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A Comparative Study on Earnings Management of Selected Private Commercial Bank

Emdadul Hoque [*1]

[*1,] Assistant Professor, Department of Business Administration, Rabindra Maitree University, Kushtia, Bangladesh.

E-mail: ehoque55@gmail.com

Abstract:

Purpose: The goal of the study is to evaluate how effectively the sample private commercial banks manage their earnings.
Methodology: For the period of 2012–2021, data on earnings management were gathered from different publications that the sample banks had published, and they were examined using both parametric and non-parametric techniques (Efficiency Analysis and ANOVA analysis).
Findings – Inefficient deployment of profits and resources is the main cause of cost inefficiency. An inappropriate choice of inputs suggests resource waste that results in inefficiency. It shows that the high number of provisions for loans and advances lowers earning efficiency of the sample banks. Changes in some of the variables due to changes in the level of fixed inputs have a direct impact on the earnings management of the selected private commercial banks which depend on changes in capacity utilization. Inefficiency is also brought on by the extension of non-performing loans and non-interest expenditure, which were not allocated in accordance with deposit collection. We found that non-interest income was insufficiently financed and that burden was high.
Limitations – The analysis only considers sample private commercial banks and runs only from 2012 to 2021. Only a few selected variables are used in the comparison calculations.

Robustness: According to the literature analysis, net profit margin, return on assets, and provision for loan loss are all closely related to earnings management and these were proven by the findings.
Proclamation– According to the author's best judgment, this may be the first study to evaluate the positions of sample banks about earnings management using DEA and SFA while taking the variables that are directly connected to profits into account.
Keywords: Earnings management, efficiency analysis, data envelopment analysis, stochastic frontier analysis, private commercial banks.
Paper type- Research paper

1. Introduction

Banks, nonbank financial institutions (NBFIs), and insurance firms make up Bangladesh's financial sectors. Planning the distribution of loans and advances, loan loss provision, and non-performing loans is necessary for effective earnings management. The proper asset recovery and upholding a reasonable net profit margin, which includes preserving and enhancing a company's liquidity and profitability, are the primary goals of earnings management. In recent years, earnings management (EM) has drawn a lot of attention. According to Schipper (1989), EM is the managerial aim to manipulate the financial reporting process in order to obtain certain personal benefits. A solid audit process, effective governance, strict financial legislation, and ethical financial reporting methods can work to lessen the use of EM (Leventis et al., 2010).

Numerous research have been done on assessing banking efficiency globally, although most of them have been done in industrialized nations (Lehmann et al., 2004; Cornett et al., 2006, 2009). A small number of studies on bank efficiency were carried out in Bangladesh (Ahmed and Liza, 2013; Yasmeen, 2011; Uddin and Suzuki, 2011). Furthermore, it is difficult to compare efficiency rankings obtained using various approaches. This study poses the following research questions in an effort to fill this knowledge gap: How is the earnings management situation for the selected private limited firms in Bangladesh, and which banks have been doing well in this area?

This study uses panel data analysis covering the years 2012 to 2021 and takes into account five well-known Bangladeshi banks that have made large investments. An accrual-based earnings management model is used to define the practice and goals of EM. Both parametric and non-parametric methods of efficiency measurement are used in efficiency analysis.

According to input data and other pertinent characteristics, this study may be the first to assess the earnings management of the selected private commercial banks from three different perspectives.

2. Statements of the Problem

The majority of banks have been unable to show noticeably better performance on indicators like capital to risk weighted assets, non-performing loans, expenditure-income ratio, return on assets, return on equity, liquid assets, and excess liquidity despite the central bank taking several steps in this direction (Khatun, 2019). Using discretionary accrual management, a company may honestly share its inside information of expected earnings (Scott, 2009). In order to operate effectively, organizations will try to set up systems that balance the interests of principals and agents. There are several determining elements that affect the performance of private commercial banks in Bangladesh; however they are not properly covered in the literature at this time.

Researchers continued to disagree on this topic. The goal of this study is to identify the firm-specific traits that could affect the selected Bangladeshi private commercial banks as well as the problems that posed the biggest obstacles to achieving optimal pragmatic performance.

As a result, the researcher decided that it was crucial to examine the situation of earnings management and contrast the earnings management of the selected private commercial banks, which have a significant impact on the development of the Bangladeshi economy.

.3. Objectives of the Study

To achieve the goal, the particular objectives are listed below:

1. To investigate the efficiency of selected variables that have a great effect on the financial performance of private commercial banks (PCBs) in Bangladesh,
2. To compare the technical efficiency of the selected variables.

3. To formulate suggestions based on the findings.

4. Hypotheses of the Study

The following hypotheses are developed in light of the overall review and the related literature:

a) H_1: There is no significant difference in the volume of the loan loss provision to loan portfolio , log of assets, non-performing loan to loan portfolio, short term loan to loan portfolio, long term loan to loan portfolio, loan portfolio to total deposit, net profit margin, spread to total income, burden to total income, income per branch, income per employee, operating income to total income operating expense to total income, return on assets, net profit to current assets, net profit to fixed assets, net profit per employee, management expense to total expense of the selected banks in the different selected years.

b) H_2: There is no significant difference in the volume of the loan loss provision to loan portfolio, log of assets, non-performing loan to loan portfolio, short term loan to loan portfolio, long term loan to loan portfolio, loan portfolio to total deposit, net profit margin, spread to total income, burden to total income, income per branch, income per employee, operating income to total income operating expense to total income, return on assets, net profit to current assets, net profit to fixed assets, net profit per employee, management expense to total expense of the selected banks.

c) H_3: Selected PCBs complying with the selected variables are technically efficient.

5. Review of related literature

According to Ab-Hamid et al. (2018), banking managers and supervisors should develop plans that emphasize activities relating to cost effectiveness and control earnings management methods. It was discovered that each nation has a varied level of efficiency. They used the stochastic frontier analysis approach to measure cost effectiveness. They found

via panel data analysis that an increase in profits management tactics considerably lowers the efficiency of the bank.

Alam et al. (2014) used Data Envelopment Analysis (DEA), a non-parametric data-driven approach, to estimate the overall, pure technical, and scale efficiencies of the banking industry in Bangladesh utilizing the data of 36 commercial banks. To compare the results of Bangladesh's state-run and private banks, they also used the basic principle of employing bilateral comparison in DEA. Depending on the model characteristics, the total technical efficiency of banks in Bangladesh ranges from 76.6% to 91.3%.

Alhadab and Al-Own (2019) used a sample of 204 bank-year observations from the years 2006 to 2011 to study the impact of equity incentives on profits management that takes place through the utilization of loan loss provisions. The findings therefore demonstrate the widespread use of discretionary loan loss provisions for income-increasing earnings management among European bank executives, which is partially driven by executive remuneration.

According to Assfaw (2018), for a bank to succeed, return on assets, return on equity, and net interest margin are all closely related. He discovered a significant relationship between managerial efficiency and a bank's financial success. They pay particular attention to the analyses of return on assets, return on equity, net interest margin, and capital adequacy ratio when it comes to analytical methodologies. They employ multiple linear regression and Pearson correlation coefficients.

According to Banna et al. (2019), Chinese banks outperform banks from ASEAN nations in terms of efficiency,. This study highlights some important policy ramifications for enhancing bank productivity. In order to evaluate the outcome, they employed data envelopment analysis, Tobit regression, bootstrapping, and Simar and Wilson double bootstrapping regression.

Das and Noor (2019), demonstrated the correlation between three metrics—return on assets, capital adequacy ratio, and non-performing loans. The performance of a bank is highly correlated with its return on assets. They came to the conclusion that credit risk is a significant and fundamental predictor when assessing the financial performance of banks.

According to Desta (2017), the discretionary loan loss provision (DLLP) is highly influenced by the loan to deposit (LD), return on asset (ROA), and earnings before tax and provision (EBTP). They analyzed the association between the discretionary LLP (DLLP) and earnings management using two-stage panel regressions, partial and pairwise correlation, and an independent t-test.

According to Goswami et al. (2019), technical efficiency is significantly influenced by liquidity risk, returns on assets, credit risk, market concentration, and GDP, but bank size, interest rate, and capitalization level are unimportant factors. Based on a VRS (variable returns to scale) assumption, they employed input-oriented Malmquist Data Envelopment Analysis on two outputs and three input variables.

Karimzadeh (2012) examined commercial bank efficiency in India, between 2000 and 2010. The results showed that public banks were more effective than their counterparts in private banks over the research periods.

According to Martensa et al. (2021), Frontier market banks address crucial financial gaps in the markets they service, which leads to greater evaluation (a positive) and earnings management (EM) (a negative). They discovered efficiency is negatively correlated with EM using stochastic frontier analysis to measure efficiency and random effects using truncated regression to look into the EM-efficiency association.

According to Moradi, et al. (2012), there would be a strong positive correlation between gross revenue to sale, current ratio, changes in net income, and firm size and earnings

management. However, there would be a negative relationship between performance coefficient and earnings management. Employers, the equity-debt ratio, leverage, tax, performance coefficient, changes in net income, the gross income-to-sales ratio, the current ratio, and business size were all taken into consideration. Multiple regression, backward regression, and interaction regression have all been applied cross-sectionally and collectively to the data in order to examine it.

According to Nair and Vinod (2019), competition has not increased the productivity of Indian scheduled commercial banks (SCBs). Larger banks have the ability to increase SCB efficiency. On a balanced panel dataset of Indian SCBs, they conducted a two-stage study using the data envelopment analysis methodology.

Nnko (2022) discovered that participants' definitions and understanding of managing earnings varied. They also shared several methods of money management that they used in their everyday lives. He pondered using a qualitative research methodology. According to McIntosh and Morse (2015), they used open-ended, semi-structured interviews for data gathering.

According to Phan et al. (2018), there is no direct correlation between indicators of market structure and efficiency. However, stock exchange listing status is linked to decreased efficiency. They utilized a second-stage regression analysis and discovered that efficiency is favorably correlated with bank size and GDP growth, but negatively correlated with revenue diversification and inflation.

According to Proença et al. (2022), discretionary provisions have a negative influence on allocative efficiency whereas loan provisions have a good impact. Together with technical efficiency (TE), allocative efficiency (AE), and cost efficiency (CE), these calculations were made. The estimate residual of the panel data random effects model is how the discretionary

component of LLP is derived. They employed the ratio of the loan portfolio to total assets, total loans, non-performing loans, and loan loss provisions as determinants.

According to Shabnaz & Islam (2014), working capital management, a crucial component of earnings management, has a considerable influence on a company's profitability. They measured a company's profitability using its return on assets (ROA) and net profit margin (NPM). The hypotheses were assessed using multiple regressions and a correlation matrix.

According to Sufian and Kamarudin's (2014) research, the majority of Bangladeshi banks are either enjoying economies of scale because they are less than the ideal size or diseconomies of scale because they are larger than the ideal size. The empirical results show that the banking industry in Bangladesh has demonstrated both the best and lowest levels of profit efficiency. They use the Slack-Based Data Envelopment Analysis (SBM-DEA) technique to gauge how profitable each bank is.

6. Research Methodology

The major goal of this study is earning management estimation. In order to quantify efficiency, this study uses both non-parametric and parametric methods, as well as the Center for Efficiency and Productivity Analysis (CEPA), version 2.1 (Coelli, 1997) and Frontier, version 4.1. The technical effectiveness of a few Bangladeshi private commercial banks is evaluated using DEA. Stochastic frontier analysis (SFA) is also carried out to assess the reliability of the findings calculated using DEA methodologies. The DEAP 2.1 and Frontier 4.1 versions of software are utilized in this study to calculate the efficiency scores.

6.1 Data envelopment analysis (DEA)

The linear programming technique used in the DEA approach. When production functions are unknown, it is used to determine the efficiency scores of efficient decision-making units (DMUs) using the minimum level of inputs to achieve the maximum level of output. numerous inputs and numerous outputs are utilized to create a frontier of the top-performing

DMUs for quantifying elative efficiency. This study determined the efficiency ratings of a few private commercial banks, following Coelli, (1996). To describe bank performance, the efficiency scores are employed. To ensure that all observed points are on or below the production frontier, DEA builds a non-parametric envelope frontier over the data points.

Here, we employ the ratio of all outputs to all inputs, denoted as y1/x1, where is an M1 vector of weights for outputs and K1 for inputs.

Here the constraints $v'x1=1$, where provides:

$\max_{U,V}(u' y_1/ v'x_1)$, st $v'x_1=1$, $(u' y_1 - v'x_1 \leq 0$, J=1,2,….3, N, u,v≥ 0

When the notation switches from u and v to u' and v', the transformation is reflected. The multiplier version of the linear programming problem is what this variant is called.

One may create an envelopment variant of this issue utilizing the duality in linear programming: min θ,λ θ; St $-y_1+Y\lambda \geq 0$; $\theta x_1 - X, \lambda \geq 0$; $\lambda \geq 0$

Where θ is a scalar and λ is a N×1 vector of constants. This envelopment form involves fewer constraints than the multiplier for m (K+M < N+1), and hence is generally the preferred form to solve. It will satisfy θ obtained will be the efficiency score for i-th DMU. It will satisfy θ≤ 1, with a value of 1 indicating a point on the frontier and hence technically efficient DMU according to the Farrell (1997) definition. Note that the linear programming problem must be solved N times, once for each DMU in the sample. A value of θ is then obtained for each DMU.

6.2 Stochastic frontier analysis (SFA)

SFA calculates the ideal procedures for a particular cost function and profit function. The production function and cross-sectional data are used in the model's formulation. Technical inefficiencies and random influences combine to form the error term. This is how the model is expressed:

$$Y_i = x_i\beta + (v_i - u_i)$$

Where, Y_i denotes the output of individual firm, X_i denotes the vector of input quantities of individual specific firm; β is the vector of the unknown parameters and v_i is the random error added to the non-negative inefficiency term, u_i The random error v_i, contains measurement error and other random factors affecting the output variable. The model is stochastic because the upper limit is determined based on stochastic variable. The random error v_i, can be positive and negative (Coelli, 1996). In the SFA method, it is vital to specify the production technology and the distribution of inefficient terms. This study is based on translog function to estimate production efficiency. Translog specification of production function can be more useful than Cobb–Douglas specification in terms of best fitted model (Berger et al., 2009). The translog equation is specified as follows:

$$Y_{it} = \beta_0 + \beta_1 \ln C_{it} + \beta_2 \ln L_{it} + \left(\frac{1}{2}\right)[\beta_{11} (\ln C_{it})^2 + \beta_{22} (\ln L_{it})^2 + \beta_{12}(\ln C_{it})(\ln L_{it})] + \beta_{13}(\ln C_{it})t + \beta_{23}(\ln L_{it})t + \beta_{33}t^2 + v_{it} - u_{it}$$

Where L and C stand for the vector of the logarithm of the study's input variables and Y represents the result.

6.3. Estimation of earnings management practices

6.3(a). The following equation is estimated to determine the existence of EM.

$LLPTLP_{it} = \alpha_{it} + \beta_1 LASSET_{it} + \beta_2 NPLTLP_{it} + \beta_3 STLTLP_{it} + \beta_4 LTLTLP_{it} + \beta_5 LPTD_{it} + \varepsilon_{it}$

Where, LLPTLP is loan loss provision to loan portfolio, LASSET is Log of assets, NPLTLP is Non-performing loan to loan portfolio, STLTLP is short term loan to loan portfolio, LTLTLP is long term loan to loan portfolio and LPTD is loan portfolio to total deposit and ε is error term and it is considered as the discretionary part.. All the variables are expressed as a percentage.

6. 3(b). Following literature review of Assfaw (2018), Das & Noor (2019) and Shabnaz & Islam(2014), to compare the efficiency of the selected commercial banks, the following equation is used:

$NPM_{it} = \alpha_{it} + \beta_1 SPTTINC_{it} + \beta_2 BDTTINC_{it} + \beta_3 INCPBR_{it} + \beta_4 INCPEMP_{it} + \beta_5 OPTTINC_{it} + \beta_6 OPEXTTEX_{it} + \varepsilon_{it}$

Where, NPM is net profit margin, SPTTINC is Spread to Total Income, BDTTINC is burden to Total Income, INCPBR is Income per branch, INCPEMP is Income per employee, OPTTINC is operating income to Total Income, OPEXTTEX is Operating income to total expense and ε is error term. All the variables are expressed as a percentage.

6.3. (c). Following the same literature review of 6.3.(b), to compare the efficiency of the selected commercial banks, The following equation is used:

$$ROA_{it} = \alpha_{it} + \beta_1 LASSET_{it} + \beta_2 NPTCASSET_{it} + \beta_3 NPTFIXASSET_{it} + \beta_4 NPPEMP_{it} + \beta_5 MANEXTTEX_{it} + \varepsilon_{it}$$

Where, ROA Return on assets, LASSET is Log of assets, NPTCASSET is Net profit to current assets, NPTFIXASSET is Net profit to fixed assets, NPPEMP is Net profit per employee, MANEXTTEX is Management expense to total expense and ε is error term. All the variables are expressed as a percentage.

Both DEA and SFA analysis are used to measure the comparability. All of the models listed above are utilized in this sector to determine overall efficiency. The distribution of inefficient terms and the manufacturing technique must be specified in the SFA approach. For the selected private commercial banks, SFA calculated efficiency ratings across various time periods (and utilized these scores as an independent variable). "i" symbolizes individual bank, "t" symbolizes the time period and "β" is the unknown parameter to be estimated that captures the potential impact of efficiency on the earnings of bank management.

6.4. Data collection and variable determination

The Sample of the Study: Five (5) private commercial banks out of the thirty (30) listed PCL were selected based on traditional banking considerations. Dutch Bangla Bank Limited, Mercantile Bank Limited, United Commercial Bank Limited, International Finance Investment and Commerce Bank Limited, and National Bank Limited are the names of the selected banks. **Periods of the study:** The period of the study covers 10 years from 2012 to 2021.

Source of Data: The secondary information was gathered from the publicly available yearly reports of the selected private commercial banks. The study's 2012–2021 observational period included l firm-year observations.

Variable Determination and Abbreviation

The following variables are used to consider the determinants:

Table: 6.4.1
Definition of variables

Dependent Variables	Formulae	Abbreviation
Loan Loss Provision to Loan Portfolio	(Loan Loss Provision / Loan Portfolio)×100	LLPTLP
Net Profit Margin	Net Profit/ Total Income	NPM
Return on Assets	(Net Income/Total Assets) ×100	ROA

Independent Variables	Formulae	Abbreviation
Total Assets	Total Assets changed by log	LASSET
Non-Performing Loans Ratio	(Total Loans and Advances- Performing Loans/Loan Portfolio) ×100	NPLTLP
Short Term Loan to Loan Portfolio	(Short Term Loan / Loan Portfolio) ×100	STLTLP
Long Term Loan to Loan Portfolio	(Long Term Loan / Loan Portfolio) ×100	LTLTLP
Loan Portfolio to Total Deposit	(Loan Portfolio / Total Deposit) ×100	LPTD
Spread to Total Income	{(Interest Income-Interest Expense)/Total Income})×100	SPTTINC
Burden to Total Income	{(Non-Interest Income- Non-Interest Expense)/Total Income})×100	BDTTINC
Income per branch	(Total Branches/ Total Income) ×100	INCPBR
Income per Employee	(Total Employees / Total Income) ×100	INCPEMP
Operating Income to Total Income	(Operating Income/ Total Income) ×100	OPTTINC
Operating expense to Total Income	(Operating Expense / Total Income) ×100	OPEXTINC
Net profit to current assets	(Net profit / Current assets)×100	NPTCASSET
Net profit to Fixed assets	(Net profit / Fixed assets)×100	NPTFIXASSET
Net profit per employee	(Net profit per employee) ×100	NPPEMP
Management Efficiency Ratio	(Management Expense/Total Expense) ×100	MANEXTTEX

Source: Researcher's own design.

The LnTA (natural logarithm of total asset) is utilized since bank size and assets may vary, whereas the DEA and SFA scores are predictable. In comparison to small banks with modest asset portfolios, banks with a big asset portfolio and a high degree of commercial operations often retain greater provisions (Ozili, 2017).

7. Data Analysis & Interpretation

Table No: 7.1

ANOVA: Two-factor without replication for loan loss provision to loan portfolio of sample banks.

Source of variation	*SS*	*Degree of*	*MS*	*F*	*P-value*	*F crit*	Hypotheses

		freedom					
year	12.40	9	1.38	5.81	5.66	2.15	Rejected
banks	4.09	4	1.02	4.31	0.06	2.63	Rejected
For log of assets of sample banks.							
year	1.16	9	0.13	208.40	2.67	2.15	Rejected
banks	0.33	4	0.08	132.22	5.37	2.63	Rejected
For non-performing loan to loan portfolio of sample banks.							
year	75.12	9	8.35	1.49	0.19	2.15	accepted
banks	178.61	4	44.65	7.97	0.00	2.63	Rejected
For short term loan to loan portfolio of sample banks.							
year	42.20	9	4.68	1.09	0.40	2.15	accepted
banks	136.10	4	34.02	7.89	0.00	2.63	Rejected
For long term loan to loan portfolio of sample banks.							
year	42.19	9	4.69	1.08	0.40	2.15	accepted
banks	136.10	4	34.02	7.90	0.00	2.63	Rejected
For loan portfolio to total deposit of sample banks.							
year	1692.12	9	188.01	14.34	1.78	2.15	Rejected
banks	1485.91	4	371.48	28.33	1.11	2.63	Rejected
For net profit margin of sample banks.							
year	87.40	9	9.71	0.82	0.60	2.15	accepted
banks	132.41	4	33.10	2.80	0.04	2.63	Rejected
For spread to total income of sample banks.							
year	1057.45	9	117.49	2.94	0.01	2.15	Rejected
banks	7686.29	4	1921.57	48.08	5.86	2.63	Rejected
For burden to total income of sample banks.							
year	5473.03	9	608.11	13.08	5.96	2.15	Rejected
banks	2975.18	4	743.79	16.00	1.29	2.63	Accepted
For income per branch of sample banks.							
year	0.12	9	0.01	5.43	0.00	2.15	Rejected
banks	0.22	4	0.05	22.75	1.94	2.63	Rejected
For income per branch of sample banks.							
year	0.12	9	0.01	5.43	0.00	2.15	Rejected
banks	0.22	4	0.05	22.75	1.94	2.63	Rejected
For income per employee of sample banks.							
year	47.05	9	5.23	1.68	0.13	2.15	Accepted
banks	1862.98	4	465.75	149.36	6.88	2.63	Rejected
For operating income to total income of sample banks.							
year	891.78	9	99.09	2.51	0.02	2.15	Rejected
banks	6415.73	4	1603.93	40.60	7.15	2.63	Rejected
For operating expense to total income of sample banks.							
year	291.49	9	32.39	1.17	0.34	2.15	Accepted
banks	3974.28	4	993.57	35.94	4.13	2.63	Rejected
For return on assets of sample banks.							
year	1.51	9	0.17	1.61	0.15	2.15	Accepted
banks	0.89	4	0.23	2.14	0.09	2.63	Accepted
For net profit to current assets of sample banks.							
year	2.34	9	0.26	1.44	0.21	2.15	Accepted
banks	1.57	4	0.39	2.16	0.09	2.63	Accepted
For net profit to fixed assets of sample banks.							
year	7700.31	9	855.59	1.06	0.42	2.15	Accepted
banks	43273.30	4	10818.32	13.39	8.84	2.63	Rejected
For net profit per employee of sample banks.							
year	5866.50	9	651.83	1.01	0.45	2.15	Accepted
banks	16217.24	4	4054.31	6.31	0.00	2.63	Rejected
For management expense to total expense of sample banks.							
year	378.72	9	42.08	4.34	0.00	2.15	Rejected

banks	424.59	4	106.15	10.96	6.48	2.63	Rejected

Source: MS excel -2010, data collected from different annual reports of the selected banks.

Table 7.1 shows that the calculated value of F is 5.81 are greater than the table value 2.15 for the variable loan loss provision to loan portfolio regarding year. The table also shows that the calculated value of F is (4.31) are greater than the table value (2.63) for the same variable regarding banks. For log of assets, the calculated value of F (208.40) is > 2.15 regarding year. In respect of banks for the same, the calculated value of F is 132.22 > 2.63. For non-performing loan to loan portfolio regarding year, the calculated value of F (1.49) is > 2.15. In respect of banks for the same, the calculated value of F is (7.97) > 2.63. For short term loan to loan portfolio in respect of year, the calculated value of F is 1.09< 2.15. For the same field in respect of banks, the calculated value of F is (7.89) > 2.63. For long term loan to loan portfolio regarding year, the calculated value of F is 1.08 < 2.15. In the same field in respect of banks, the calculated value of F is (7.90) > (2.63). For loan portfolio to total deposit regarding year, the calculated value of F is 14.34>2.15. In the same variable regarding banks, the calculated value of F is (28.33)> 2.63. For loan net profit margin for year measurement, the calculated value of F is 0.82<2.15. In the same variable for the measurement of banks, the calculated value of F is (2.80)> 2.63. In respect of year and for loan spread to total income, the calculated value of F is 2.94>2.15. In the same variable regarding banks, the calculated value of F is (48.08)> 2.63. In respect of year, and for burden to total income, the calculated value of F is 13.08>2.15. In the same variable regarding banks, the calculated value of F is (16.00)> 2.63. For income per branch regarding year the calculated value of F is 5.43>2.15. In the same variable, in respect of banks, the calculated value of F is (22.75)> 2.63. For income per employee regarding year, the calculated value of F is 1.68<2.15. In the same variable regarding banks, the calculated value of F is (149.36)> 2.63. So the hypothesis is rejected. For operating income to total income regarding year, the calculated value of F is 2.51>2.15. In the same variable regarding banks, the calculated value of F is (40.60)> 2.63. For operating expense to total income regarding year, the calculated value of F is 1.17<2.15.

In the same variable regarding banks, the calculated value of F is (35.94)> 2.63. For return on assets regarding year, the calculated value of F is 1.61<2.15. In the same variable regarding banks, the calculated value of F is (2.14)<2.63. For net profit to current assets regarding year, the calculated value of F is 1.44<2.15. In the same variable regarding banks, the calculated value of F is (2.16)< 2.63. For net profit to fixed assets regarding year, the calculated value of F is 1.06<2.15. In the same variable regarding banks, the calculated value of F is (13.39)> 2.63. For net profit per employee regarding year, the calculated value of F is 1.01<2.15. In the same variable regarding banks, the calculated value of F is (6.31)> 2.63. For management expense to total expense regarding year, the calculated value of F is 4.34>2.15. In the same variable regarding banks, the calculated value of F is (6.48)> 2.63.

Interpretation:

$H_{1:}$ There is significant difference in the volume of the loan loss provision to loan portfolio, log of assets, loan portfolio to total deposit, spread to total income, burden to total income, income per branch, operating income to total income, management expense to total expense of the selected banks in the different selected years as $H_{0:}$ is not accepted for the mentioned variables. Moreover, it is concluded that there is no significant difference in the volume of non-performing loan to loan portfolio, short term loan to loan portfolio, long term loan to loan portfolio, net profit margin, income per employee, operating expense to total income, return on assets, net profit to current assets, net profit to fixed assets and net profit per employee of the selected banks in the different selected years as $H_{1:}$ is accepted for the mentioned variables.

$H_{2:}$ There is significant difference in the volume of the loan loss provision to loan portfolio , log of assets, non-performing loan to loan portfolio, short term loan to loan portfolio, long term loan to loan portfolio, loan portfolio to total deposit, net profit margin, spread to total income, income per branch, income per employee, operating income to total income operating expense to total income, net profit to fixed assets, net profit per employee, management expense to total expense of the five sample banks as $H_{0:}$ is not accepted for the

mentioned variables Moreover, it is also concluded that there is no significant difference in the volume of burden to total income, return on assets and net profit to current assets of the five sample banks as H_1: is accepted for the mentioned variables.

8. A.

For H_3: Selected PCBs complying with the selected variables are technically efficient.

Here, input-oriented DEA, DEAP version 2.1, is utilized. Scale is assumed to be CRS. Multi-stage process used to determine slacks. Here, log of assets, non-performing loan to loan portfolio, short-term loan to loan portfolio, long-term loan to loan portfolio, and loan portfolio to deposit ratio have been considered independent variables. Loan loss provision to loan portfolio as a percentage has been considered the dependent variable. Once more, FRONTIER Version 4.1c is employed for analysis. Scale is assumed to be CRS. Frontier of Error Components (see B&C 1992).A production function is the model. The logged dependent variable. The efficiencies are computed using the same dependent and independent factors.

Table: 8.A. 1

Technical efficiency measured by using DEA and SFA software(using model-1)

Firm	Technical Efficiency by using DEA	Technical efficiency by using SFA
DBBL	1	0.89463243E+00
MBL	1	0.83102272E+00
UCBL	1	0.73614087E+00
IFIC	1	0.60467938E+00
NBL	1	0.44268169E+00

Source: Different annual reports of the selected banks and designed by the researcher.

Table: 8.A.1 displays the technical effectiveness calculated with DEA and SFA software. For each of the selected banks, technical efficiency is 1, which is the adopted base model. TE (technical efficiency) in the SFA technique is also 0.89 for DBBL, 0.83 for MBL, 0.74 for UCBL, 0.60 for IFIC, and 0.44 for NBL.

Interpretation: The fact that the technical efficiency for each of the selected banks is 1 indicates that the efficiency is good. However, for the variable in question, DBBL is

followed, in that order, by MBL, UCBL, IFIC, and NBL. NBL's management of its earnings is insufficient because its TE is less than 0.50.

8. B. Here, according to 2nd model, (using the same tools but considering net profit margin as dependent variable and spread to total Income, burden to total income, income per branch, income per employee, operating income to total income and operating income to total expense as independent variables, the results have been found as follows:

Table: 8.B. 2
Technical efficiency measured by using DEA and SFA software (using model -2)

Firm	Technical Efficiency by using DEA	Technical efficiency by using SFA
DBBL	1	0.98027258E+00
MBL	1	0.98114422E+00
UCBL	0.979	0.98197800E+00
IFIC	1	0.98277550E+00
NBL	1	0.98353824E+00

Source: Different annual reports of the selected banks and designed by the researcher.

The technical effectiveness determined by DEA and SFA software is displayed in table 8.B.2. Technical efficiency for all of the selected banks is 1, with the exception of UCBL (0.979), according to the adopted base model-2. Additionally, with the SFA technique, the TE (technical efficiency) of each selected bank is nearly identical.

Interpretations: Technical efficiency for all of the chosen banks is 1, which indicates that efficiency is good because it is greater than 1, with the exception of UCBL. Although the technical efficiency of all the selected banks is nearly equal, the variable in question is below 1, which indicates a slight inefficiency in the management of earnings.

8. C. Here, using the same tools but considering return on assets as dependent variable and Log of assets, net profit to current assets, net profit to fixed assets, Net profit per employee, Management expense to total expense as independent variables, the results have been found:

Table: 8.C. 3
Technical efficiency measured by using DEA and SFA software (using model -3)

Firm	Technical Efficiency by using DEA	Technical efficiency by using SFA
DBBL	1	0.99274805E+00
MBL	1	0.99274805E+00
UCBL	0.995	0.99274805E+00
IFIC	0.978	0.99274805E+00

NBL	1	0.99274805E+00

Source: Different annual reports of the selected banks and designed by the researcher.

Table 8.C.3 displays the technical effectiveness calculated with DEA and SFA software. The technical efficiency of DBBL, MBL, and NBL as the adopted base model-3 is 1, and it is 0.995 for UCBL and 0.978 for IFIC. Additionally, it was discovered that the TE (technical efficiency) of all the selected banks is equivalent when the model-3 in the SFA approach was applied to the variable in question.

Interpretation: The fact that the technical efficiency of the banks DBBL, MBL, and NBL is 1 indicates that the efficiency is good. However, there is some inefficiency in the TE of UCBL and IFIC to meet the standard. All of the selected banks' technical efficiency for the relevant variable is below 1, which indicates a slight inefficiency in managing earnings.

8.4 Summary of input slacks using DEA analysis

Table: 8.4

Summary of input slacks using DEA software

	Dependent	Independent					
Name of variables	LLPTLP	LASSET	NPLTLP	STLTLP	LTLTLP	LPTDP	-
mean	-	0.346	0.046	0.545	0.00	0.00	
	Dependent	Independent					
Name of variables	NPM	SPTTINC	BDTTINC	INCPBR	INCPEMP	OPTTINC	OPEXTINC
mean	-	0.000	0.302	0.000	0.000	0.057	0.179
	Dependent	Independent					
Name of variables	ROA	LASSET	NPTCASSET	NPTFIXASSET	NPPEMP	MANEXTTEX	-
mean	-	0.022	0.000	0.000	5.687	2.745	-

Source: Different annual reports of the selected banks and designed by the researcher.

Slacks depend on exactly which DEA model one uses. For example, if one is output maximizing, the efficient peers may use less of the input, and similarly for input orientation. However, in the classic radial models, the slacks relate to the further increases in output or reductions in input that could be gained beyond what is implied by the radial projection (i.e. equal increase in all outputs, or decrease in all inputs). In this study, the effectiveness of Data Envelopment Analysis (DEA) is measured using a slacks-based measure (SBM). Table 8.4

demonstrates that when the dependent variable is LLPTLP, the slack of LTLTLP and LPTDP is 0.00 and STLTLP, LASSET, and NPLTLP are, respectively, 0.545, 0.346, and 0.046. When the dependent variable is NPM, the slack of SPTTINC, INCPBR, and INCPEMP is 0.00 and BDTTINC, OPEXTTEX, and OPTTINC are 0.302, 0.179, and 0.057, respectively. When the dependent variable is ROA, the slack of NPTCASSET, NPTFIXASSET, and NPPEMP is 0.00 while that of NPPEMP, MANEXTTEX, and LASSET is 5.687, 2.745, and 0.022, respectively.

8.5. Using frontier analysis for the model-1, the following results have been calculated:

Table: 8.5
SFA software (for model -1)

Beta	coefficient	Standard error	t-ratio
beta 0	0.19	0.46	0.41
beta 1	- 0.24	0.68	-0.35
beta 2	-0.12	0.36	-0.33
beta 3	0.11	0.46	0.25
beta 4	0.13	0.46	0.30
beta 5	-0.69	0.16	-0.42
gamma (g) =0.47, sigma-squared= 0.53			

Beta 0 = LLPTLP, Beta 1 = LASSET, Beta 2 = NPLTLP, Beta 3 = STLTLP, Beta 4 = LTLTLP, and Beta 5 = LPTDP are all used in this table 8.5. The values beta 0, beta 1, beta 2, beta 3, beta 4 and beta 5 are taken from Table C.2 and refer to the coefficients of the production function described above. The amount of variance in the model that is attributable to capacity use is indicated by the value of gamma (g). The fact that this value for beta 1, 2, 3, 4, and 5 is rather low (-0.24, -0.12, 0.11, 0.13, and -0.69) shows that a large portion of the fluctuation was caused by variations in the level of fixed inputs and capacity utilization. However, the model's low (0.47) and significantly different from zero value of g indicates that much of the variance in production between years is caused by variations in capacity utilization.

8.6. Using frontier analysis and considering NPM as dependent variable and SPTTINC, INCPBR, INCPEMP, BDTTINC, OPTTINC and OPINCTEXP as independent variables, the results have been found:

Table: 8.6
SFA software (for model -2)

Beta	coefficient	Standard error	t-ratio
beta 0	-0.23	0.28	-0.81
beta 1	0.90	0.92	0.98
beta 2	0.30	0.49	0.61
beta 3	0.28	0.49	0.58
beta 4	-0.43	0.12	-0.35
beta 5	0.41	0.88	0.47
beta 6	-0.45	0.91	-0.50
gamma (g) =0.50, sigma-squared= 0.19			

Here beta 0= NPM, beta 1= SPTTINC, beta 2= INCPBR, beta 3= INCPEMP, beta 4= BDTTINC, beta5= OPTTINC and beta 6= OPINCTEXP . The values of beta 0, beta 1, 2, 3, and 4 in table 8.6 correspond to the coefficients of the production function described above. The amount of variance in the model that is attributable to capacity use is indicated by the value of gamma (g). Since these values for beta 4 and beta 6 are so low (-0.43 and -0.45), it is likely that a large portion of the fluctuation was caused by changes in the level of fixed inputs rather than by variations in capacity utilization.

However, the model's low (0.45) and significantly different from zero value of g indicates that much of the variance in production between years is caused by variations in capacity utilization. Additionally, beta 1's rather high value of 0.88 indicates that a large portion of the variance that isn't directly attributable to changes in the quantity of fixed inputs is rather related to variations in capacity utilization.

8.7. Using frontier analysis and considering ROA as dependent variable and NPTCASSET, NPTFIXASSET, NPPEMP, MANEXTTEX and LASSET as independent variables, the results have been found as follows:

Table : 8.7
SFA software (for model -3)

Beta	coefficient	Standard error	t-ratio
beta 0	0.53	0.23	0.24
beta 1	-0.11	0.42	-0.26

beta 2	0.71	0.20	0.36
beta 3	0.42	0.21	0.21
beta 4	0.68	0.28	0.24
beta 5	0.57	0.14	0.39
gamma (g) =0.50, sigma-squared= 0.19			

Here beta 0= ROA, beta 1= NPTCASSET, beta 2= NPTFIXASSET, beta 3= NPPEMP P, beta 4= MANEXTTEX and beta5= LASSET. The values of beta 0, beta 1, 2, 3, and 4 in table 8.7 correspond to the coefficients of the production function described above. The amount of variance in the model that is attributable to capacity use is indicated by the value of gamma (g). Since this value of beta 1 (-0.11) is so low, it is likely that changes in capacity utilization were the primary cause of a large portion of the fluctuation. In contrast, the model's low (0.50) and significantly different from zero value of g indicates that a large portion of the production variance between years is likely caused by variations in capacity utilization. And because these values (0.71, 0.68, and 0.57) are relatively high for beta 2, 4, and 5, it implies that changes in capacity utilization account for a large portion of variation that is not directly caused by changes in the quantity of fixed inputs.

Robustness:

High numbers of non-performing loans in low quality loan portfolios, which can increase costs for loan monitoring and execution (Sufian and Kamarudin, 2015), provide support for our findings. Another element that supports FRONTIER 4.1's (Coelli, 1996) assertion that all the variables considered have a significant impact on earnings management is the fact that variation in input and output between years is caused by variations in capacity utilization, and that the earnings management of the selected private commercial banks is directly impacted by changes in the level of fixed inputs, which depend on changes in some of the variables. Our findings are consistent with the existing research [Ab-Hamid et al. (2018); Banna et al. (2019); Goswami et al. (2019); Phan et al. (2018)] with regard to the effects of the control variants on the various efficiency measures.

Findings:

The earnings management of all the selected private commercial banks is about identical, as seen in all of the interpretations, as most of the variables pertaining to banks do not differ significantly. Despite the fact that several of the selected factors have large disparities, the methods employed imply that they have minimal impact. The results of the DEA analysis show that DBBL has the highest efficiency of earnings management, followed by MBL, UCBL, IFIC, and NBL, which was in last place. However, some selected factors suggest that UCBL and IFIC were not performing well enough in terms of earnings management.

The selected private commercial banks' long-term loans, asset volume, and non-performing loans were not allocated appropriately due to large and burdensome slacks, and operational revenue as a percentage of total income was insufficient for the sample banks, particularly UCBL and NBL. According to the measurement of slacks, profit per employee and management expense in comparison to total expense was both high proportionally.

Remedial Measures: The loans and advances made by all the selected private commercial banks should be distributed in accordance with their returns. In accordance with deposit collection, non-performing loans and non-interest expenses should be decreased. Since the non-interest income is relatively low for all the selected banks, the burden should be reduced.

Conclusion:

The positional earnings management of the Bangladeshi sample banks is compared in this study. It has been noted that inadequate allocation is the main cause of cost inefficiency. Inefficient use of resources results from poor input selection. In light of the aforementioned, it would seem that the sample banks' management of earning efficiency is being negatively impacted by the huge volume of provisions for loans and advances. To the best of our knowledge, the position of earnings management is measured by the components of LLP, NPM, and ROA, so our study adds to the body of literature on this subject.

The current study enables a concise description of banking efficiency and earnings management for the application of latest IFRS. Future research on the impact of best earnings management on the level of provision management and financial management may show to be intriguing. Using dynamic network DEA to assess its effectiveness would also be of interest. In addition, income efficiency analysis allows us to identify inefficiencies in both outputs and inputs, which help us, get around the limitation of examining cost efficiency. The study is limited to a small number of Bangladeshi private commercial banks, which is another drawback. Future research would be interesting in examining all Bangladeshi banks and board features like gender, independence, and political connections.

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