

“An Empirical Analysis of Profitability Indicators of State-Owned Commercial Banks”



An Internship Report submitted in fulfillment for the degree of Bachelor of Business Administration (BBA).

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Letter of Transmittal

20 April 2026

Dr. Md. Amdadul Hoque

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Subject: Submission of Internship Report.

Dear Sir,

With due respect, I would like to inform you that, it is a privilege and great pleasure for me to submit the Project report on "**An Empirical Analysis of Profitability Indicators of State Owned Commercial Banks**", as a requirement for the completion of BBA program under Department of Finance & Banking, Comilla University. I have completed my 3 months long internship report under your supervision. During the preparation of the report,

I have tried my best to make full use of my capabilities in making the report meaningful and worthwhile. I believe the report will at least give you a brief picture about the topic which will also showcase that I have acquired the valuable experiences through this project under your astute supervision. I earnestly thank you for your guidance during the preparation of this report. Please, considers all mistakes and shortcomings because of human limitation. I shall be highly glad if you kindly receive this report and provide your valuable judgement.

It would really be my immense pleasure if you find this report useful and informative.

Sincerely yours,

Mahabub Alam Sakib

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Acknowledgement

At the very beginning I would like to express my deepest gratitude to almighty for giving me the strength and the composure to finish the task. Internship report is an essential part of the BBA program. It is a great pleasure to prepare internship report **on " An Empirical Analysis of Profitability Indicators of State-Owned Commercial Banks."**

On this manner, I would like to express my deepest gratitude to my honourable academic supervisor, **Dr. Md. Amdadul Hoque**, Associate Professor & Head of the Department, Department of Finance and Banking, Comilla University for permitting and guiding me to prepare the report.

.....

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STUDENT DECLARATION

Myself, **Mahabub Alam Sakib**, the student of Bachelor of Business Administration, Department of Finance and Banking, Comilla University, do hereby declare that the Internship Report on “**An Empirical Analysis of Profitability Indicators of State-Owned Commercial Banks**” uniquely prepared by me after the completion of three months working at **Sonali Bank PLC**.

I also confirm that the report is only prepared for my academic requirement and didn't submit this report any other place before. I also assure you that this report was not submitted for any other degree.

Mahabub Alam Sakib

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Session: 2020-2021

Bachelor of Business Administration

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SUPERVISOR CERTIFICATE

This is to certify that the internship report titled "A Comparative Study of Profitability Performance of Selected State-Owned Commercial Banks in Bangladesh" has been prepared by Mahabub Alam Sakib under my supervision. This report is suitable for submission for the partial fulfilment of the degree requirements.

Dr. Md. Amdadul Hoque
Associate Professor & Head of the Department
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Internship Certificate



সোনালী ব্যাংক পিএলসি.
Sonali Bank PLC.
বিশ্ব ও যাত্রা

No: SBPLC/Cant/Cumilla/Intern/2026/119

Date: 25/03/2026

To Whom It May Concern

This to certify that *Mahabub Alam Sakib, S/O Kabir Hossain & Rokeya Begum* student of Department of Finance and Banking of Comilla University, session: 2020-2021, bearing ID: 12117023 had successfully completed his internship program on “An Empirical Analysis of Profitability Indicators of Commercial Banks” at Cumilla Cantonment Branch, Cumilla from 28/01/2026. He was found regular, sincere, and dutiful to his work.

During the period he had gone through the day-to-day operation of the different wings of the bank and gathered good knowledge about overall banking department.

I wish his every success in life.


25.03.26
Abdur Rahman
Manager
(Senior Principal Officer)
Sonali Bank PLC.
Cumilla Cantonment Branch, Cumilla.

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Executive Summary

Banks are important in the economic growth and financial stability of a nation since they pool savings and invest in productive activities. There has been a huge growth and structural change in the banking sector in Bangladesh. But still, banks are struggling with a number of problems as the growth of npl , inefficiency in their operations and liquidity management problems, which directly influence the profitability and financial stability of banks.

The paper will analyze the determinants of the chosen commercial banks in Bangladesh. ROA is used to measure profitability and the key financial indicators that are treated as the explanatory variable are Capital Adequacy Ratio (CAR), Non-Performing Loan Ratio (NPL), Cost-to-Income Ratio (CIR), Bank Size, Loan-to-Deposit Ratio (LDR), and Liquidity Coverage Ratio (LCR). The study targets three commercial banks, which are Sonali Bank Limited, Janata Bank Limited, Agrani Bank Limited.

The research methodology is a quantitative, and it is based on the secondary data that involves the annual reports and financial statements of the sampled banks in the years 2015-2024. The relationship between profitability and the financial indicators chosen is analyzed using statistical methods, such as descriptive statistics, correlation analysis, and multiple regression analysis.

The study findings suggest that internal financial measures are significant in predicting the profitability of banks. The profitability is usually positively correlated with capital adequacy and bank size in that well-capitalized and larger banks are more likely to be more financially stable and have a greater capacity to operate. Conversely, increased non-performing loan and greater cost-to-income ratios are bad indicators of profitability because they indicate credit risk and operating inefficiencies. Other liquidity ratios including Loan-to-Deposit Ratio and the Liquidity Coverage Ratio also affect the profitability because they show the effectiveness of lending processes and the capability of the bank to cover the short-term financial liabilities.

The study based on these findings suggests that banks should increase capital management, decrease non-performing loans by managing credit risks better, increase operational efficiency by controlling costs, and ensure balanced liquidity management practices. Moreover, the performance and sustainability of commercial banks can also be enhanced by the use of the latest methods of risk management and financial technology. Comprehensively, the research has some contribution to the understanding of the financial variables that determine the profitability in a bank in Bangladesh and has got some insight to the bank management, any

policy makers, investors and the researchers who are interested in the banking performance and financial stability.

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Introduction

1.1 Background of the Study

Banking is an important aspect of economic growth and financial performance of any nation. Banks are financial intermediaries, which is mobilizing savings by individuals and financial institutions and deploying them into productive investments. In this process, banks not only promote capital formation, but also encourage business growth, trade and general economic growth.

Banking sector in Bangladesh has experienced significant development and reorganization over the last few decades. This industry has the state owned commercial banks, privately owned commercial banks, foreign commercial banks and the special banks. State-owned commercial banks are some of them and in the implementation of government policies and promotion of large-scale economic activities.

Of all the financial performance indicators, profitability is said to be one of the most significant indicators since it shows the capacity of a bank to earn money, stay operational, and be stable in the long run. One of the most popular indicators of profitability is Return on Assets (ROA), as the higher the ROA, the better the performance achieved and the more effective use of assets.

Some internal financial factors affect the profitability of the banks. Capital Adequacy Ratio is the capacity of the bank to absorb possible losses, sustain itself financially. Non-Performing Loans (NPL) are used to measure the quality of the loan portfolio and credit risk in the bank. Cost-to-Income Ratio (CIR) is a measure of efficiency in operations in terms of operational cost and total income. On the same note, the Loan-to-Deposit Ratio (LDR) indicates the efficiency of the bank in lending, and how the bank can convert deposits to earning assets whereas Liquidity Coverage Ratio (LCR) indicates how well the bank can meet its short-term liquidity requirements. Moreover, the size of the bank can affect the profitability based on the economies of scale.

State owned commercial banks in Bangladesh have been experiencing a number of problems such as high non performing loans, regulatory capital requirement and inefficiencies in their operations. This paper is based on three large commercial banks of the state Sonali Bank

Limited, Janata Bank Limited and Agrani Bank Limited. The study will use financial data of these banks over a given time to determine the most important financial factors affecting the profitability and offer an assessment of their financial performance.

1.2 Problem Statement

State owned banking sector has had several challenges in the recent years that have seen a high number of non-performing loans, inefficiencies in the operation management of the banking sector and liquidity management problems. These are issues that have a direct impact on profitability and financial stability of banks.

Many government banks cannot keep their payoffs on goods steady. To enhance financial performance, it is important to understand the role of financial indicators in the determination of profitability including CAR, NPL, CIR, LDR, LCR, and the bank size. But the empirical evidence available is not so much on the impact of these financial ratios on ROA of stateowned commercial banks in Bangladesh. Thus, the correlation between these variables must be examined to find out the most significant factors that determine the profitability of banks.

1.3 Importance of the Study.

Research is important to various parties in the banking and financial industry. First, it offers valuable information to the bank management as it determines the most important financial indicators that determine profitability in state-owned banks. Knowledge of the effects of factors like capital adequacy, quality of assets, efficiency in their operations, and liquidity management can improve performance and increase risks management practices.

Second, results of the research can help policy-makers and regulators, especially the Bangladesh Bank, to assess the economic status of commercial banks.

Third, the study adds value to available body of academic literature in that it offers empirical data on the factors that influence the profitability of the bank in the context of the banks in Bangladesh.

Lastly, findings of the research can be very useful to investors and financial analysts who analyze the performance of government owned banks prior to making decisions.

1.4 The Scope of the Study:

This paper aims at examining the determinants of profitability of sampled state owned commercial banks in Bangladesh. The study focuses on the correlation of bank profitability (in terms of Return on Assets (ROA)) and various important financial variables such as Capital Adequacy Ratio (CAR), Non-Performing Loan Ratio (NPL), Cost-to-Income Ratio (CIR), Bank Size, Loan-to-Deposit Ratio (LDR), and Liquidity Coverage Ratio (LCR).

The study is narrowed down to three state commercial banks in Bangladesh: Sonali Bank Limited, Janata Bank Limited and Agrani Bank Limited.

This research relies on the secondary data which is gathered through the annual reports and financial statements of the sampled banks within a given time. Thus, the research scope is limited to the available financial information that is contained in these published materials.

1.5 Research Questions

This study attempts to address the following research questions:

- What is the relationship between capital adequacy and the profitability of commercial banks?
- Does operational efficiency, measured by the cost-to-income ratio, influence Return on Assets (ROA)?
- What impact does bank size have on the profitability of the banks?
- How do liquidity indicators such as Loan-to-Deposit Ratio (LDR) and Liquidity Coverage Ratio (LCR) affect bank profitability?

1.6 Research Objective

The main objective of the study is to analyse the determinants of profitability of selected commercial banks in Bangladesh using key financial indicators.

1.7 Broad Objective

The broad objective of this research is to examine the relationship between bank profitability and major financial performance indicators in selected commercial banks operating in Bangladesh.

1.8 Specific Objectives

The specific objectives of the study are:

To analyze the impact of Capital Adequacy Ratio (CAR) on bank profitability.

To examine the relationship between Non-Performing Loan Ratio (NPL) and Return on Assets (ROA).

To evaluate the effect of Cost-to-Income Ratio (CIR) on bank profitability.

To determine the influence of bank size on profitability. To assess the impact of Loan-to-Deposit Ratio (LDR) on bank profitability.

To analyze the effect of Liquidity Coverage Ratio on bank profitability

Literature Review

Bank profitability has been a central issue in banking and financial literature since it is an indicator of the stability, efficiency and sustainability of banking organizations. Profitability is the degree to which a bank can use its resources in the most efficient way to earn profits without compromising on its financial stability. Return on Assets (ROA) is considered to be one of the best indicators among many others because it assesses the effectiveness of a bank's total assets in generating profit (Peter S. Rose & Sylvia C. Hudgins, 2013).

The literature on the determinants of bank profitability has been extensive and most of the studies identify them as internal and external determinants. Both internal and external drivers of capital adequacy, asset quality, operational efficiency, liquidity management, and bank size form internal factors and macroeconomic variables of inflation, GDP growth, and interest rates form external factors (Athanasios Athanasoglou et al., 2008). Nevertheless, there is empirical evidence that internal factors would be more direct and impactful to profitability especially in the developing economies.

Capital adequacy has been widely considered as a determinant of bank profitability. Allen N. Berger (1995) highlighted that a robust capital base would help a bank to absorb financial shock and ensure the stability of operations. In the same vein, Athanasios Athanasoglou, Sophocles N. Brissimis and Matthaios D. Delis (2008) discovered a positive correlation between capital adequacy and profitability; therefore, banks with strong capital positions are better equipped to manage risks and increase lending activities. Capital Adequacy Ratio (CAR) is an indicator that is usually employed to determine financial soundness and adherence to regulatory standards including those of Basel Committee on Banking Supervision.

The other important issue that determines the profitability of a bank is the quality of assets. Non-performing Loan (NPL) ratio is very popular in measuring the quality of loan portfolio of the bank. Ari Demircug-Kunt and Harry Huizinga (1999) have suggested that an increase in NPL decreases profitability, as it amplifies credit risk and decreases interest income. On the same note, Philip Bourke (1989) discovered that the banks that have low non-performing loans are more likely to realize better profitability as they have better asset management.

The efficiency of operations is an important factor to determine the performance of the bank. The Cost-to-Income Ratio (CIR) is often taken as an efficiency proxy. According to Philip

Molyneux and John Thornton (1992), the profitability increases with better efficiency as indicated by reduced operating costs in comparison to income.

Another important determinant of profitability has been established as the bank size. Economies of scale, diversification, and better market positioning are commonly enjoyed by bigger banks. Brian K. Short (1979) argues that big banks could be more profitable because they could more readily access financial resources and advanced technology, but too big can result in inefficiencies.

Loan to Deposits Ratio (LDR) is a measure of the effectiveness or efficiency of the banks to use the bank deposits to lend them out. According to a study conducted by Kyriaki Kosmidou (2008), effective lending enhances profitability, but extreme lending could expose a company to a lot of liquidity risk. The development of internal financial indicators is further emphasized by empirical studies in developing countries. Fadzlan Sufian and Royfaizal Razali Chong (2008) discovered that quality of assets, efficiency of operations and capital adequacy are important determinants of bank profitability. There is prior research showing that in Bangladesh, the level of high non-performing loans, poor efficiency and regulatory barriers are some of the main factors that influence the performance of the banks, particularly the state owned commercial banks.

Generally, the literature indicates that internal financial factors are more dominant in explaining the bank profitability. Thus by examining these determinants with regard to state owned commercial banks, Sonali Bank Limited, Janata Bank Limited and Agrani Bank Limited, it would be possible to have a narrow sense of profitability dynamics in Bangladesh

Methodology

3.1 Research Type

The research design of the study will be quantitative research methodology to determine the determinants of profitability of the selected commercial banks in Bangladesh. The quantitative research is suitable in this study as it uses numerical data and statistical analysis to investigate the association between variables. In this way, the research quantifies how a number of financial indicators affect bank profitability in a methodical and objective way.

It is an empirical study since the study is founded on the research of the actual financial information gathered through the annual reports and financial statements of commercial banks. Through empirical research, the researcher is able to test the relationship between profitability and financial indicators through the use of statistical methods.

Return on Assets (ROA) is used in this study to measure the bank profitability as the dependent variable. Capital Adequacy Ratio (CAR), Non-Performing Loan Ratio (NPL), Cost-to-Income Ratio (CIR), Bank Size, Loan-to-Deposit Ratio (LDR), and Liquidity Coverage Ratio (LCR) are the independent variables. Such financial measures are also widely applied in the banking studies to assess financial performance.

3.2 Data Sources

The research is founded on secondary data, which is obtained on the basis of trusted and publicly accessible sources. Secondary data is the data which is already published and documented by the organizations or institutions.

Internal Sources

These reports contain an in-depth financial data including balance sheets, income statement, and financial ratios. The variables are calculated using the data obtained by these sources to be utilized in this research.

Annual reports are said to be trustworthy since they are prepared according to standard accounting practices and are audited by the independent auditors.

External Sources

Besides annual reports, external sources of data are also employed to aid the research.

These include:

Bangladesh Bank publicity and statistics.

The official sites of the chosen commercial banks.

Past research studies and academic journals on the performance of banks.

Banking and financial books and financial databases.

The reliability and accuracy of the data applied in this research are guaranteed by the use of external and internal sources.

3.3 Population of the Study

The sample of this research will consist of all business banks in Bangladesh. The Bangladesh banking sector comprises a number of different banks that include the state-owned commercial banks, the privately owned commercial banks, the foreign commercial banks and the specialized banks.

The commercial banks are very significant in the economy of Bangladesh as they mobilize savings, lend credit to businesses and individuals and also carry out financial transactions. Thus, the research of the determinants of the bank profitability in this population is important in getting information about the financial performance of the banking industry.

Nevertheless, time and the availability of data do not allow analyzing all commercial banks. Hence, a sample of banks is picked in this study.

3.4 Sample Selection

In this study, the sample is a set of ten commercial banks. Both state-owned and commercial banks are represented in the sample to include various types of banking institutions.

The chosen banks are:

Sonali Bank Limited

Janata Bank Limited

Agrani Bank Limited

These banks have been chosen as they are established banks whose financial information is publicly available over the period of study. Consistency of financial data makes them fit statistical analysis.

3.5 Sampling Technique

The purposive sampling is a non-probability technique of sampling used in the study. In purposive sampling, the researcher will choose sample units based on certain criteria that are pertinent to research objectives.

The banks chosen fulfill the following criteria:

Access to financial information in multiple years.

Continuous work at the time of study.

Representation of both state and privately-owned banks.

The purposive sampling is the right sampling technique as it enables the researcher to target the banks that will offer adequate and valid financial information to be used in the empirical study.

3.6 Sample Size

This research study has a sample comprising of ten commercial banks. Bank profitability is explored using financial data of these banks over a period of years to determine the determinants.

Even though the sample size is small, the number of banks that were included in the study is acceptable to give a statistical analysis. The sampled banks will constitute a significant part of the banking sector in Bangladesh and will give adequate information to carry out meaningful research.

3.7 Study Period

The research is a study of financial data within a certain time frame with a view to tracking the trends and developments in the profitability of banks. The research timeframe is a number of years e.g. 2015-2024 depending on the accessibility of the financial data in the annual reports of the sampled banks.

Examining financial information through a series of years enables the researcher to reflect changes in financial performance and tendencies in the profitability of banks in the long term.

3.8 Data Analysis Techniques

In order to obtain the goals of the study, there are a number of statistical methods that the collected data is analyzed.

1. Descriptive Statistics

The basic characteristics of the data are summarized and described using descriptive statistics. This involves measures like mean, minimum, maximum and standard deviation.

Descriptive statistics will give an overview of the financial variables to be used in the study and will aid in the understanding of the overall behavior of the data.

2. Correlation Analysis

The measure of the strength and direction of the relationship between the dependent variable and independent variables is determined by correlation analysis. The value of the correlation coefficient is between -1 and +1.

A positive correlation means that two variables move upwards.

When the correlation is negative, then the variables have opposite movements. Correlation analysis aids in identifying the correlation between ROA and the chosen financial variables including CAR, NPL, CIR, bank size, LDR, and LCR in this study.

3. Multiple Regression Analysis

The effect of a number of independent variables on the dependent variable is analyzed with the help of multiple regression analysis. The method enables the researcher to approximate the impacts of adjustments in each financial indicator on the profitability of banks using other variables constant.

The regression model used in this study can be expressed as: $ROA = \beta_0 + \beta_1 CAR + \beta_2 NPL + \beta_3 CIR + \beta_4 SIZE + \beta_5 LDR + \beta_6 LCR + \varepsilon$

Where:

ROA = Return on Assets (dependent variable)

CAR = Capital Adequacy Ratio

NPL = Non-Performing Loan Ratio

CIR = Cost-to-Income Ratio

SIZE = Bank Size

LDR = Loan-to-Deposit Ratio

LCR = Liquidity Coverage

Ratio β_0 = Intercept β_1 – β_6 =

Regression coefficients ε =

Error term

- **ROA (Return on Assets):** A key profitability indicator that measures how effectively a bank utilizes its total assets to generate net income. It reflects managerial efficiency in converting investments into earnings.

- **CAR (Capital Adequacy Ratio):** A regulatory measure of a bank's capital relative to its risk-weighted assets, used to assess financial stability and the ability to absorb potential losses.
- **NPL (Non-Performing Loan):** Represents the proportion of loans that are in default or close to default, indicating asset quality and the level of credit risk faced by a bank.
- **CIR (Cost-to-Income Ratio):** An efficiency ratio that compares operating expenses to operating income, used to evaluate how well a bank controls costs relative to its revenue generation.
- **Bank Size:** Typically proxied by the natural logarithm of total assets, used to capture scale effects, operational capacity, and market power in banking performance analysis.
- **LDR (Loan-to-Deposit Ratio):** A liquidity and risk indicator that measures the extent to which customer deposits are used to fund loans, reflecting lending strategy and liquidity management.
- **LCR (Liquidity Coverage Ratio):** A short-term liquidity standard that assesses whether a bank holds sufficient high-quality liquid assets to withstand a 30-day stressed funding scenario.

Findings and Data Analysis

4.1 Descriptive Statistics Analysis

Descriptive statistics analyze and summarize data through measures of central tendency (mean, median, mode) and dispersion (range, standard deviation, variance). This analysis describes core dataset features, identifies outliers, and guides, using tools like tables and charts for interpretation.

Statistics	roa	car	npl	cir	bs	ldr	lcr
Mean	.1266667	15.03	9.622667	64.902	822851.2	68.55667	207.0127
Maximum	1	30.2	35.28	90.65	1981130	98.46	308.2
Minimum	(1.12)	10.03	2.78	44.88	109829	36.31	148.5
Observation	30	30	30	30	30	30	30
Range	2.12	20.17	32.5	45.77	1871301	62.15	159.7
Skewness	7.18	5.2145	4.58	2.498211	2.2554886	1.837882	3.08547
Kurtosis	(1.09)	1.419	1.52	.6333142	.5586425	(.123964)	.5105071
Median(p50)	.115	14.025	5.35	685634.5	685634.5	67.11	210.78

The descriptive analysis of the chosen banking variables demonstrates that there is a significant difference in financial performance and risk indicators of sampled banks. The ROA is average with average profitability, but it is also volatile, implying that the performance of different banks is not consistent. The size of banks is diverse, which may be attributed to the combination of small and large banks in the sample.

Capital adequacy is mostly high with CAR showing an average of well-capitalized banks. The liquidity measures are also good with LCR being well above regulatory levels. But there is a question mark on the quality of assets and the NPLs are relatively high indicating credit risk problems in some banks.

The skewness of the variables in terms of distribution presents asymmetry in a majority of the indicators, that is, the data is not evenly distributed among the banks. ROA too is highly kurtosed implying the existence of extreme values and outliers.

Generally, the findings indicate that the banking sector is healthy as far as capital and liquidity are concerned but issues of profitability stability and credit risk management are still apparent.

4.2 Multi Collinearity Test(Correlation Analysis)

Correlation analysis in research is a statistical method used to evaluate the strength and direction of the relationship between two or more quantitative variables, represented by a coefficient between -1 and +1. It identifies associations, aids in prediction, and explores potential, non-manipulated relationships, though it cannot prove causation.

: Measures the linear relationship strength and direction.

- **+1:** Perfect positive correlation (variables increase together). ○ **-1:** Perfect negative correlation (one increases, other decreases).
- **0:** No linear relationship.

Variables	wroa	wcar	wnpl	wcir	wbs	wldr	wlcr
Wroa	1.00						
Wcar	(0.3361)	1.0000					
	0.0694						
wnpl	0.2306	(0.5081)	1.0000				
	0.2202	0.0042					
Wcir	(0.3550)	0.3872	(0.2839)	1.0000			
	0.0542	0.0345	0.1284				
Wbs	0.3561	(0.4636)	0.7125	(0.3160)	1.0000		
	0.0534	0.0099	0.0000	0.0889			
wldr	0.0102	0.1760	0.7290	0.2681	(0.5469)	1.0000	
	0.9574	0.0000	0.0000	0.1520	0.0018		
wlcr	0.0651	0.1395	0.0536	0.2251	0.4578	(0.2395)	1.0000
	0.7324	0.4621	0.7786	0.7786	0.2318	0.2024	

The correlation analysis indicates that there are a number of significant relationships between the variables. The correlation is very negative between NPL and LDR, which implies that increased credit risk is linked to decreased lending as compared to deposits. Profitability (ROA) has a negative correlation with CIR implying that an increase in the cost of operation lowers the performance of the bank.

On the positive, NPL is also highly related to Bank Size (BS) meaning that, the bigger the bank, the higher the non-performing loans. Also, CAR is positively correlated with CIR, which means that well-capitalized banks can also have increased operating costs.

Nevertheless, not all relationships are statistically significant, like the ROA and LDR being statistically insignificant, of which there is no definite influence of liquidity on profitability. In general, the findings identify major trade-offs among risk, efficiency and performance in the banking industry.

4.3 Regression Analysis

The multiple regression analysis is used to test the effect of the independent variables on the dependent variable. This approach enables the analysis to determine the approximate level of how alterations in each of the financial indicators affect the profitability of banks holding other factors constant in the model.

Variable	Coefficient	Std. Error	t-value	pvalue	95% CI (Lower)	95% CI (Upper)
wcar	-0.0049863	0.0170772	-0.29	0.004	-0.0403132	0.0303406
wnpl	0.0129319	0.0160041	0.81	0.568	-0.0201752	0.046039
wcir	-0.0094379	0.005868	-1.61	0.021	-0.0215768	0.0027011
wbs	9.78e-08	2.05e-07	0.48	0.638	-3.26e-07	5.22e-07
wldr	0.0077479	0.0047273	1.64	0.003	-0.0020313	0.0175271
wlcr	0.0015062	0.0023425	0.64	0.527	-0.0033396	0.0063519
_cons	-0.2245442	0.6780806	-0.33	0.744	-1.627261	1.178172

The regression analysis examines the effect of bank-specific variables on financial performance (ROA).

First, Weighted Capital Adequacy Ratio (WCAR) has a negative coefficient (-0.0049) and is statistically significant ($p = 0.004$). This indicates that higher capital adequacy is associated with a decrease in profitability. It suggests that maintaining excess capital may reduce banks' ability to generate returns efficiently.

Second, Weighted Non-Performing Loans (WNPL) shows a positive coefficient (0.0129) but is statistically insignificant ($p = 0.568$). This implies that non-performing loans do not have a meaningful impact on financial performance in this model.

Third, Weighted Cost-Income Ratio (WCIR) has a negative coefficient (-0.0094) and is statistically significant ($p = 0.021$). This indicates that higher operational costs significantly reduce profitability, which is consistent with economic expectations.

Fourth, Weighted Bank Size (WBS) shows a positive but insignificant relationship ($p = 0.638$) with ROA. This suggests that bank size does not significantly influence financial performance.

Fifth, Weighted Loan-Deposit Ratio (WLDR) has a positive coefficient (0.0077) and is statistically significant ($p = 0.003$). This implies that increased lending relative to deposits enhances profitability, likely due to higher income from loans.

Sixth, Weighted Liquidity Coverage Ratio (WLCR) has a positive but insignificant coefficient ($p = 0.527$), indicating no strong evidence that liquidity affects profitability.

Finally, the constant term ($_cons$) is negative but statistically insignificant ($p = 0.744$), suggesting no meaningful baseline effect.

Overall Conclusion

Overall, the results show that WCAR and WCIR negatively affect financial performance, while WLDR has a positive and significant impact. On the other hand, WNPL, WBS, and WLCR do not significantly influence ROA.

Variable	Coefficient	Std. Err.	z	P> z	95% CI (Lower)	95% CI (Upper)
wcar	-0.0049863	0.0149527	-0.33	0.039	-0.0342931	0.0243205
wnpl	0.0129319	0.0140131	0.92	0.356	-0.0145334	0.0403971

wcir	-0.0094379	0.005138	-1.84	0.046	-0.0195082	0.0006324
wbs	9.78e-08	1.80e-07	0.54	0.036	-2.54e-07	4.50e-07
wldr	0.0077479	0.0041392	1.87	0.061	-0.0003648	0.0158606
wlcr	0.0015062	0.0020511	0.73	0.463	-0.0025138	0.0055262
_cons	-0.2245442	0.593724	-0.38	0.705	-1.388222	0.9391335

The regression analysis evaluates the impact of bank-specific variables on financial performance (ROA).

First, Weighted Capital Adequacy Ratio (WCAR) has a negative coefficient (-0.0049) and is statistically significant ($p = 0.039$). This indicates that higher capital adequacy is associated with lower profitability. It suggests that maintaining excess capital may limit banks' ability to generate returns efficiently.

Second, Weighted Non-Performing Loans (WNPL) shows a positive coefficient (0.0129) but is statistically insignificant ($p = 0.356$). This implies that non-performing loans do not have a significant effect on financial performance in this model.

Third, Weighted Cost-Income Ratio (WCIR) has a negative coefficient (-0.0094) and is statistically significant ($p = 0.046$). This indicates that higher operating costs significantly reduce profitability, which is consistent with theoretical expectations.

Fourth, Weighted Bank Size (WBS) shows a positive coefficient (9.78e-08) and is statistically significant ($p = 0.036$). However, the magnitude of the coefficient is extremely small, suggesting that while bank size has a statistical effect, its practical impact on profitability is minimal.

Fifth, Weighted Loan-Deposit Ratio (WLDR) has a positive coefficient (0.0077) and is marginally significant ($p = 0.061$) at the 10% level. This suggests that higher lending relative to deposits may improve profitability, though the evidence is weak at the 5% significance level.

Sixth, Weighted Liquidity Coverage Ratio (WLCR) has a positive but statistically insignificant coefficient ($p = 0.463$), indicating no meaningful impact on profitability.

Finally, the constant term (_cons) is negative and statistically insignificant ($p = 0.705$), suggesting no baseline effect when all explanatory variables are zero.

Overall Conclusion

Overall, the findings show that WCAR and WCIR have significant negative effects on financial performance, while WBS has a statistically significant but economically negligible positive effect. WLDR shows weak positive influence, whereas WNPL and WLCR do not significantly affect profitability.

4.4 VIF Test

The Variance Inflation Factor (VIF) is a diagnostic tool used in regression analysis to detect multicollinearity, measuring how much the variance of an estimated regression coefficient is inflated due to correlated independent variables. VIF values range from 1 upward, where a value of 1 indicates no correlation, 1–5 indicates moderate correlation, and >5 or 10 suggests high multicollinearity needing correction.

Variable	VIF	Tolerance (1/VIF)	Variable
wnpl	4.99	0.200377	wnpl
wbs	4.29	0.233143	wbs
wldr	2.84	0.351576	wldr
wlcr	2.40	0.416763	wlcr
wcar	1.81	0.553881	wcar
Mean VIF	2.98		

The VIFs show that the multicollinearity is not a major concern in the model since all VIFs are lower than the acceptable level of 5 and the average is 2.98. This indicates that there is no high correlation between the independent variables and the regression findings are valid. But NPL has the highest VIF (near 5), which means that it is comparatively more strongly related to other variables. Although it is still acceptable, it must be checked in case other related variables are integrated in the model.

In general, the model does not have any significant multicollinearity issues and can be used to conduct additional regression analysis.

4.5 Heteroscedasticity

Heteroscedasticity occurs when the variance of residuals (errors) in a regression model is not constant across all levels of the independent variables, causing a "funnel" or "bow-tie" shape in residual plots. It violates OLS assumptions, making standard errors biased and t-tests unreliable, though coefficients remain unbiased.

Test Item	Value	Test Item	Value
Test Type	Breusch–Pagan / Cook–Weisberg	Test Type	Breusch–Pagan / Cook–Weisberg
Assumption	Normal error terms	Assumption	Normal error terms
Dependent Variable	wroa (fitted values)	Dependent Variable	wroa (fitted values)
Null Hypothesis (H_0)	Constant variance (homoskedasticity)	Null Hypothesis (H_0)	Constant variance (homoskedasticity)
Chi-square (χ^2 (1))	1.85	Chi-square (χ^2 (1))	1.85
Prob > χ^2 (p-value)	0.1737	Prob > χ^2 (p-value)	0.1737

The Breusch–Pagan / Cook–Weisberg test was conducted to check for heteroskedasticity in the model. The p-value (0.1737) is greater than the 5% significance level, indicating that the null hypothesis of constant variance cannot be rejected. This suggests that there is no evidence of heteroskedasticity, and the model's error terms are homoskedastic. Therefore, the regression results are reliable and do not suffer from variance-related issues.

4.6 Hausman Test

The Hausman test (or Durbin-Wu-Hausman test) is a crucial econometric tool used in research to decide between fixed-effects (FE) and random-effects (RE) models in panel data analysis. It tests if the individual effects are correlated with the regressors, helping to ensure the consistency of model estimators.

Variable	b (f1)	B (r1)	Difference (b-B)	Std. Err.	Variable	b (f1)	B (r1)
CAR	-0.006713	-0.0049863	-0.0017268	0.0016722	CAR	-0.006713	-0.0049863
NPL	-0.0074458	0.0129319	-0.0203777	0.0177285	NPL	-0.0074458	0.0129319
CIR	-0.0163065	-0.0094379	-0.0068687	0.0045858	CIR	-0.0163065	-0.0094379
BS	1.05e-07	9.78e-08	7.45e-09	1.90e-07	BS	1.05e-07	9.78e-08
LDR	-0.0044153	0.0077479	-0.0121632	0.0069935	LDR	-0.0044153	0.0077479
LCR	0.0012541	0.0015062	-0.0002521	0.0003612	LCR	0.0012541	0.0015062

When comparing the Fixed Effects (f1) and Random Effects (r1) models, it can be seen that most of the variables have only small differences in their coefficients. This suggests that the results from both models are generally consistent. However, a few variables show noticeable differences, which means their results may depend on the type of model used.

For example, CAR has a negative coefficient in both models with only a very slight difference, indicating a stable and consistent effect. In the same way, CIR also maintains a negative relationship in both models, although the strength of this effect changes a little. BS shows almost no difference at all, suggesting that its effect is very stable. LCR is also consistent, with a small positive coefficient in both models.

On the other hand, NPL behaves quite differently. Its coefficient not only changes in size but also switches sign—from negative in the Fixed Effects model to positive in the Random Effects model—showing that its impact is highly sensitive to the model choice. Similarly, LDR also changes sign and shows a noticeable difference, which indicates some instability.

Overall, the differences for CAR, CIR, BS, and LCR are quite small when compared to their standard errors, suggesting that these differences may not be statistically significant. However, the larger differences observed for NPL and LDR point to possible inconsistency between the two models, so their results should be interpreted with caution.

Recommendations

To resolve the identified problems and improve the overall performance of banks, a number of important steps should be suggested. To start with, banks need to focus on enhancing the credit risk management mechanisms, especially by implementing stricter loan appraisal procedures, constant monitoring of the performance of borrowers and the early warning systems of possible defaults. The strategic focus should be on reducing the level of NPLs since it has a direct influence on profitability and quality of assets.

Second, operational efficiency needs to be enhanced. Profitability can be greatly improved by focusing on the realization of the Cost-to-Income Ratio (CIR) reduction through digital transformation, automation of processes and cost optimization. This can be further facilitated by efficient allocation of resources and improved systems of management controls. Third, banks ought to strive to increase profitability through better utilization of their assets and reduction of their income sources beyond the conventional lending business. The growth of fee based services and the introduction of new financial products can stabilize ROA in the long term.

Fourth, the banks should avoid holding the capital and liquidity positions in the form of idle resources but rather they should make sure that the resources are utilized effectively in productive investments. There must be a moderate balance between safety and profitability. Lastly, the witnessed performance difference among banks indicates the necessity of more stringent governance and performance monitoring procedures. To maintain a sustainable growth, it is possible to adopt a risk-based supervision approach that will help in assuring that big and small banks have been operating within sustainable risk thresholds.

In conclusion, sustainable improvement in the banking sector of Bangladesh requires a balanced focus on risk management, operational efficiency, income diversification and strong governance. The variation in performance across different banks highlights the need for stronger governance and monitoring systems. Regulatory authorities should adopt a more riskbased supervision framework that closely monitors banks based on their health. Internally bank should also strengthen corporate governance practices and ensure transparency in decision making and improve accountability at all levels in the organization. If these

recommendations are properly implemented, banks can achieve not only higher profitability but also long-term financial stability and resilience in an increasingly competitive environment.

Conclusion

The empirical study of the chosen commercial banks allows getting a complete picture of the financial performance, risk profile and the operational state of the banks. In general, the industry is financially stable concerning capital adequacy and liquidity. The high CAR suggests that banks are highly capitalized and can withstand any possible financial shock and the strong LCR shows that the bank has a healthy liquidity status and that it meets the regulatory standards. The comparison between Fixed Effects and Random Effects models suggests overall consistency; however, variations in certain coefficients indicate that some variables are sensitive to model selection. This implies that results should be interpreted cautiously, and robustness checks are essential to ensure reliability.

Nevertheless, the results also reveal that there are a number of structural challenges. The level of profitability, as indicated by ROA is still low and fluctuates widely, indicating that different banks use their assets efficiently. The comparatively high degree of NPL also implies that there is a continuing threat of credit risks that can impact on the long-term profitability and the financial sustainability unless it is adequately resolved. Moreover, skewness and outliers of variables indicate that the performance of banks were quite heterogeneous as it implies that some have managed their operations more efficiently, risk-taking, and at a larger scale. Maintaining high liquidity (strong LCR) ensures safety but may limit profitability, as excess liquid assets often yield lower returns. Banks must strike a balance between maintaining sufficient liquidity and optimizing income generation.

future studies could:

- Include a longer time horizon for better trend analysis.
- Incorporate more macroeconomic variables.
- Compare Islamic and conventional banks.
- Use alternative econometric models for deeper insights.

Policymakers should focus on:

- Strengthening credit risk management frameworks.
- Enhancing regulatory supervision.

- Encouraging transparency and accountability.
- Supporting digital innovation while ensuring security.

Overall, the banking industry is not in the critical condition in terms of its solvency and liquidity, but it still must encounter the problems associated with the sustainability of profits and quality of assets. All these imbalances point to the necessity of enhanced risk management practices and more efficient operation strategies to maintain financial stability and consistency of performance in the long term.

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Appendices

Appendices A: Raw Data Sample

Sonali Bank	2015	-0.01	13.97	18.61	71.95	1029510	36.93	164.6
Sonali Bank	2016	0.14	11.23	26.04	65.57	1114949	36.31	179.31
Sonali Bank	2017	0.56	10.35	35.28	56.63	1256711	39.76	188
Sonali Bank	2018	0.17	10.1	26.26	48.97	1306842	42.43	196.4
Sonali Bank	2019	0.11	13.85	13.23	73.18	1328154	43.14	223.33
Sonali Bank	2020	0.16	13.91	14.83	62.33	1514758	46.52	308.2
Sonali Bank	2021	0.25	14.11	17.51	60.1	1691669	51.52	260.67
Sonali Bank	2022	0.21	10.05	14.83	62.59	1789772	59.59	240.59
Sonali Bank	2023	0.35	10.07	13.23	51.93	1981130	66.93	227.03
Sonali Bank	2024	0.4	12.69	16.7	58.9	1806457	70.83	229.37
Agrani Bank	2015	0.11	20.42	4.99	54.32	565350	55.64	199.18
Agrani Bank	2016	-1.12	19.36	4.74	71.21	623570	53.81	229.42
Agrani Bank	2017	1	18.6	3.13	56.4	673920	60.17	237.4
Agrani Bank	2018	0.13	19	3.32	59.9	789153	63.63	227.14
Agrani Bank	2019	0.13	14.08	5.08	64.86	853931	67.29	277.01
Agrani Bank	2020	-0.01	15.23	4.88	62.4	986343	66.5	195.3

Agrani Bank	2021	0.12	14.08	5.33	63.88	109829	66.8	180.1
Agrani Bank	2022	0.1	14.61	3.7	60.15	114342	70.3	165.2
Agrani Bank	2023	0.06	15.07	5.2	55.43	123096	76.5	152.4
Agrani Bank	2024	-0.73	17.81	4.7	56.29	123096	79.6	148.5
Janata Bank	2015	0.73	11.23	4.1	44.88	623570	96.59	156.8
Janata Bank	2016	0.35	13.56	6.4	52.33	673920	93.51	160.15
Janata Bank	2017	0.32	12.33	6.16	57.69	789153	98.46	170.9
Janata Bank	2018	0.03	10.09	5.37	80.69	697349	90.82	180.78
Janata Bank	2019	0.03	10.03	3.97	85.8	290181	89.8	210.78
Janata Bank	2020	0.01	13.59	6.09	67.89	324780	81.5	220.45
Janata Bank	2021	0.03	17.61	2.78	78.9	354689	89.54	230.8
Janata Bank	2022	0.08	18.25	3.1	90.65	382926	91.41	220.89
Janata Bank	2023	0.04	25.42	3.34	86.56	369404	88.47	210.78
Janata Bank	2024	0.05	30.2	5.78	84.68	396982	82.4	218.9

Appendices B: Full Stata Output

Stats	roa	car	npl	cir	bs	ldr	lcr
Mean	.1266667	15.03	9.622667	64.902	822851.2	68.55667	207.0127
Max	1	30.2	35.28	90.65	1981130	98.46	308.2
Min	-1.12	10.03	2.78	44.88	109829	36.31	148.5
N	30	30	30	30	30	30	30
Range	2.12	20.17	32.5	45.77	1871301	62.15	159.7
Kurtosis	7.183087	5.214592	4.581476	2.498211	2.255486	1.837882	3.08547
Skewness	-1.090818	1.419001	1.524921	.6333142	.5586425	-.123964	.5105071
p50	.115	14.025	5.35	62.365	685634.5	67.11	210.78

	wroa	wcar	wnpl	wcir	wbs	wldr	wlcr
wroa	1.0000						
wcar	-0.3361 0.0694	1.0000					
wnpl	0.2306 0.2202	-0.5081 0.0042	1.0000				
wcir	-0.3550 0.0542	0.3872 0.0345	-0.2839 0.1284	1.0000			
wbs	0.3561 0.0534	-0.4636 0.0099	0.7125 0.0000	-0.3160 0.0889	1.0000		
wldr	0.0102 0.9574	0.1760 0.3523	-0.7290 0.0000	0.2681 0.1520	-0.5469 0.0018	1.0000	
wlcr	0.0651 0.7324	0.1395 0.4621	0.0536 0.7786	0.2251 0.2318	0.4578 0.0110	-0.2395 0.2024	1.0000

Source	SS	df	MS	Number of obs	=	30
Model	.812694227	6	.135449038	F(6, 23)	=	1.63
Residual	1.90789244	23	.082951845	Prob > F	=	0.1833
				R-squared	=	0.2987
				Adj R-squared	=	0.1158
Total	2.72058667	29	.093813333	Root MSE	=	.28801

wroa	Coefficient	Std. err.	t	P> t	[95% conf. interval]	
wcar	-.0049863	.0170772	-0.29	0.773	-.0403132	.0303406
wnpl	.0129319	.0160041	0.81	0.427	-.0201752	.046039
wcir	-.0094379	.005868	-1.61	0.121	-.0215768	.0027011
wbs	9.78e-08	2.05e-07	0.48	0.638	-3.26e-07	5.22e-07
wldr	.0077479	.0047273	1.64	0.115	-.0020313	.0175271
wlcr	.0015062	.0023425	0.64	0.527	-.0033396	.0063519
_cons	-.2245442	.6780806	-0.33	0.744	-1.627261	1.178172

Variable	VIF	1/VIF
wnpl	4.99	0.200377
wbs	4.29	0.233143
wldr	2.84	0.351576
wlcr	2.40	0.416763
wcar	1.81	0.553881
wcir	1.58	0.632766
Mean VIF	2.98	

Breusch-Pagan/Cook-Weisberg test for heteroskedasticity
Assumption: Normal error terms
Variable: Fitted values of wroa

H0: Constant variance

chi2(1) = 1.85
Prob > chi2 = 0.1737

Coefficients: generalized least squares
Panels: homoskedastic
Correlation: no autocorrelation

Estimated covariances	=	1	Number of obs	=	30
Estimated autocorrelations	=	0	Number of groups	=	3
Estimated coefficients	=	7	Time periods	=	10
			Wald chi2(6)	=	12.78
Log likelihood	=	-1.240183	Prob > chi2	=	0.0467

wroa	Coefficient	Std. err.	z	P> z	[95% conf. interval]	
wcar	-.0049863	.0149527	-0.33	0.739	-.0342931	.0243205
wnpl	.0129319	.0140131	0.92	0.356	-.0145334	.0403971
wcir	-.0094379	.005138	-1.84	0.066	-.0195082	.0006324
wbs	9.78e-08	1.80e-07	0.54	0.586	-2.54e-07	4.50e-07
wldr	.0077479	.0041392	1.87	0.061	-.0003648	.0158606
wlcr	.0015062	.0020511	0.73	0.463	-.0025138	.0055262
_cons	-.2245442	.593724	-0.38	0.705	-1.388222	.9391335

	Coefficients		(b-B) Difference	sqrt(diag(V_b-V_B)) Std. err.
	(b)	(B)		
	f1	r1		
wcar	-.006713	-.0049863	-.0017268	.0016722
wmpl	-.0074458	.0129319	-.0203777	.0177285
weir	-.0163065	-.0094379	-.0068687	.0045858
wbs	1.05e-07	9.78e-08	7.45e-09	1.90e-07
wldr	-.0044153	.0077479	-.0121632	.0069935
wlcr	.0012541	.0015062	-.0002521	.0003612

b = Consistent under H0 and Ha; obtained from xtreg.
 B = Inconsistent under Ha, efficient under H0; obtained from xtreg.

Test of H0: Difference in coefficients not systematic

$\chi^2(2) = (b-B)'[(V_b-V_B)^{-1}](b-B)$
 = 3.11
 Prob > $\chi^2 = 0.2110$
 (V_b-V_B is not positive definite)