, lnTA), and macroeconomic factors such as GDP growth, inflation, and interest rate spread.

Estimated R^2 values of 0.3225, 0.480, and 0.0480 for the ordinary least squares (OLS), fixed effect, and random effect methods, respectively, show that 32.25%, 4.80% and 8.43% of the observed variance in the dependent variable, fitted model adequately explains as measured by the NIM ratio. Furthermore, the F-value of 1.84 obtained under OLS is jointly statistically significant at 5% level of significance in explaining variations of the NIM ratio

Table 2: Comprehensive statistics for each variable in the model

Variables	Observations	Mean	SD	Minimum	Maximum
ROE	100	0.115250	0.050162	0.009900	0.253900
ROA	100	0.010140	0.006434	0.000600	0.049200
NIM	100	0.028550	0.008957	0.006100	0.057088
CMSMELTL	100	0.124630	0.119895	0.002031	0.513331
CMSMELTA	100	0.082460	0.079620	0.000958	0.355080
CMSMES	100	0.342610	0.342297	0.008427	1.361635
InTA	100	11.408900	0.426244	8.330830	12.202055
GDP growth	100	0.063950	0.011276	0.034500	0.078800
Inflation	100	0.066360	0.017211	0.055100	0.114000
Int.rate spread	100	3.28	0.804497	1.87	4.48

Source: Authors' contribution. NIM: Net interest margin, ROE: Return on equity, ROA: Return on assets

Table 3: Output of coefficient of model based on equation no. 1, 2 and 3

Dependent variable NIM (net interest margin) ratio	Estimation models			
	Ordinary least square (OLS)	Fixed effect (FE)	Random effect (RE)	Generalized least square (GLS)
Independent variables				
CMSMELTL	0.02779341**	0.0460583	−0.0003116	0.02779341**
CMSMELTA	0.01248911*	−0.073174	−0.0136664	−0.0004217
CMSMES	−0.001654	−0.0026475	−0.001441	0.0024823
InTA	−0.0000448	0.0022834	0.0015574	0.006802
GDP growth	0.0139524*	0.1683657*	0.1580072*	0.1684799
Inflation	0.0809802	0.1029568*	0.0953428*	−0.1376688
Int.rate spread	−0.0264973	−0.0188765	−0.0221775	−0.0014266
Constant	0.0173295	−0.0132788	−0.003261	0.1092849
N	100	100	100	100
R²	0.3225	0.084		
F	1.84	1.54		
rho		0.38418823	0.3929073	
sigma_u		0.00585545	0.0059639	
sigma_e		0.00741332	0.00741332	
Chi-square			10.85	6.25

Source: Authors' estimations based on STATA, Note: *, **, *** show respective significance levels of 5%, 1%, 0.1%. NIM: Net interest margin

Table 4: Output of coefficient of model based on equation no. 4, 5 and 6

Dependent variable: ROE (return on equity) ratio	Estimation models			
	Ordinary least square (OLS)	Fixed effect (FE)	Random effect (RE)	Generalized least square (GLS)
Independent variables				
CMSMELTL	0.1432026**	−0.7136635	−0.449739	0.1432026**
CMSMELTA	−0.0041948*	0.8071511	0.9080203	−0.0041948*
CMSMES	−0.0316949	−0.0639822*	−0.0297994	−0.0316949
InTA	−0.0623509***	−0.0068444	−0.0210928	−0.0623509***
GDP growth	−0.0992356	−0.4819083	−0.1831925	−0.0992356
Inflation	0.2416991	0.4555838	0.4835848	0.2416991
Int.rate spread	0.0024266	0.1461553	0.3098167	0.0024266
Constant	0.8039198***	0.2334256	0.3167283*	0.8039198***
N	100	100	100	100
R²	0.2435	0.0099	0.223	
F	4.23	2.6		
Rho		0.65917888	0.072000942	
sigma_u		0.05890356	0.01179848	
sigma_e		0.04235485	0.04235485	
Chi-square			19.44	32.19

Source: Authors' estimations based on STATA, Note: *, **, *** respective significance levels of 5%, 1%, 0.1%.NIM: Net interest margin, ROE: Return on equity, ROA: Return on assets

assessing banks' profitability and F-value 1.54 of fixed effect reveal that no regressor of the mentioned model is jointly statistically significant in explaining variations of the NIM ratio assessing banks' profitability. According to the fixed effect model and random effect model account for around 38.42% and 39.29% of the variance in the explained variables (as measured by the intra class correlation coefficient, or rho), respectively. Error terms for each individual bank and the entire model are denoted by sigma_u and sigma_e, respectively, in the fixed effect and random effect approaches.

Table 5: Output of coefficient of model based on equation no. 7, 8 and 9

Dependent variable: ROA (return on asset) ratio	Estimation models			
	Ordinary least square (OLS)	Fixed effect (fe)	Random effect (re)	Generalized least square (GLS)
Independent variables				
CMSMELTL	0.0143534*	−0.07718	−0.0343638	0.0143534*
CMSMELTA	−0.0002134	0.077182	0.0726021	−0.0002134
CMSMES	−0.0050703*	−0.0074442*	−0.0049242	−0.0050703*
lnTA	−0.0055276*	−0.0035849	−0.0036482*	−0.0055276*
GDP growth	−0.0217917	−0.065131	−0.0311904	−0.0217917
Inflation	0.0539997	0.0502261	0.0644544	0.0539997
Int.rate spread	0.0004873	0.0003102	0.0005045	0.0004873
Constant	0.0694619*	0.0566578*	0.0478055*	0.0694619
N	100	100	100	100
R^2	0.1779	0.0078	0.1809	
F	2.84	2.79		
rho		0.5388681	0.06319913	
sigma_u		0.0063264	0.00152006	
sigma_e		0.00585232	0.00585232	
Chi-square			18.35	21.63

Source: Authors' estimations based on STATA, Note: *, **, *** respective significance levels of 5%, 1%, 0.1%. NIM: Net interest margin, ROE: Return on equity, ROA: Return on assets

Table 6: Output of Hausman test

Hausman Chi² test (NIM)		Hausman Chi² test (ROE)		Hausman Chi² test (ROA)	
Prob>Chi²	0.9701	Prob>Chi²	0.6907	Prob>Chi²	0.5301

Source: Authors' estimations based on STATA. NIM: Net interest margin, ROE: Return on equity, ROA: Return on assets

Table 7: Output of Breusch and Pagan Lagrangian multiplier test

Lagrangian multiplier test (NIM)		Lagrangian multiplier test (ROE)		Lagrangian multiplier test (ROA)	
Prob>Chi²	0.1697	Prob>Chi²	0.2855	Prob>Chi²	0.120

Source: Authors' estimations based on STATA. NIM: Net interest margin, ROE: Return on equity, ROA: Return on assets

Table 8: Breusch-Pagan/Cook-Weisberg test for heteroskedasticity

Heteroskedasticity test (NIM)		Heteroskedasticity test (ROE)		Heteroskedasticity test (ROA)	
Prob>Chi²	0.9929	Prob>Chi²	0.3958	Prob>Chi²	0.990

Source: Authors' estimations based on STATA. NIM: Net interest margin, ROE: Return on equity, ROA: Return on assets

Table 9: Multicollinearity test

Variables	NIM		ROE		ROA	
	VIF	1/VIF	VIF	1/VIF	VIF	1/VIF
CMSME TL	2.87	0.3478	2.87	0.3478	2.87	0.3478
CMSME TA	2.57	0.3885	2.57	0.3885	2.57	0.3885
CMSME S	1.96	0.5100	1.96	0.5100	1.96	0.5100
IntraSpread	1.87	0.5348	1.87	0.5348	1.87	0.5348
GDP growth	1.39	0.7175	1.39	0.7175	1.39	0.7175
Inflation	1.34	0.7482	1.34	0.7482	1.34	0.7482
lnTA	1.28	0.7835	1.28	0.7835	1.28	0.7835
Mean VIF	1.90		1.90		1.90	

Source: Authors' estimations based on STATA. NIM: Net interest margin, ROE: Return on equity, ROA: Return on assets

Table 10: Breusch-Godfrey LM test for Autocorrelation

Autocorrelation test (NIM)		Autocorrelation test (ROE)		Autocorrelation test (ROA)	
Prob>Chi²	0.000	Prob>Chi²	0.001	Prob>Chi²	0.01

Source: Authors' Contribution based on STATA. NIM: Net interest margin, ROE: Return on equity, ROA: Return on assets

Table 11: Ramsey RESET test for omitted variable

Omitted Variable bias test (NIM)		Omitted variable bias test (ROE)		Omitted variable bias test (ROA)	
Prob>Chi²	0.1183	Prob>Chi²	0.5944	Prob>Chi²	0.0927

Source: Authors' estimations based on STATA. NIM: Net interest margin, ROE: Return on equity, ROA: Return on assets

The impact of CMSME banking on bank profitability was estimated using a variety of methods with sample size (N) 100 and Return on Equity (ROE) as a dependent variable, including the Pooled OLS (standing for ordinary least square), Fixed effect, Random effect, and generalized least square (GLS), with results shown in the table 4. The results from the estimators show that, after controlling for other factors, some of them have a substantial effect on explaining the variance of the ROE ratio, which is used to assess banks' profitability. Using the Pooled Ordinary Least Squares (OLS) approach and the Generalized Least Squares (GLS) method, we find statistically significant effects of the ratio of CMSME loans to total loans at 1% significance level and CMSME loans to total assets at 5% significance level and the effect of bank size and constant at 0.1% significance level. Using the fixed effect

and random effect methods, we find that the ratio of CMSME Sales to the constant is the only explanatory variable that is statistically significant at the 5% level of significance.

At the 1% level of significance, the Chi-square value of 19.44 for the random effect and 32.19 for the GLS method reveal collective significance of the model's components in interpreting variations in banks' profitability as measured by the ROE ratio.

Estimated R^2 values of 0.2435, 0.0099, and 0.2230 for the ordinary least squares (OLS), fixed effect, and random effect methods,

respectively, show that 24.35%, 0.99% and 22.30% of the observed variance in the dependent variable, fitted model adequately explains as measured by the ROE ratio. Furthermore, the F-values of 4.23 and 2.6 respectively, results obtained under OLS and fixed effect show that the aforementioned models' regressors are jointly statistically significant in explaining changes of the ROE ratio used to evaluate banks' profitability at the 0.01% and 1% levels of significance, respectively. According to the fixed effect model and random effect model account for around 65.92% and 7.21% of the variance in the explained variables (as measured by the intra class correlation coefficient, or rho), respectively.

The impact of CMSME banking on bank profitability was estimated using a variety of methods with sample size (N) 100 and Return on Asset (ROA) as a dependent variable, including the Pooled OLS (standing for ordinary least square), Fixed effect, Random effect, and generalized least square (GLS), with results shown in the table 5. The results from the estimators show that, after controlling for other factors, some of them have a substantial effect on explaining the variance of the ROA ratio, which is used to assess banks' profitability. Both the Pooled OLS technique and the Generalized Least Squares (GLS) approach, both at the 5% level of significance, find statistically significant relationships between CMSME Loan to Total Loan, CMSME Sales, and Bank Size. With the aid of the fixed effect, we find that the ratio of CMSME Sales is statistically significant at the 5% level of significance. At the 5% level of significance for the random effect, bank size is determined to be significant. Here, using those techniques, we find that constant is significantly different from zero at the 5% level of significance. At the 5% level of significance, the chi-square value of 18.35 for the random effect and at the 1% level of significance, the Chi-square 21.63 for the GLS method reveal collective significance of the model's components in interpreting variations in banks' profitability as measured by the ROA ratio.

Estimated R^2 values of 0.1779, 0.0078, and 0.1809 for the ordinary least squares (OLS), fixed effect, and random effect methods, respectively, show that 17.79%, 0.78% and 18.09% of the observed variance in the dependent variable, fitted model adequately explains as measured by the ROA ratio. Furthermore, the F-values of 2.84 and 2.79 respectively, results obtained under OLS and fixed effect show that the aforementioned models' regressors are jointly statistically significant in explaining changes of the ROE ratio used to evaluate banks' profitability at the 1% and 5% levels of significance, respectively According to the fixed effect model and random effect model account for around 53.89% and 6.32% of the variance in the explained variables (as measured by the intra class correlation coefficient, or rho), respectively.

In this section, we will discuss about the various tests performed to determine the model parameters used to estimate the effect of CMSME Banking on the profitability of Bangladeshi commercial banks measured by net interest margin (NIM), return on equity (ROE), and return on assets (ROA).

First, the Hausman Effect should be applied to determine which model is superior. For the purpose of choosing between the Random Effect GLS model and the Fixed Effect model, it was developed specifically for global data regression analysis.

Let,
H_0: Fixed effect is not better than random effect
H_1: Fixed effect is better than random effect.

As the values of Chi^2 in table 6 for NIM (0.9701), ROE (0.6907), and ROA (0.5301) models are all more than 0.05 so, we should accept null hypothesis and conclude that random effect model is better than fixed effect model.

After ruling out the Fixed Effect models, need to choose between the Pooled OLS and Random Effect models. Because of this, need to run the Lagrangian multiplier test developed by Breusch and Pagan.

Let,
H_0: Random effect is not better than OLS
H_1: Random effect is better than OLS

All three dependent variables (NIM, ROA, and ROE) have Chi^2 values larger than 0.05 reported in table 7, totaling 0.1697, 0.2855, and 0.1154 respectively. That the pooled OLS model is superior than the random effect model is shown. That being the case, we must accept H_0.

After completing the model selection procedure, determined that the pooled OLS model is the most promising option, and now conducting the corresponding diagnosis test for understand better the impact of CMSME financing on banks profitability ratio NIM, ROA and ROE.

If, found error variance is not constant from one group data to another group of data this is called non-constant error variance which is known as problem of heteroskedasticity.

Let,
H_0: Constant variance, the model has homoscedastic variance
H_1: Non-constant variance, the model has heteroskedastic variance

According to the table 8, Chi^2 value of NIM, ROE and ROA models are 0.9929, 0.3958 and 0.9862 respectively. All the values are >0.05, it indicates that we are failed to reject null hypothesis and conclude that model has constant variance or homoscedastic variance.

When explanatory or independent variable are perfectly or near perfect or highly correlated with each other then regression function suffers from multicollinearity problem. Correlation can be perfectly positive correlation or perfectly negative correlation. It can be tested by VIF stand for Variance Inflator Factor.

Let,
H_0: There is no multicollinearity
H_1: There is multicollinearity

According to the table 9, the value of mean VIF for all independent variables is 1.9 which is <5.00, it indicates that we are failed to reject null hypothesis and conclude that there is no correlation among all the explanatory variables.

Autocorrelation problem occurred when error term of one point or observation is correlated with error term of another point or observation. Autocorrelation problem happened in regression function because of model specification bias, data manipulation and Cobweb Phenomenon (not applicable here).

Let,
   H_0: No serial autocorrelation
   H_1: Autocorrelation

According to the table 10, Chi^2 value of NIM, ROE and ROA models are 0.000, 0.0001 and 0.0104 respectively. All the values are <0.05, it indicates that the results are significant that have to reject null hypothesis and conclude that model has autocorrelation problem.

Omitted variable bias means when you drop the relevant variable from your regression function. In this case, the estimators, error variance, and standard error will all be inaccurate. Because of this, our statistically significant test is likely to be skewed or insufficient.

Let,
   H_0: Model has no omitted variable
   H_1: Model has omitted variable

According to the table 11, P value of chi^2 test statistic for NIM, ROE and ROA models are 0.1183, 0.5944 and 0.0920 respectively. All the values are >0.05, it indicates that we are failed to reject null hypothesis and conclude that model has no omitted variable bias.

4. DISCUSSION

In in order to assess the effectiveness of CMSME banking, research has found that to assess the relationship of CMSME excellence with a few significant factors. CMSME Loan to Total Loan Ratio, CMSME Loan to Total Asset Ratio, CMSME Sales, Bank Size, and GDP Growth Rate all have a significant positive correlation with the success factors of CMSME banking, so although Inflation Rate and Interest Rate Spread have a bit of a negative correlation. This analysis was done in order to evaluate the success factor of CMSME banking. This result shows some intriguing reading in regards to the elements that contributed to the success of cottage, micro, small and medium-sized enterprise (CMSME) banking in Bangladesh. The coefficients derived using NIM as the dependent variable under Pooled OLS, fixed effect, and GLS technique used in the model indicate that the ratio of CMSME loans to total loans (CMSMELTL) is positively correlated with NIM. This is the case because a high CMSMELTL ratio increases the profitability of bank as well as investment opportunities of banks, and because giving loan in CMSME's industry bank creates positive impact on their profitability as well as increased employment and development of the country, according to Hasan (2019). One other significant factor in NIM

is the ratio of CMSME loans to total assets, which was found to be positively related despite the expected sign of the coefficient being negative. This occurs because limited sanction of loans to the CMSME sector does not lead to an increase in either bank total assets or NIM.

In contrast, it has been discovered that there is a statistically significant inverse correlation between CMSME interest income and net interest income and NIM, keeping up higher levels of sales activity for the purpose of loan security will reduce the company's net income and consequently the NIM at financial institutions. There is a negative impact on banks' ability to invest and lend when inflation is high because customers are less likely to deposit funds owing to the rising cost of goods and services. As a result, consumers are unable to save as much, which reduces banks' net income and return on assets (ROA) under all projected methodologies relevant to the model. In contrast, Islam et al. (2014) find that larger banks are more likely to have effective governance, which in turn encourages bank management to prioritize risk-adverse investments in profitable portfolios. According to the estimated model that evaluates the versatile influence of commercial banks' profitability, investment in lucrative long-term assets that are funded by Cottage, Micro, Small and Medium Enterprises (CMSME) would provide large amount of return for banks, increasing profitability as measured by ROE. As predicted from the positive previous sign of the coefficient, the percentage of loans made to cottage, micro, small and medium-sized businesses was also found to be statistically significant at the 5% level of significance. For this reason, a big increase in interest revenues will increase banks' net income because this is the primary source of revenue for financial institutions. Since a relatively high CMSME loan could very well pursue an effective governance to achieve maximum profitability of banks, and since banks are usually quite cautious when disbursing loanable funds to safeguard profitability as measured by return on equity (ROE).

Fredrikson and Moro (2014) examine commercial banks in Sri Lanka from 2001 to 2005 and find that commercial banks tend to be large, the significance of bank size at the 0.1% level is confirmed, and the observed positive direction of the coefficient goes much beyond theoretical expectations. Another explanatory variable, CMSME sales, is significant at the 5% level of significance, with a negative direction, because restricted lending would reduce banks' net income and, by extension, ROA. As Qamruzzaman and Jiango (2019) examine well-dependent CMSME finance, they find that the ratio of CMSME loans to total loans is statistically significant at the 5% level of significance, and that its positive trend means that banks will earn more money as a result of receiving more CMSME financing. The ratio of CMSME loans to total assets is statistically significant at the 5% level of significance with a negative direction, suggesting that increased investment in unsecured assets or short-term loans may not yield much income for banks, leading them to increase the amount they set aside to provision for expected credit losses.

Consequently, Racheal and Uju (2018), who examined the impact of profitability on the financial performance of Nigeria's

commercial banks, agree that the increase of banks' profits will decelerate. The literature evaluation indicates a favorable correlation between economic growth and corporate profits. That is to say that a rise in GDP will also lead to a rise in profits, and vice versa. The numbers look well under NIM, but ROE and ROA are giving a mixed picture. That implies while GDP rises in Bangladesh, commercial banks see a decline in profitability. One probable explanation is that banks are making less money because, as GDP rises, more people become able to borrow money, leading to riskier lending practices that benefit only the top executives. Being one of the most researched concepts, inflation is often viewed negatively by the authors of the reviewed works. However, only one theoretical framework accounts for its significance in our study. One possible explanation could be that the rate of inflation is very constant across all stages, making it impossible to use as a metric for determining profitability. Interest rate spread is another widely researched macroeconomic variable. Earnings are inversely proportional to the interest rate spread. It follows that a wider interest rate gap has a negative effect on a bank's bottom line. Researchers found a negative correlation between inflation and interest rate spread, corroborating findings from the aforementioned literature. Again, commercial bank profitability is positively correlated with GDP expansion.

5. CONCLUSION

The following suggestions are figured out for consideration in view of the challenges and deficiencies that have been brought to light regarding cottage, micro, small and medium companies (CMSMEs) in Bangladesh. The Bangladeshi government and central bank, "Bangladesh Bank," have taken the measure of mandating that all commercial banks reserve a portion of their before-tax profits for investment fund in CMSMEs in an effort to lower the risk of lending to CMSMEs. In order to encourage commercial banks in Bangladesh to obtain expertise in medium and long-term building operation, the BB may rediscount some loans as a trial run. Multiple discount rates, quotas, and preferred discount rates are just a few of the methods that can be implemented. By supplying different types of small businesses with the necessary technological and managerial resources, banks can guarantee greatest risk of loan losses. They might use this information for better project planning, management, and execution with the use of this information. Labor-intensive manufacturing techniques, less reliance on imported raw materials, and improved utilization of production and trade potentials are particularly attractive to developing nations like Bangladesh. To secure the long-term viability of the sector, experts and industry professionals have been increasingly interested in developing methods to support cottage, micro, small and medium-sized enterprises (CMSMEs). The CMSME sector can benefit from the government and banks utilizing the rural banking initiative to increase access to loans. The government should design programs for small businesses that include mechanisms for incentivizing and managing financial institutions so that they would more readily extend credit to small businesses. Other nations' experiences with cottage, micro, small and medium-sized enterprises (CMSMEs) that have been successful might serve as a model for countries like Bangladesh. In these nations, both the public and private sectors contribute to the growth of cottage, micro, small and medium-sized enterprises by providing resources and capital.

The traditional banking system in developing nations is woefully inadequate, hence other institutional methods to CMSME finance are required. In this case, it would be best to work with a bank that specializes in providing financing to cottage, micro, small and medium-sized businesses. We also suggest that CMSMEs not confine themselves to major cities for operations. This is because commercial banks are unable to provide loans to every one of the alarmingly high number of small businesses popping up in metropolitan areas. For this reason, supporting rural small businesses can help attract more people to the countryside. Establishing banks that cater specifically to the needs of CMSMEs might be the greatest option for resolving their financial issues. Such a bank would have an ideal organizational and regulatory framework, allowing it to efficiently address the issues facing CMSMEs. Cottage, micro, small and medium-sized enterprises (CMSMEs) looking to expand their capital structure may also consider buying shares in such a bank. The final option, venture capital is perhaps the greatest option for cottage, micro, small and medium-sized enterprises in terms of long-term investment.

This paper has already achieved its goal of revealing the relationship between bank profitability (as measured by the NIM, ROE, and ROA) and several profitability factors, including bank-specific factors like CMSME loan to total loan ratio and CMSME loan to total assets ratio, CMSME sales, and bank size (as measured by the log of total assets), and macro-specific factors like GDP growth, Inflation, and Interest rate spread. An econometric model is constructed with all the variables and then estimated using a Pooled OLS, Fixed effect, GLS Random effect, and Generalized Least Square (GLS) method using a dynamic panel data model for analysis. This motivated the researchers to examine the impact of cottage, micro, small and medium-sized enterprise (CMSME) financing on the bottom lines of 10 commercial banks (3 state-owned and 7 private). In the earlier, researchers in Bangladesh did not conduct nearly as much work, and what little they did find often proved prescient. To fill this knowledge vacuum, we conducted a panel data regression study of financial performance using secondary data from 10 commercial banks over a 10-year period (2011-2020). According to the estimated findings of the models, almost all profitability measures largely account for the variations in return on assets of banks that adhere to the management techniques mandated by Bangladesh Bank, providing a useful contribution to the existing literature by elucidating the importance of profitability factors comprising the whole metrics. While it is true that a rise in the total quantity of cottage, micro, small and medium-sized enterprise (CMSME) loans does not automatically increase banks' net revenue, it does speed up the banks' future profitability by guaranteeing strong governance is followed by the management department of Banks. Because financing eats into a bank's profit margin, loan disbursement structure decisions and the CMSME loan to total assets ratio play critical roles in bringing about changes in profitability. The perspective of how banks utilize interest revenue to manage its expenditures can have a positive or negative impact on the bank's profit margin, making it more or less vulnerable to low interest income retained against loan losses.

REFERENCES

Ahmed, I. (2018), Evaluation of Customer Satisfaction Level: A Study on Customer Service in SME Loan Disbursement of Prime Bank-Wari Branch. BRAC University: Bangladesh.

Ahmed, K.F., Bown, R. (2016), Exploring the role of private commercial banks in increasing small and medium size enterprises' financial accessibility in developing countries: A study in Bangladesh. International Journal of Social, Behavioral, Educational, Economic, Business and Industrial Engineering, 10(6), 2028-2039.

Anwar, M. (2013), The effect of lending portfolios to small business on bank profitability and interest margin: Study on state-owned banks and local government-owned banks in Indonesia. Finance and Banking Journal, 15(2), 173-189.

Bosri, R. (2016), SME financing practices in Bangladesh: Scenario and challenges evaluation. World Journal of Social Sciences, 6(2), 39-50.

Bhattacharya, D. and T.Chowdhury. (2003). "Financial Sector Reforms in Bangladesh: The Next Round (Paper 22)." Centre for Policy Dialogue, Dhaka, p. 06.

Fredriksson A., Moro A.(2014). Bank–SMEs relationships and banks' risk-adjusted profitability. Journal of Banking & Finance 41 (4): 67–77.

Hasan, F., Jamil, G.M.H. (2014), Financing small and medium enterprises in Bangladesh-issues and challenges. The Asian Journal of Technology Management, 7(1), 45-54.

Hasan, K. (2019), SME financing and entrepreneurship development in Bangladesh: An impact analysis. European Journal of Business and Management, 11(4), 51-55.

Hasan, M.S. (2017), Current Status of SME Banking Activities: A Case Study of Four Commercial Banks in Bangladesh. Stamford University Bangladesh: Bangladesh. p1-109.

Hallberg, K.. (2000). A Market-Oriented Strategy for Small and Medium-Scale Enterprises. World Bank Publications.

Islam, K.M.A., Miajee, M.R.K. (2018), Small and medium enterprises (SMEs) financing in Bangladesh: A review of literature. International Journal of Small and Medium Enterprises, 1(1), 11-15.

Islam, M.A., Yousuf, S., Rahman, M.I. (2014), SME financing in Bangladesh: A comparative analysis of conventional and Islamic banks. Journal of Islamic Banking and Finance, 2(1), 79-92.

Liang, L., Huang, B., Liao, C. and Gao, Y. (2017) The Impact of SMEs' Lending and Credit Guarantee on Bank Efficiency in South Korea. Review of Development Finance, 7, 134-141.

Matthew, R.A. and Hammill, A. (2009), Sustainable development and climate change. International Affairs, 85: 1117-1128.

Md. Qamruzzaman & Jianguo, W., (2019) SME financing innovation and SME development in Bangladesh: an application of ARDL, Journal of Small Business & Entrepreneurship, 31:6, 521-545

Olutunla, G.T., Obamuyi, T.M. (2008), An empirical analysis of factors associated with the profitability of small and medium enterprises in Nigeria. African Journal of Business Management, 2, 195-200.

Racheal, J.A.C., Uju, S.M. (2018), The role of commercial bank in financing small and medium size enterprises in Nigeria: A study of selected banks and firms in Anambra state, Nigeria. European Journal of Economic and Financial Research 3(1), 1-32.

Rahman, A., Rahman, M.T., Ključnikov, A. (2016), Collateral and SME financing in Bangladesh: An analysis across bank size and bank ownership types. Journal of International Studies, 9(2), 112-126.

Rabbani, M., & Suleiman, M. (2005), Financing SMEs and its effect on employment generation: A study of BRAC bank's SME lending. Technical report, BRAC Research and Evaluation Division

Uddin, M.R., Bose, T.K. (2013), Factors affect the success of SME in Bangladesh: Evidence from Khulna city. Journal of Management and Sustainability, 3(3), 161-171.

Ullah, G.M.W., Zahid, A., Khan, I., Islam, M.N. (2018), Working capital management and SME profitability: Empirical evidence from Bangladesh. Global Journal of Management and Business, 5(2), 94-99.

Zaman, A & Islam, Md. (2011). SMEs Development in Bangladesh: Problems and Prospects. ASA University Review, 5(1), 145-160.