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A COMPARATIVE FINANCIAL PERFORMANCE AND IDENTIFYING THE DETERMINANTS OF PERFORMANCE: A STUDY ON COMMERCIAL BANKS OF BANGLADESH

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ABSTRACT

The main purpose of this study is to analyze the comparative financial performance of different ownership structured commercial banks in Bangladesh and specify the determinants of performance exposed by the financial ratios based on CAMEL framework. The study considered a dataset of 25 commercial banks for the period of 2009 to 2013. Firstly, the study adopted financial analysis based on the CAMEL framework and later formulated two regression models to estimate the impact of different financial ratios on the financial performance namely ROA and ROE of sample banks. The overall results found that state owned banks are significantly less efficient than their counterparts, and local and foreign commercial banks are equally efficient. Further, the regression results reveal that ROA was significantly influenced by capital adequacy ratio, non-performing loan ratio and credit to deposit ratio, while capital adequacy ratio and non-performing loan ratio had significant effect on ROE. The findings of the study may lend a strong policy support for the concern regulators and enriches the literature of the banks performance analysis.

1. Introduction

Financial Institutions is the backbone of economy of a country. It operates by providing successful monetary intermediation as a facilitator for achieving sustainable economic development. A strong financial system promotes investment by financing productive business opportunities, mobilizing savings, efficiently allocating resources and makes easy the trade of goods and services. Several studies (McKinnon, 1973; Levine, 1997) have stated that the ability of financial system to minimize information and transaction costs plays a significant role in deciding the savings rate, technological improvement, investment decision and hence the rate of economic growth.

Banking has become an essential aspect of serving individuals in financial matters, and its scale of operation is rising day by day. In Bangladesh, it is the largest financial institutional structure, accounting for more than 70 % of the total assets of all financial institutions. In order to survive adverse upsets and boost efficiency in the financial system, a profitable and stable banking sector is in a stronger position (Athanasoglou et al., 2008).

A competitive banking system encourages efficiency and is therefore necessary for growth, but the stability of the banking system needs market power (Northcott, 2004). Commercial banks retain a

substantial share of a country's economic activities. In Bangladesh, the role of commercial banks has been enhanced to sustain the rising need for the service sector and the economy in general. For a decade now, the stock market has been dominated by commercial banks. In addition to the capital market, commercial banks have also been significant contributors to the country's revenue. They have been paying a large amount of tax every year.

Performance appraisal is an effective method for businesses to provide their operators with rewards and restraint, and it is an important way for stakeholders to acquire performance information (Sun, 2011). A commercial bank's performance appraisal is generally related to how well the bank can utilize its assets, equity and liabilities of shareholders, revenues and expenses. For all parties, including depositors, investors, bank managers and regulators, the performance assessment of banks is critical. The assessment of the performance of a company typically uses the financial ratio approach, since it offers a clear explanation of the financial performance of the company relative to previous periods and helps to enhance its management performance (Lin et al., 2005). Moreover, the ratio analysis helps determine the bank's financial status relative to other banks. CAMEL Framework-based financial ratios are linked to capital, assets, management, earnings and liquidity considerations.

As the banks' financial performance is very crucial for the economic development of Bangladesh, the study intended to analysis the financial performance of DSE listed commercial banks of Bangladesh. Therefore, for the period 2009 to 2013, different ratios namely Return on Assets (ROA), Return on Equity (ROE), Capital Adequacy Ratio (CAR), Nonperforming Loan Ratio (NPL), Interest Expense on Total Loans (IETTL), Net Interest Margin (NIM), Credit to Deposit Ratio (CDR) will be analyzed to examine the financial performance of selected Bangladeshi commercial banks. Such ratios will help to show the status of the various types of banks in terms of capital, asset quality, management, earnings and liquidity. Financial ratio analysis is also used to quantitatively analyze the performance differences among Bangladesh's State-owned Commercial Banks (SCBs), Private Commercial Banks (PCBs), Islamic Commercial Banks (ICBs) and Foreign Commercial Banks (FCBs), and the banks are rated on the basis of their financial measures and performance to assess each other as a guide for the future pattern of finance. Further the study will assess the determinants of financial performance of commercial banks using econometric models.

2. Review of Literature

The pattern of commercial banking is increasingly changing. Competition is getting stiffer and, hence, by improving performance, banks need to increase their competitiveness and productivity. The financial performance of commercial banks and other financial institutions has usually been calculated using a combination of analysis of financial ratios, benchmarking, budget performance assessment or a mixture of such methodologies (Avkiran, 1995).

Gopinathan (2009) noted that the analysis of financial ratios can define better investment opportunities for investors as the ratio analysis tests different aspects of performance and analyzes a business or an institution's fundamentals. Furthermore, Ho and Zhu (2004) indicated that the assessment of the performance of a company centered on operational efficiency and effectiveness, which could directly affect the survival of the company. The research's empirical findings (Raza et al., 2011; Tarawneh, 2006) demonstrated that a business that has better performance does not mean that it will always produce better efficiency. Alam et al. (2011) concludes that ranking of banks differ as the financial ratio changes.

In the paper of Bakar and Tahir (2009) used multiple linear regression techniques and simulated neural network techniques for bank performance prediction. As a bank performance ROA was used as

dependent variable, and seven variables were used as independent variables, namely liquidity, cost to income ratio, credit risk, size and concentration ratio. They argued that the neural network approach succeeds the multiple linear regression method, but the factor used needs to be clarified and they noted that multiple linear regressions can be used as a simple tool to research the linear relationship between the dependent variable and independent variables, despite its limitations.

Neceur (2003) recorded a significant positive capitalization effect on ROA using a sample of ten Tunisian banks from 1980 to 2000 and a panel linear regression model. There are numerous studies that use the CAMEL method, which is the latest financial analysis model, to analyze bank performance. Elyor (2009) and Uzhegova (2010) used the CAMEL model to examine effective factors influencing bank profitability. The CAMEL framework is the most widely used model (Baral, 2005). The CAMEL framework for performance assessment of banks and other financial institutions has also been adopted by the Central Bank of Bangladesh (BB). CAMEL stands for capital adequacy, asset quality, management efficiency, earnings performance and liquidity. The capital adequacy ratio is a crucial indicator in which the health of banks and financial institutions can be evaluated. According to (Kosmidou, 2008) capital adequacy indicates the availability of sufficient capital for absorbing any financial shocks which the bank may experience.

As of January 2015, commercial banks operating in Bangladesh need to hold at least 5.5% of Tier-1 capital and 10 % of total capital (Tier 1 and Tier 2), i.e. core capital and supplementary capital, respectively. Tier 1 capital is made up of paid-up capital, equity premium, non-redeemable preference equity, general reserve fund, accumulated profit, capital redemption reserve, capital adjustment fund and other free reserves. Tier 2 capital comprises of capital comprises of general loan loss provision, assets revaluation reserve, hybrid capital instruments, subordinated term loan, exchange equalization reserve, excess loan loss provision, and investment adjustment reserve.

These minimum capital adequacy criteria are based on the banks' risk-weighted exposures (Risk-Based Capital Adequacy Guidelines, 2015). Credit risk is one of the factors influencing the health of an individual bank, while the measurement of asset quality includes taking into account the possibility of borrowers repaying loans. The severity of the credit risk depends on the quality of the assets held by each bank. The assets quality of a bank depends on exposure to specific risks, trends in non-performing loans, and the health and profitability of bank borrowers (Baral, 2005). The two major triggers of bank failures are poor asset quality and low liquidity levels. In the early 1980s, poor asset quality led to many bank failures in Kenya (Olweny and Shipo, 2011).

Bangladesh Bank (BB), central bank of Bangladesh uses composition of assets, nonperforming loan to total loan ratio, net nonperforming loan to total loan ratio as the indicators of the quality of assets of the commercial banks (BB, 2015). The maximum NPL allows for a healthy bank is 5%. Management quality plays a major role in deciding the bank's future. The management has an overview of the activities of a bank, controls the quality of loans and has to make sure the bank is profitable. According to Elyor (2009) the efficiency of bank management can be calculated by interest expenses divided into total loans. The ability to promote a bank's current and future operations relies on the consistency of its profile of earnings and profitability (Shar et al., 2011). BB utilizes the return on total assets (ROA) as a measure of a commercial bank's profitability.

Furthermore, to determine the profitability of a commercial bank, absolute metrics such as interest income, net interest income, non-interest income, net non-interest income, non-operating income, net non-operating income and net profit are used (BB, 2015). One of the most essential functions of a bank is liquidity management. If the funds tapped are not used properly, the company will incur losses

(Sangmi and Nazir, 2010). The review of literature suggested that financial performance of banks is very significant and CAMEL framework for this analysis is also commonly accepted technique. Therefore this study used CAMEL framework for financial analysis of the commercial banks of Bangladesh.

2.1 Research Objectives

The broad objective of this study is to conduct comparative performance evaluation and identify the influencing variables on banks performance of different ownership structured commercial banks in Bangladesh in order to document the results of each sector during period under reviewed. In summary the specific objectives are:

- To compare the financial performance under the CAMEL framework of different ownership structured commercial banks in Bangladesh.
- To evaluate the factors determining the performance of the commercial banks in Bangladesh.

2.2 Research Hypothesis

Based on the second objective, the present study seeks to test the following hypothesizes:

H1: There is a significant relationship between capital adequacy ratios and performance of the banks.

H2: There is a significant relationship between asset quality ratios and performance of the banks.

H3: There is a significant relationship between management efficiency ratios and performance of the banks.

H4: There is a significant relationship between earnings ratios and performance of the banks.

H5: There is a significant relationship between liquidity ratios and performance of the banks.

The factors considered for the analysis include ROA and ROE (profitability ratio) as dependent variables, which each examines separately with same explanatory variables that is, CAR, NPL, IETTL, NIM, CDR.

3. The Commercial Banks in Bangladesh

Despite the fact that many non-bank financial institutions have been founded in recent years, Bangladesh's financial system is still mainly focused on the banking sector. The banking sector of Bangladesh comprises of Bangladesh Bank as the central bank and four categories of scheduled banks. These are State-owned Commercial Banks (SCBs), State-owned Specialized Financial Institutions (SFIs), Local Private Commercial Banks (PCBs) and Foreign Commercial Banks (FCBs).

In the recent years, nine newly approved private commercial banks have begun operating. So, in 2015, the number of banks increased to 56. Out of the 56 banks, six are state-owned commercial banks (SCBs), 39 local private commercial banks (PCBs), 9 foreign commercial banks (FCBs) and the rest two are Specialized Financial Institutions (SFIs). There are 8 private Islamic commercial banks in Bangladesh that are known as local private commercial banks. There are a total of 8794 branches of these banks that are diminishing over time. Bangladesh's banking sector has shown tremendous progress in improving its resilience in the midst of political turbulence during FY2014. Bangladesh Bank (BB) has continued to concentrate on improving the nation's financial system. During the year, a series of policy steps continued to emphasize risk management, corporate governance, stress testing, improving banks' CSR and Green Banking activities, as well as tracking fraud-forgeries through self-assessment of internal anti-fraud controls.

In order to make it more acceptable to international standards, a revised guideline for CAMEL ranking has been put into practice. In view of the changes made in the Bank Company Act in 2013, the supervision of the investment in shares by the scheduled banks has been strict. The Board-level

Risk Management Committee has been made compulsory to ensure proper risk management practices in banks. Banks are currently being graded for their overall success in risk management. Hence, the banking sector of Bangladesh is very large and competitive performance measure is important for policy support to the banks and Bangladesh bank.

4. Methodology of the study

4.1 Methods and variables

The method of ratio analysis was used to analyze the comparative performance of various Bangladeshi Commercial Banks structured by ownership. Financial ratios such as capital adequacy, asset quality, management, earnings and liquidity were adopted based on the CAMEL framework. The method of ratio measurement is very simple and many previous researchers have widely used it. The key benefit of this approach is that it reduces the disparities and makes the data more comparable. Pearson correlation of all the ratios and an econometric multivariate regression model applied to test the significance of variables on performance of different commercial banks.

4.2 Sample Design

The sample of different ownership structured commercial banks was chosen using a purposive random sampling technique. Five state-owned commercial banks, ten local private commercial banks, five Islamic commercial banks and five foreign commercial banks, in total 25 commercial banks, have been selected for this research.

4.3 Data Source

The data for this study was derived from secondary sources, the five-year financial statements of the bank. This data was used to measure the main financial ratios of the selected commercial banks.

4.4 The variables used to measure performance

4.4.1 Profitability Performance

Return on Asset Ratio (ROA)

ROA is the indicator of measuring managerial efficiency. Return on Asset ratio shows how a bank can convert its asset into net earnings (Abduh et al., 2013). The formula for calculating return on asset ratio is, Return on Assets (ROA) = Net Profit / Total Assets. A higher ratio shows a higher capacity and is therefore a predictor of better performance.

Return on Equity Ratio (ROE)

ROE is an indicator of measuring managerial efficiency. It measures a firm's efficiency at generating profits from every unit of shareholders' equity. A higher ratio is an indicator of higher managerial performance. The formula for calculating ROE is, Return on Equity (ROE) = Net Profit / Total Equity.

4.4.2 Credit Risk Performance

Capital Adequacy Ratio (CAR)

The CAR is a measure of the amount of a bank's capital expressed as a percentage of its risk weighted credit exposures. A high CAR doesn't always indicate good performance. A standard CAR is around 12%. Capital Adequacy Ratio (CAR) is the ratio of a bank's capital to its risk. It is calculated as:

$$\text{Capital Adequacy Ratio (CAR)} = \frac{\text{Tier 1 Capital} + \text{Tier 2 Capital}}{\text{Risk Weighted Assets}}$$

Where, Tier 1 Capital = Equity Capital + Disclosed Reserves

Tier 2 Capital = Undisclosed Reserves + General Loss reserves + Subordinate Term Debts

4.4.3 Asset Quality

Non-performing loan ratio (NPL)

Loans make up the basic elements of assets of a bank. Therefore, assets quality is measured by examining the percentage of classified loans or non-performing loan among total loans disbursed, where non-performing are those loans which have a more than normal risk of not being repaid. The formula for NPL = Non-performing or Classified Loan / Total Loan. The lower the ratio of NPL, the better is the asset/credit performance for the commercial banks (Samad, 2004).

4.4.4 Managerial efficiency:

Interest Expenses to Total Loan (IETTTL)

The IETTTL is the ratio that measures how efficiently management of the banks maintains the quality of loans and disburses earned interest to the depositors and creditors. A high IETTTL is preferred over a lower one as this indicates the ability and efficiency of the bank in generating more total income which is distributed as interest. IETTTL is calculated as IETTTL = Interest Expense / Total Loans.

4.4.5 Earning Performance:

Net Interest Margin (NIM)

The net interest margin (NIM) measures how large the spread between interest revenues and interest costs that management has been able to achieve by close control over earning assets and the pursuit of the cheapest sources of funding (Rose et al., 2006). Net Interest Margin is calculated as NIM = Net Interest Income / Average Earning Asset.

4.4.6 Liquidity Performance

Credit to Deposit Ratio (CDR)

Credit to Deposit Ratio is calculated as CDR = Net Credit or Loan disbursed / Total Deposit. It indicates the percentage of the total deposit locked into non-liquid asset. The higher the CDR, the higher is the liquidity risk (Samad, 2004).

4.5 Econometrics Model: Panel Data Model

The panel character of the data collected in this study allows using a panel data model. A combination of time-series and cross-section data is panel data. According to Mohammed (2007), the equation of panel regression varies by the double subscript added to each variable from a normal time series or cross-section regression.

The basic framework for panel data estimation is a regression model of the following form:

$$Y_{it} = \alpha + \sum_{k=1}^5 \beta_{itk} X_{itk} + u_i + \varepsilon_{it} \dots \dots \dots (1)$$

The subscript i represent the cross-sectional dimension and t denoting the time-series dimension. The leftward variable Y_{it} denotes the dependent variable, which is the firm's leverage ratio while α represents the intercept, β_{itk} the coefficient and X_{itk} the independent variables as follows (k=1, 2, 3... 5).

4.6 Model Specification

The choice between a fixed and a random effect panel data model is one of the most important questions in panel data modeling. Many economists and financial analysts use the following criteria in order to determine which model is most suitable. If one or more of the other independent variables are associated with the individual-specific dependent unobserved effect (u_i), then the fixed-effect model is the appropriate model. On the other hand, if the unobserved individual-specific dependent effect (u_i) is not associated with one or more independent variables and can be interpreted as the outcome of a

random variable, the random-effect model is the right model. In this paper, Hausman Specification testing techniques were designed to test the selected regression model to check the model's reliability and functionality and to calculate the relationship between a dependent variable and one or more independent variables.

Table 1: Hausman specification test when considered ROA as a performance measure

	Coefficients			
	(b) fixed	(B) random	(b-B) Difference	sqrt(diag(V_b-V_B)) S.E.
CAR	.0948065	.0927377	.0020688	0.0175
NPL	-.0310953	-.0385711	.0074758	0.0276
IETTL	.0434572	.0256752	.017782	0.0143
NIM	.0327121	.0441794	-.0114673	-0.009
CDR	.0094732	.0117212	-.002248	0.0021

Note: b = consistent under H_0 and H_a ; obtained from xtreg. B = inconsistent under H_a , efficient under H_0 ; obtained from xtreg. Test: H_0 : difference in coefficients not $\chi^2(5) = (b-B)'[(V_b-V_B)^{-1}](b-B) = 20.11$. Prob> $\chi^2 = 0.0012$ (V_b-V_B is not positive definite).

Table 2: Hausman specification test when considered ROE as a performance measure

	Coefficients			
	(b) fixed	(B) random	(b-B) Difference	sqrt(diag(V_b-V_B)) S.E.
CAR	1.666924	1.688018	-0.0210942	0.0042
NPL	-.78171	-0.9146547	0.1329448	0.0409
IETTL	0.584889	0.2546206	0.3302684	0.0973
NIM	0.8524572	1.083057	-0.2305993	0.0032
CDR	-.0888918	-0.0597402	-0.0291516	- 0.0137

Note: b = consistent under H_0 and H_a ; obtained from xtreg. B = inconsistent under H_a , efficient under H_0 ; obtained from xtreg. Test: H_0 : difference in coefficients not $\chi^2(5) = (b-B)'[(V_b-V_B)^{-1}](b-B) = 60.11$. Prob> $\chi^2 = 0.0002$ (V_b-V_B is not positive definite).

The Hausman tests, as seen in Table 1 and 2 above, provide empirical proof of P-values of 0.0012 and 0.0002 respectively, indicating that fixed-effect estimators vary substantially from random-effect estimators. This means the rejection of the null hypothesis. The fixed-effect model is therefore the appropriate model for the estimation of both. For model acceptance and rejection, the decision criterion is p-value. If p-value is greater than 0.05, we can consider the null hypothesis, which means that the random effect model is appropriate and vice versa.

Thus the fixed-effect panel data model was used to test the performance measures of the firms. To explain the relationship between bank's ROA and ROE ratios and the determinants, the following models are devised respectively:

$$ROA_{it} = \beta_0 + \beta_1 CAR_{it} + \beta_2 NPL_{it} + \beta_3 IETTL_{it} + \beta_4 NIM_{it} + \beta_5 CDR_{it} + u_i + \varepsilon_{it} \dots \dots \dots (2)$$

$$ROE_{it} = \beta_0 + \beta_1 CAR_{it} + \beta_2 NPL_{it} + \beta_3 IETTL_{it} + \beta_4 NIM_{it} + \beta_5 CDR_{it} + u_i + \varepsilon_{it} \dots \dots \dots (3)$$

Where, the profitability ratios (ROA and ROE) are assumed as dependent variables while capital adequacy ratio (CAR), non-performing loan ratio (NPL), interest expenses to total loan (IETTL), net interest margin ratio (NIM) and credit to deposit ratio (CD) are as independents variables. In the

equations, β_0 is constant and β is coefficient of variables, u_i and ε_{it} already discussed beginning of this part.

In Addition, the study adopted multi-colinearity and Durbin Watson statistics to test the multi-colinearity problem and autocorrelation problem of variables. All estimations have been performed in the STATA software program whereas the ordinary calculations in Excel.

5. Results and Discussion

The results and discussion part commence with summary statistics of all variables. Table 3 shows the five year average values of individual bank and ownership based average in the connection of all variables.

5.1 Financial ratios of commercial banks in Bangladesh

Table 3: Five year average ratios of the commercial banks in Bangladesh

Banks	Ratios (%)						
	ROA	ROE	CAR	NPL	IETTL	NIM	CDR
SCBs	Rupali Bank	0.66	8.06	6.55	16.47	7.76	68.28
	Agrani Bank	-0.04	-29.76	6.38	17.32	6.65	72.10
	Sonali Bank	0.36	6.43	5.97	20.17	11.08	1.56
	Janata Bank	0.16	9.57	9.43	9.61	7.85	1.84
	BDBL	2.34	5.06	27.36	35.76	3.49	5.83
	Average	0.70	-0.13	11.14	19.87	7.37	4.01
PCB	AB Bank	1.79	19.06	10.98	2.87	0.98	3.05
	Jamuna Bank	0.97	21.07	10.82	2.67	9.20	11.98
	Bank Asia	1.56	20.28	11.42	3.44	9.35	3.11
	BRAC Bank	1.11	14.59	11.82	6.51	11.3	3.92
	Dutch Bangla Bank	1.72	26.6	11.62	2.90	9.77	1.72
	Easteran Bank	1.46	12.45	11.05	3.39	6.84	3.30
	Mutual Trust Bank	0.39	6.58	12.98	3.70	6.43	2.89
	Premier Bank	1.44	15.53	11.64	4.37	4.98	2.07
	Prime Bank	2.02	4.50	11.04	1.82	7.32	3.82
	Uttara Bank	1.43	15.57	12.43	6.88	11.88	3.43
	Average	1.38	15.62	11.58	3.86	7.81	3.93
ICB	Al Arafah Islami Bank	1.92	18.02	13.12	1.63	7.79	4.69
	Social Islami Bank	2.15	12.82	12.13	4.11	9.78	3.57
	Shahjalal Islami Bank	1.76	19.57	12.29	2.83	10.04	2.96
	E XIM Islami Bank	1.98	12.83	17.84	2.72	9.10	2.95
	Islami Bank	1.32	15.58	12.71	2.86	6.43	3.28
	Average	1.82	15.77	13.62	2.83	8.62	3.49
FCB	Bank of Ceylon	1.76	24.24	12.36	4.48	8.42	3.26
	Habib Bank	1.63	20.56	15.19	2.18	10.83	2.74
	Bank Al-Falah	0.52	12.60	11.86	0.72	6.45	3.19
	HSBC	0.13	8.62	14.68	0.94	2.89	2.25

Standard Chartered Bank	0.77	11.08	12.56	1.50	7.30	2.24	82.66
Average	0.96	15.42	13.33	1.96	7.18	2.73	68.63

Source: study findings

Profitability

In this study, with the aid of return on assets and return on equity, the status of profitability was measured. Return on assets (ROA) is, from an accounting viewpoint, a systematic indicator of overall bank performance (Sinkey and Joseph, 1992). Table 3, column 1 depicts average ROA of major commercial banks in Bangladesh for the period 2009 to 2013.

With the exception of Agrani bank, the average ROAs of all the premeditated banks are positive. In Bangladesh, the performance of the banking system is fair in terms of net profit. The average ROA of SCB (0.7%) is found lower than that of PCB (1.39%), ICB (1.82%) and FCB (0.96%) due to having poor asset quality. SCB's earnings performance is unsatisfactory and net operating losses are also incurred by a state-owned bank.

There was a positive ROA pattern over the study period, except for a particular bank. The last place with an average ROA equal to -0.04 percent belonged to Agrani bank. A SCB named DBBL held first position among the selected banks with ROA equaling 2.34 percent, while the second position was for SIBL (2.15 percent) from Islami commercial banks (ICBs) group. The prime bank's average ROA was registered at 2.02 percent and this bank was ranked first among private commercial banks. The second position was 1.79 percent for AB Bank with ROA, and the last position was 0.39 percent for Mutual Trust Bank with ROA.

The average ROAs of RB, SB, JB, MTB, HSBC, Bank Al-Falah and Standard Chartered Banks were estimated less than 1, fall in the marginal earning performance (Baral, 2005). Since the ROAs of most banks of the PCBs and ICBs were estimated to be greater than those of banks of the SCBs and FCBs, it can be concluded that banks of the PCBs and ICBs were more efficient in mobilizing their available resources. Furthermore, the underlying factors for the proper use of resources and eventually the earning profit were corruption and less morale of SCB employees. The smaller number of branches is the primary reason for the proper use of FCB's resources and, consequently, the lower profits.

For an average of five years, the ROEs of the major commercial banks in Bangladesh are shown in Table 1, column 2. With fluctuating and pessimistic ROE trends, the SCB situation was the most terrible. For Agrani bank, the average ROE ratio was -29.76 percent, whereas other state-owned banks had a lower positive ratio. This means that, in terms of dividends, shareholders receive very low returns. Among the five state-owned banks, JBL's ROE is projected to be the largest. JBL seems to have used the funds of its shareholders more efficiently than other state-owned banks. The average ROEs for the FCBs were well recorded relative to others. DBBL was the first position as PCBs based on this ratio; it has an average ROE of 26.6 percent, not only among PCBs but also among all sampled banks.

The second position was equivalent to 21.07 percent for Jamuna bank with ROE, and the last position was 4.50 percent for Prime bank with ROE. It shows that PCB has a satisfactory profit earnings and that shareholders gain a higher return on their investment. With an average ROE of 15.58 percent, the average ROEs of all ICBs were satisfactory. Shajalal bank was the first to rate the ICBs based on this ratio. It had a 19.57 percent average ROE. The second position was equal to 18.02 percent for Al Arafah bank with ROE, and the last position was equivalent to 12.82 percent for Social Islami bank with ROE. It demonstrates that ICBs use the funds of their shareholders effectively and receive a

satisfactory amount of net profit. The Bank of Ceylon was the first to rate the FCBs based on this ROE ratio. It had a 24.24 percent average ROE. The last place belonged to HSBC with a ROE equal to 8.62%. It demonstrates that FCBs use the funds of their shareholders effectively and gain net profit at a sufficient pace.

5.2 Comparative Performance Based on Different Components of CAMEL framework

5.2.1 Capital adequacy

As mentioned in the above review, the banks under study are well capitalized and comply with the capital adequacy ratio instructions of the Bangladesh bank. However, their capital base is not so strong relative to the risk-weighted assets. According to the international rating convention, in order to have a strong capital base, total capital should be greater than 19.5% of the total risk-weighted assets of commercial banks. However, with the exception of BDBL, none of the banks under review had a capital fund greater than 19.5% of the overall risk-weighted capital. As indicated by the CAR, during the study period, on average, the capital adequacy of Islamic commercial banks was highest. The total capital adequacy ratio of less than 15 and equal to 13 shows that the capital adequacy ratio is fair and that it falls within this range on average. It is evident from column 3 of Table 1, none of the CAR banks are in negative, and this is a good sign of the banking sector. Four state-owned banks' CARs, however, were positive and lower than the others.

During the study period, average PCB CARs were 11.58 percent, ICBs were 13.62 percent and FCBs were 13.33 percent. This appears to mean that these banks are in accordance with the BB Directive on the capital base requirements of commercial banks.

5.2.2 Asset quality

The theoretical prescription makes it clear that the success of commercial banks is essentially dependent on the quality of the assets they possess, and that the quality of the assets is dependent on the financial health of their borrowers.

Many measures may be used to assess the quality of assets held by commercial banks, as mentioned earlier. Loans are one of a bank's key outputs, but because loans are a risk output, there is often an ex ante risk that a loan will potentially become non-performing (Yike et al., 2011). Here, however, only one basic indicator was used to measure the quality of the assets retained by the banks: non-performing loan ratios. The growing trend in these ratios illustrates the declining quality of the assets of commercial banks. Table 1 column 4; show that the average NPL ratio of SCBs was 19.87% over the five-year period. Compared to the PCB, ICB and FCB, the ratio of NPL in the SCB was very high. The ratio of SCBs in the NPL was extremely high, which clearly demonstrates the deterioration in the quality of loans and concentration as well. The average NPL ratio of Uttara bank and BRAC bank was very high among the private commercial banks. The two banks did not achieve an acceptable stage. Other private commercial banks were at a reasonable level, on average. The NPL suggests that Islamic banks and foreign banks have increased their asset quality year by year. Bank Al Falah's average NPL ratio was superior to that of other commercial banks. On average, the other foreign commercial banks were at a reasonable level. However, the NPL ratio of banks was below the aggregate percentage and the trend was declining. The decreasing NPL ratio represented the improved quality of their assets year after year.

5.2.3 Management

For a span of five years, Table 1, column 5, displays the average IETTTL of the major commercial banks in Bangladesh. SCB's average IETTTL (7.36%) was found to be lower than that of PCB (7.8%)

and ICB (8.62%) because the management of the state-owned commercial banks was the least efficient. The average IETTTL of FCB shows lowest result because of HSBC's (2.89) lowest IETTTL. However, the quality of loans was controlled and profit was assured by the Islamic and private sector banks. Among the sampled state-owned commercial banks, BDBL (3.5 percent) management was the least efficient, while Uttara bank (11.88 percent) management was the most efficient among private commercial banks, Shajalal bank (10.04 percent) was the most efficient among the Islamic banks, and Habib bank (10.83 percent) was the most efficient among the FCBs.

5.2.4 Earnings

The net interest margin (NIM) measures how large the spread between interest revenues and interest costs that management has been able to achieve by close control over earning assets and the pursuit of the cheapest sources of funding (Rose et al., 2006). NIM has been regarded as an extremely important measure for the bank and approximately 4 percent of its standard value for a healthy bank is considered. There is a significant effect on profitability from a slight shift in the interest margin. Higher NIM is associated with profitable banks by maintaining good asset quality. The state owned banks in Bangladesh are entirely different from foreign banks, Islamic banks and private banks. Table 1, column 6, shows that the average NIM (4.01 percent) of the state-owned commercial banks was higher than that of the PCB (3.93), ICB (3.5 percent) and FCB (2.73). It means State owned commercial banks have higher interest income from earning assets.

The result was very different from the average values when the individual banks were compared. Although as a state-owned bank, Sonali bank was in the last position with the lowest interest margin of 1.56%, while Jamuna bank, a private commercial bank, was in first place with the highest interest margin of 11.9%. As a state-owned commercial bank, Rupali bank had an interest margin of 6.8 percent and ranked second. Of all the commercial banks selected, only three had the minimum level maintained. In Bangladesh, it seems that the profitability of the banks is not so satisfactory.

5.2.5 Liquidity

The credit-to-deposit ratio (CDR) is a significant instrument for analyzing a bank's liquidity and calculating the fund ratio used by a bank to loan out of the total deposit collected. The higher the CDR demonstrates the banks' are efficient in using the collected fund more. As set out in Table 2, column 7, the CDR shows that the liquidity status of the state-owned commercial banks was lower than the accepted level. BDBL, however, appeared to be more efficient in using their collected funds as deposits and its CDR is higher with lower total deposits. The average CDR of ICB is 88.27 percent, was satisfactory during the study period. Although there is no standard for CDR in Bangladesh, it can be agreed that a ratio of 75% is adequate. During the past five years, the bank's average CDR has been quite consistent. Among the ten private commercial banks, the average CDR of Bank Asia was higher than other PCBs. The average CDR of PCBs, ICBs and SCBs were in the accepted level. But the average CDR of FCBs is not in acceptable level. The CDR of ICBs was higher, which is adequate.

BDBL was the first one to rate the banks; it has an average CDR of 143.9 percent. The second position was equivalent to 92.09 percent for Shajalal bank with CDR, and the last position was 39.6 percent for Habib bank. The funds collected as deposits appear to be used efficiently by private commercial banks.

5.3 Ranking of the commercial banks

Table 4: Ranks of the commercial banks in Bangladesh

		Indications						
		ROA	ROE	CAR	NPL	IETTTL	NIM	CDR
Banks								
SCB	Rupali Bank	19	20	23	4	14	2	19
	Agrani Bank	25	25	24	3	18	5	16
	Sonali Bank	22	22	25	2	3	25	23
	Janata Bank	23	18	22	5	12	23	17
	BDBL	1	23	1	1	23	3	1
PCB	AB Bank	6	7	20	15	25	15	10
	Jamuna Bank	17	3	21	19	9	1	22
	Bank Asia	11	5	17	12	8	14	7
	BRAC Bank	16	12	14	7	2	6	8
	Dutch Bangla Bank	9	1	16	14	7	24	14
	Easteran Bank	12	16	18	13	17	10	18
	Mutual Trust Bank	21	21	6	11	21	18	21
	Premier Bank	13	11	15	9	22	22	12
	Prime Bank	3	24	19	21	15	7	15
	Uttara Bank	14	10	9	6	1	9	20
ICB	Al Arafah Islami Bank	5	8	5	22	13	4	5
	Social Islami Bank	2	14	12	10	6	8	9
	Shahjalal Islami Bank	7	6	11	17	5	16	2
	EXIM Bank	4	13	2	18	10	17	3
	Islami Bank	15	9	7	16	20	11	6
FCB	Bank of Ceylon	8	2	10	8	11	12	4
	Habib Bank	10	4	3	20	4	19	25
	Bank Al-Falah	20	15	13	25	19	13	24
	HSBC	24	19	4	24	24	20	13
	Standard Chartered Bank	18	17	8	23	16	21	11

Source: study findings

On the basis of each financial ratio relating to ROA, ROE, CAR, NPL, IETTTL, NIM and CDR, different commercial banks were ranked in different position (Table 4). Based on the return on assets (ROA), the higher rank was for BDBL, which is a state-owned commercial bank, Social Islami Bank, was the second, which is Islamic commercial bank and the last position, belonged to Agrani Bank, a state-owned commercial bank. Dutch Bangla Bank was in first place on the basis of return on equity

(ROE), Bank of Ceylon was in second position and Agrani Bank was in the lowest position. Based on the capital adequacy ratio, BDBL was first, EXIM Bank was second, and Sonali Bank was third. BDBL was in first position, according to the NPL ratio, while Sonali Bank was in second position and Bank Al-Falah was in last place. Uttara Bank was in first place; BRAC Bank was in second place, while AB Bank's last place was considering interest expenses to the total loan ratio. The first position for Jamuna Bank was based on the net interest margin, while Rupali Bank held the second position and Sonali Bank held the last position.

5.4 Correlation analysis

Table 5: Correlation matrix of ROA and CAMEL ratios

		ROA	CAR	NPL	IETTL	NIM	CDR
Pearson Correlation	ROA	1	0.507	-0.197	-0.101	0.113	0.309
	CAR	0.507	1	0.056	-0.235	0.042	0.472
	NPL	-0.197	0.056	1	-0.013	0.082	0.329
	IETTL	-0.101	-0.235	-0.013	1	-0.045	-0.326
	NIM	0.113	0.042	0.082	-0.045	1	0.089
	CDR	0.309	0.472	0.329	-0.326	0.089	1

Source: study findings

Table 6: Correlation matrix of ROE and CAMEL ratios

		ROE	CAR	NPL	IETTL	NIM	CDR
Pearson Correlation	ROE	1	0.284	-0.281	-0.033	0.088	0.011
	CAR	0.284	1	0.056	-0.235	0.042	0.472
	NPL	-0.281	0.056	1	-0.013	0.082	0.329
	IETTL	-0.033	-0.235	-0.013	1	-0.045	-0.326
	NIM	0.088	0.042	0.082	-0.045	1	0.089
	CDR	0.011	0.472	0.329	-0.326	0.089	1

Source: study findings

The relationships between the study variables shown in the model were evaluated using separate correlations with ROA and ROE with determinants of the profitability ratio of the bank, provided in Tables 5 and 6, respectively.

The results show that ROA was negatively associated with NPL (-0.197) and IETTL (-0.101) in the state-owned banks in Bangladesh due to heavy cumulative losses and capital below the prescribed limit. Moreover, the excessive amount of the classified loan caused NPL to correlate negatively with ROA. The negative coefficient estimates of the association resulted in an inverse relationship with ROA in these ratios. CAR (0.507) was, on the other hand, positively associated with ROA, which indicates that commercial banks in Bangladesh have failed to control their credit risk. NIM (0.113) and CDR (0.309) were also found positively correlated with ROA. The positive coefficient of NIM and CDR in correlation matrix implied a direct relationship with ROA.

ROE had a strong association with CAR (0.284), NIM (0.088) and CDR (0.011) shown in Table 6. It implies that an increase in CAR, NIM and CDR would lead to an increase in ROE, while ROE was negatively associated with NPL (-0.281) and IETTL (0.033). The correlation coefficient clearly indicates that none of the variables is highly associated with ROE. The statistics also suggest that none of the variables is highly correlated in both instances. There seemed to be no multi-collinearity

concerns, therefore. Hence, there appeared to be no multi-collinearity problems.

5.5 Test of multi-collinearity and autocorrelation problem

After testing the collinearity problem and autocorrelation of variables the study found the following statistics shown in table 7.

Table 7: Multi-collinearity and autocorrelation diagnosis

Variables	Collinearity Statistics of explanatory variables	
	Tolerance	VIF
CAR	0.761	1.314
NPL	0.868	1.151
IETTL	0.877	1.140
NIM	0.988	1.012
CDR	0.635	1.574
	Model 2 (ROA)	Model 3 (ROE)
Durbin Watson Statistics	1.499	1.971

Source: study findings

By evaluating the variance inflation factor (VIF) of all the explanatory variables used in both models, it was found that tolerance values greater than 0.1 of all explanatory variables. The results suggest that all variables have a VIF value of less than 10. This result indicates that multi-collinearity was not a problem when selected explanatory variables were used to construct the predicted model in the logistic regression analysis and validate the evidence provided in the matrix of correlation. The Durbin-Watson (DW) statistics are the ratio of the sum of the squares of successive residual differences to the sum of the error squares. The statistics for Durbin-Watson (DW) are in the 0-4 range. A value of 2 or nearly 2 is indicating that there is no first order autocorrelation. An accepted range of Durbin-Watson (DW) statistics is 1.50 – 2.50. The Durbin-Watson statistics of this study are 1.499 and 1.971 for model 2 and 3 respectively; it means that there were no positive autocorrelation between independent variables and ROA; and independent variables and ROE.

5.6 Regression statistics for the models (2) and (3)

Table- 8: Regression result of ROA and explanatory variables

ROA	Coef.	Std. Err.	t	P> t
CAR	0.093	.0595	1.59	0.002**
NPL	-0.039	.0199	-1.56	0.001**
IETTL	0.026	.0251	1.73	0.361
NIM	0.044	.0352	0.93	0.166
CDR	0.012	.0078	1.20	0.020**
_CONS	-0.911	.6061	-1.49	0.059
R-squared = 0.351				
Adjusted R-squared = 0.324				

* denotes Significance at 1% level, ** denotes Significance at 5% level and *** denotes Significance at 10% level.

From Table 8 of regression result, the regression equation can be developed as follows:

$$ROA = - 0.911 + 0.093 CAR - 0.039 NPL + 0.026 IETTL + 0.044 NIM + 0.012 CDR + u_i + \varepsilon_{it} \dots \dots (4)$$

Table 8 & 9 show the regression results for commercial banks, including state-owned, private, Islamic and international commercial banks. Table 8 shows that the relationship of the CAR and CDR were positive with ROA and the coefficients were statistically significant ($p < 0.05$). The coefficients, respectively, were 0.093 and 0.012, which indicates that the relationship might not be very strong. It is clear, however, that the poor positive relationship was due to the Bangladesh bank's compliance with the minimum capital adequacy ratio rule, and most of Bangladesh's commercial banks used the funds raised as deposits effectively. On the other hand, the NPL ratio was negative and significant, indicating that there was a negative correlation between the quality of assets and the ROA. This shows that commercial banks that have failed to monitor their loans appear to be less profitable than those that have paid careful attention to the quality of their assets. NIM and IETTL have a relationship with ROA that is positive and statistically insignificant. In model 2, the R-square value was 0.351, indicating that the influence of the independent variables accounted for 35 percent of the overall variance in the ROA value. The adjusted R square was 0.324. This indicates that the independent variables were collectively related to the dependent variable ROA by 32.4 percent on an adjusted basis.

Table 9: Regression result of ROE and explanatory variables

ROA	Coef.	Std. Err.	t	P> t
CAR	1.688	1.679708	0.99	0.001**
NPL	-0.915	.3474777	-2.25	0.001**
IETTL	0.255	.8790549	0.67	0.740
NIM	1.083	.3973063	2.15	0.214
CDR	-0.06	.1397702	-0.64	0.662
_CONS	-3.513	19.15645	-0.19	0.789
R-squared	= 0.282			
Adjusted R-squared	= 0.277			

* denotes Significance at 1% level, ** denotes Significance at 5% level and *** denotes Significance at 10% level.

From Table 9 of regression result, the regression equation can be developed as follows:

$$ROE = -3.513 + 1.688 \text{ CAR} - 0.915 \text{ NPL} + 0.255 \text{ IETTL} + 1.083 \text{ NIM} - 0.06 \text{ CDR} + u_i + \varepsilon_{it}, \dots (5)$$

From the regression result displayed in table 9, it is revealed that the CAR relationship was positive and significant at 5 percent level with ROE, and NPL was negative relationship with ROE due to weak credit policy, including poor evaluation and insufficient follow-up and monitoring of the distribution of loans eventually. CAR and NPL were significant while the other variables IETTL, NIM, and CD were insignificant. The ratio of IETTL and NIM was positive, but insignificant statistically. Since commercial banks don't concentrate much on credit and investment, CDR was negative but insignificant. To reach the optimum CDR, more credit flows are required. Except for CDR, the coefficients of all explanatory variables are notably large. The R-square value obtained from the regression result of model 3 shown in table 9 is 0.282, which means that 28 percent of the overall variation in the ROE value was due to the effect of the independent variables. The adjusted R square was 0.277. This shows that on an adjusted basis, the independent variables were collectively 27.7% related to the dependent variable ROA.

In a nutshell it is summarized from the regression results of the model-2, CAR and CDR have positive and significant influence on banks performance while IETTL and NIM have positive but insignificant influence on banks performance in Bangladesh. NPL has negative but significant influence on banks performance. In case of model – 3, it is found that only CAR and NPL have significant influences on commercial banks performance of Bangladesh while IETTL, NIM, and CDR have no significant impacts on banks performance of Bangladesh.

5.7 Testing Hypothesis

The result of the ROA model indicates that the capital adequacy ratio, the non-performing loan ratio and the loan-to-deposit ratio were significant, while interest expenses to total loans and the net interest margin were not significant. Hypotheses 1, 2 and 5 have therefore been accepted and have a major impact on the performance of commercial banks in Bangladesh, and by accepting null hypotheses; hypotheses 3 and 4 are rejected. On the other hand, Capital adequacy ratio and non-performing loan ratio were significant in the ROE model, although other variables were not significant in terms of interest expenses to total loans ratio, net interest margin ratio, credit to deposit ratio. Hypotheses 1 and 2 were then accepted, although hypotheses 3, 4 and 5 were rejected by the acceptance of null hypotheses.

6. Conclusion

The major objective of the study was to find the comparative performance under CAMEL framework and identify the influencing variables on banks performance of different ownership structured commercial banks in Bangladesh. To do this, the study has adopted a five year span panel data set of 25 commercial banks under different ownership structure. A ratio analysis and an econometric model were considered for estimating the study objectives. The study found that state-owned commercial banks' overall performance was not sound, but most of the performances of private, Islamic and foreign commercial banks were sound. The study revealed that the continued deterioration in the financial health of state-owned commercial banks was exacerbated by high overhead costs, political interventions, poor management and low collateral quality. The values set for the financial ratios demonstrate that in Bangladesh, private, Islamic and foreign commercial banks are also not so strong as to handle potential large-scale balance sheet shocks. In addition, in both ROA and ROE performance measurements, the CAR and NPL are identified as significant determinants of bank performance. Further, when using ROA as a performance measure, the CDR is shown to be a significant determinant of bank performance. The rest of the variables, on the other hand, are not known to be essential determinants of bank performance in either the ROA or the ROE model. The findings of the study will lend a strong policy support to the concern authorities for improving the performances of commercial banks of Bangladesh.

Conflict of interests

The author declares no conflict of interest.

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